Digital Diets and the Impact of Screen Time on Language Development
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- - [Operator] And at this time, it is a pleasure to introduce Angie Neal this afternoon who is presenting on Digital Diets and the Impact of Screen Time on Language Development. Angie Neal is a speech language pathologist from Greenville, South Carolina. She has worked in outpatient and pediatrics, I'm sorry, outpatient pediatrics in school settings, but her passion is helping students succeed in an academic setting. Mrs. Neal frequently presents across the United States, and uses her animated presentation style to share practical strategies that can be quickly and easily implemented. So thank you so much for joining us Angie, it's always great to have you with us.

- [Angie] And thank you, so here we go. I'm gonna begin with a question, so here's my question: How many of you have noticed an increase in referrals and/or concerns in young children, your K-3, K-4, K-5 kiddos, but especially over the past five years? I have, and it has not been because there are more kids who are struggling to speak clearly, but due to students who struggle with academic readiness, primarily the ability to interact appropriately, follow teacher directives, and the ability to appropriately control emotions. Now I'll go ahead and tell you, I've done this workshop for school psychologists as well as nationwide conferences for pediatricians, for developmental pediatricians and other related fields, and guess what, they're saying the same thing. I've actually gotten a lot of head nodding throughout the workshop, and at the end of one of these conferences, I would say the biggest compliment that I think I've ever received, had a developmental pediatrician came up to me afterwards and say, "This really made me think." And that's what I hope to do today, just make you think about how exposure to excessive amounts of simulation through technology can have a negative impact on the development that's necessary for academic readiness. So as she mentioned, my name is Angie Neal, and I'm a school-based speech language pathologist. I may sound kind of familiar to you as I have done a few workshops for speechpathology.com and I have absolutely loved every moment of it. I am including my email on here in case you'd like to reach out with any additional questions, or if

you're interested in ever having me come speak to your association or your district in person. So here we go, let's start with a few disclosures. Okay, so financial, I'm an author on TeachersPayTeachers, who receives royalties, so I'll go ahead and tell you what I have included is a three-page handout that's really and truly just a parent-friendly version of everything we're talking about today, but it is also on TeachersPayTeachers if anyone who did not take this course is looking for something like that. I'm also presenting for speechpathology.com, and I'm receiving an honorarium. And non-financial, I'm a member of ASHA. Our learning outcomes for today are to describe the negative impact of excessive screen time on how we relate to the world socially, to review key data and emerging research on this topic, and to talk about strategies you can share with families.

Here we go. As I begin talking about the current research into the impact of technology on development, there's one thing I want you to keep in mind, and that is that human development is cumulative. Each step builds upon the next. When one step is delayed or disturbed, there's a snowball effect on the development of other skills so I'm gonna give you a few quick statistics especially as it relates to young children. And I'm gonna begin with in 2011, 38% of children age eight and under used tablets and smartphones. In 2013, it was 72%. Now today in 2019, do you think that number's higher or lower? Probably much higher. Now in 2018, one in four children under the age of six have smartphones, and so my question is what is a five year old doing with a smartphone? I think we all know. Also about a third of all screen time used by children is on a mobile device, meaning it's not set to within a fixed location, but likely used in many locations. Now this is more important than you might think when it comes to building oral language and how learning how to interact with the world around them, and the use of mobile devices in children has risen from five minutes a day in 2011 to 48 minutes a day in 2017. So again, 2019, you think that number's higher or lower? Now, where this gets really precarious is in children age two and under. Almost 40% of children under the age of two use mobile media as of 2017. And recent studies are

revealing that kids and babies under the age of two are spending more than double the time in front of screens than they did in the 1990s, but here's the kicker. It's not even until around the age of 18 months that a baby's brain has developed to the point to understand that the symbol they see on a screen represents a real world equivalent. Also between birth and age three, all learning takes place in a social context through relationships, and the younger kids are, the more true this is. And children under the age of two are wired to learn and remember things through experience, through imitation, but research is telling us that children who watch screens imitate 50% less actions than children who engaged in live, three-dimensional interactions, which means it's actually easier to learn from humans than from screens. Now, children 12 months and younger aren't even able to follow the changing scenes on a screen or a program's dialogue because they haven't even learned the words, concepts, context, and syntax yet, so what's keeping them engaged? Well, it's all the exciting colors, the quick scene changes, the music and sounds, the over-exaggerated characters.

So here's an example. Baby Einstein, A Day on the Farm, that is one of the videos they have, there are actually seven scene changes in one 20 second section, which means there's roughly one every three seconds. So what is actually keeping them engaged isn't what they're seeing, but the constant stimulation. Now, what happens when they go actually see a farm then? Guess what, it's boring, 'cause there's no sheep popping out of the corner, and the cow's face isn't super exaggerated for being at super close-up focus, and you actually have to walk from point A way over to point B to see the horse. So in other words, it's conditioning the mind to a reality that doesn't exist, and as a result, and this is a big one for us, for every 30 minutes of screen time, there's a 49% increased risk of expressive speech delay. This comes from a 2017 study out of Canada by Dr. Catherine Birkin, and this is the first study to report a link between handheld devices and expressive language delays, but there are now over 200 peer-reviewed studies that point to screen time correlating to things like increase ADHD, addiction to screens, increased aggression, depression, anxiety, and even

psychosis. And right now, the National Institute of Health is currently conducting a $300 million study using fMRIs to examine the changes in brain structure among children who use smartphones and other screen devices. Now, the first batch of results show this: Kids who spend more than two hours a day on screens score lower on language and thinking tests. The kids who spend more than seven hours per day on electronic devices are starting to show premature thinning of the cortex. So now let's think about what is the recommended amount of time today that kids should be spending on technology? Here we go, less than two hours a day for kids age five to 18, no more than one hour a day kids age two to five, and none for children younger than 18 months. Now keep this in mind, this is per day. Now think about this as it relates to technology use in school and how quickly this adds up. How many of you have circle time that you see being done on a Promethean board using videos? How many of these schools also have 30 minutes of iPad center time or Chromebook time?

Well, that right there is an hour. And if you have a child who is carpooling back and forth to school, let's say it's 20 to 30 minutes to and from school, that's 30 minutes right there if they're watching a screen on the back of the headrest. So now we're up to two hours, and here's what this looks like. So I want you to keep in mind how it's not just children watching screens, but also consider what happens when parents are distracted and on their phone. This picture is from a friend of mine, a really good friend of mine who's an amazing mom. Her son just started kindergarten this year, and what I want you to notice are the little red circles. When asked to draw a picture of his family, he drew a picture of a phone, meaning he sees that as part of their person. So this is becoming something we need to pay very close attention to. We've also started to see a recent increase in the incidence and prevalence of autism, classifications, and medical diagnoses. Now I'm not here to say that technology causes autism at all but rather I want to point out that a disproportionate exposure during critical periods can negatively impact development of areas that we're looking at when we're considering autism, such as social communication including social reciprocity, social emotional

skills including the development of theory of mind, and the behaviors that may be related to emotional regulation and self-regulation. Right now nationally, one in 59 children have a diagnosis of autism spectrum disorder, and in the year 2000, it was one in 150. In the 2000-2001 school year, the number of children age three to 21 receiving special education for autism classifications was 93,000. In 2015, it's 617,000. Now as it relates to screen time, I want you to consider as I go through the impact on development what happens when children are having less social interaction opportunities, and what happens when there are obstacles being put in the way of healthy brain development that's necessary for learning social communication, learning social emotional skills, and learning emotional and self-regulation skills.

So a child who struggles socially, they may look like they're a child on the autism spectrum, but consider this: Out of the three prongs necessary to find out if they have autism or not, they are without the atypical restricted repetitive patterns of interests and behavior including sensory sensitivities, and I say atypical because an eight year old boy who's really into Minecraft isn't necessarily atypical. An eight year old boy play who's really into manhole covers, now that would be more atypical. And while they may be really interested in their video games we still need to tease out whether or not this is an atypical interest versus possibly an addiction, which presents itself as decrease in interests in other activities, including activities shared with other people, irritability and frustration when they're asked to get off of technology, and a pre-occupation with technology, meaning they think about it or they're talking about it even when they're already engaged in it. Not that they can't talk about other things, but the reality of where they spend their time doesn't even afford them knowledge about other things that they may talk about what their peers, like football, movies, or even pretty girls as one of my students talked about in their group recently. And when it comes to developing the ability to engage in socially appropriate interaction, it's really kind of a chicken and the egg kind of a thing. When kids don't practice social interaction with peers, they aren't getting opportunities to exercise their emotional

regulation with peers who provide them with the feedback to know whether or not their behaviors are appropriate or not. And the less they regulate these emotions, because they lack the practice, the more they stand out to peers, and the more they stand out to peers, the less likely peers want to spend time with them, often because poor emotional regulation causes the child to appear unpredictable or even at times unsafe. Now, what's interesting to note is this, countries who have not experienced the digital revolution have not seen these increases in autism, meaning the exponential rise in autism affects children in all rich countries and only in rich countries, meaning countries that have access to five to 10 screens within one household, between the TVs, the smartphones, the laptops, the iPads, the video game systems, and even the screens within a car. And there's actually a term for this called virtual autism. In Romania and France, for example, they were seeing an increase in children with social, emotional and sensory concerns, and these were children in orphanages, so there was a lot of data logs that were kept which showed exactly how much time they were spending in front of screens. So they decided to remove or decrease the amount of screen time, and the concerns all or nearly completely remediated.

Now of course, this is a gross generalization and certainly wouldn't cure every child, especially those with factors related to or a predisposition to social-emotional language or sensory concerns, but there's enough truth in there to recognize and give pause to the negative impact of screen time on development. And again, it's not just the children looking at the screens but the impact of parents attending to screens instead of interacting with their child. And think about all of the missed opportunities for language as you're riding down the road, as you sit at the dinner table, as you walk through the grocery store, as you wait in the long lines at Disney watching the car go through even the drive-through car wash. I actually had a situation the other day, I took my puppy for puppy classes, there was two families that came too, but once the children got bored, they got on their phone, in a room full of puppies. Now these are some of the more common times that you see kids and parents maybe perhaps on their devices but

know this, when parents are distracted by their phones, it impacts joint attention with the child and emotional connectedness with the child. Now the statement we often hear made by parents though is, well, the only let their kids use phones to read books on the iPad, and there's something certainly to be said for that. However, children age three to five whose parents read to them or have children read to through electronic books, they're actually finding they have lower reading comprehension than compared to physical books because of all the bells and whistles that come along from electronic books that distract them from a focus on the actual story. So for example, if reading a Curious George book, you push Curious George, he climbs up and down the tree, or you push the Man with the Yellow Hat, and his hat comes on and off. And also know this, young children learn word meaning through social interaction with real objects, and sharing a book with a child is significantly different than having the child read to on an iPad because book sharing, and this is important, book sharing is the only setting when parents typically are able to talk about things outside of the everyday routine.

So for example, it's the chance to talk about space, Africa, castles, and so on because books are not constrained to the here and now. Subsequently, this contributes to the knowledge gap, and exposures to concepts outside of the everyday routines which then impacts vocabulary, which we'll talk a little bit more about in a bit. Now at a recent development pedes conference, I had several pediatricians tell me this as well, talking about parents and use of screens, and others were nodding in agreement. What they're seeing is that well baby appointments, when children are getting their shots, it's not at all uncommon that after the shot, instead of holding, calming, or soothing the child, the parent gives the child the phone instead. Now what I want you to appreciate about this is self-regulation and the ability to learn how to calm isn't learned through distraction, it's learned and modeled through interaction. So, parents will also state, "But hey, "they're playing educational games and apps, "so it should be okay, right?" Well, there's more than 700,000 educational apps, and 80% or more of them are targeted specifically towards young children, and many of them claim to help children

learn to read, but most of them don't. And they teach the child how to recognize letters or words on sight, but that doesn't mean they can actually blend sounds to form words. They may actually teach a child to count to 10, but that doesn't mean that they can show you a group of 10 blocks. In short, many apps really just glorified flash cards that don't add to the depth of knowledge necessary to build a strong foundation for learning, because when it comes to teaching children, nothing, and I mean nothing is more important, valuable, or effective than human interaction. Now, let's take a moment to think about who invented all of this tech. Many of those tech executives in Silicon Valley don't even allow their children near certain devices. There's a private school in the Bay Area, the Waldorf School, where 75% of the parents are tech execs, and it doesn't, that school doesn't allow any tech in the school at all, no iPads, no Promethean boards, no Chromebooks.

So Steve Jobs and Bill Gates are famous for saying they didn't let their own children use iPads. And nannies in Silicon Valley have to sign no technology agreements, that they won't even be on devices, or allow the children on devices while in their care. Now, let's think about the video game and app designers. Now they don't only hire video game designers, but they also hire neurobiologists and neuroscientists who hook up electrodes and other sensors when testing the program, and if it doesn't produce the blood pressure increase and skin response and other biological responses that they're looking for within a few minutes of playing, they go back and tweak it until it does. And using hyper stimulating digital content to engage students creates a vicious and addictive cycle, meaning the more the child is stimulated, the more the child needs to be stimulated in order to hold their attention. And is there any data to support that these educational apps actually produce better outcomes for students who use them? Good question, so now let's talk more specifically about the parts of the brain that negatively impact, are negatively impacted by excessive screen time during critical periods of development so that you can communicate this with parents. First, let's talk about dopamine. Dopamine plays a major role in reward motivated behavior, and it

serves to some extent as a survival function. Take for example eating. After some effort in delay, such as making the list to buy the food, shopping for the food, cooking the food, waiting for it to be put on the table if you're that lucky, which I'm not, eventually there's the reward of eating the food. So this serves, this reward serves as a survival function, it's a reward to incentivize essential biological functions such as eating, but technology, games and apps, they're providing a shortcut to this reward process, then it floods us with dopamine, and it serves no biological function whatsoever. Now consider how many dopamine hits kids are getting per game or per swipe. Now multiply that by the length of time they're on the device per day, and dopamine being what it is, it makes us crave more and more, not dissimilar to any other kind of addiction. And evolutionarily speaking, humans have not adapted to figure out what to do with all of this dopamine. Also, children get used to an immediate stimuli response and then they start to prefer that kind of interaction. It is an immediate gratification response over real world connections.

Again, as I do workshops all over the United States and hearing again and again from speech pathologists who are working with nonverbal or even limited verbal students, and the first thing they have to do before beginning to work on assistive or augmentative communication is they have to first have kids go through a four to six digital detox from technology so that that child can begin to interact with technology as a tool and not as a toy. We have whole generations of children being trained to have shorter attention spans than what books require because books take cognitive patience, learning to read takes perseverance. Apps don't, and when it gets hard, what do they do? They turn it off. And a 2013 study from the University of Oregon found that attention span persistence doesn't just impact reading and learning to read and reading development, but it also predicts their math and reading scores by the age of 21. Now let's talk about frontal lobe development. The frontal lobes are considered our emotional control center. I like to picture the Disney Pixar movie Inside Out when I picture the frontal lobe emotional control center. Anger, fear, disgust, joy and sadness,

and it's also home to our personality. Now, frontal lobe damage results in difficulties with many things, but just to hit a few of the highlights; One, memory. Memory for what has occurred in the past, including those teachable moments that remind us not to do the same thing over again that got us in trouble last time. It also impacts initiation, meaning slowing down enough to use filters, or how to approach others appropriately. Three, impulse control. We may want to blurt out everything and anything, but impulse control and restraint, that's what keeps that in check. And then finally, social behavior. Consider that in order to recognize a social cue and then respond to it appropriately, we need to attend to other people long enough to notice and process the signals that are being sent, and executive function is part of frontal lobe development as well. And how is executive function important to social skills and social communication? Let me ask you this, have you ever had to carry on a conversation with someone you don't like about a topic you don't care about, in order to do a task that you don't even want to do? I'm betting that many of you have.

Yes, and now the whole time somebody's talking to you about all these things, what are you doing? She's talking and you're planning what to say in order to get out of there as fast as possible, and you're also inhibiting your eye roll or that loud oh my gosh, I cannot believe this is happening again kind of a sigh. So that's what executive function does as it relates to communication. Now development in the frontal lobe take off between the ages of six to 12 months when babies becomes more mobile and verbal, but it matures in spurts with new functions added all along until the frontal lobe fully reaches maturity around the late 20s, but what happens when you give kids nearly unlimited access to devices and they haven't yet fully developed the frontal lobe? And again, this is where we really need to give the term addiction some consideration, so let's define what that term means. Addiction is something that you enjoy in the short-term that undermines your well-being in the long-term, but you still do in a compulsive way anyway. Now what is similar about an addiction to screens as an addiction to anything else is the parts of the brain that are involved. Dopamine,

adrenaline, and a few other things we're gonna talk about next those, things make us crave more but the difference between addiction in children versus adults is that children have not yet fully developed the frontal lobe which is the part of the brain we need for impulse control and decision-making. In other words, they haven't developed the part of the brain that tells us, "Whoa, I should put on the brakes up here. "I've been doing this for too long "or maybe I should do my homework first "and then maybe set a timer for how long "I'm gonna do this because this isn't good for me, "and this is keeping me from doing things "I should be doing." But there's a double whammy, this type of hyperstimulation stunts the growth of the frontal cortex. So continual hyperstimulation creates more of a dopamine response to crave it and less of the good decision-making abilities to step away from it.

Now, next, have you had any runners in your school before? All right, the HPA, or the hypothalamic pituitary adrenal axis, this is related to our fight or flight adrenal responses and the adrenaline rush we feel. Our blood pressure goes up, our pupils constrict, our palms get sweaty, and this fight or flight adrenaline rush is typical and necessary, but it's supposed to be short-term. It's the function of our bodies, okay? So a dog chases you, your heart races, your adrenaline surges, you calm down after threat goes away however when kids are engaged in similar adrenaline dopamine enhancing activities for hours, there's a consequence to that. The consequence is increased aggression, impulsivity, hyper-vigilance and hyperactivity. So this, what we see is when faced with tragedies such as not being first in line or having to use to blue game piece or not winning at Candyland, there's an immediate physical reaction; Pushing, jumping, screaming, crying, running, otherwise known as fight or flight. Now keep in mind this, again, learning to read requires patience, practice, perseverance to things that aren't full of bells and whistles, or multicolored stars that fall down on the page every time they get a word correct. Reading is actually an amazing collaboration between the visual, auditory, linguistic, and prefrontal cortex. Pretty much every lobe of the cerebrum is involved. And kids who are in a fight or flight mode who struggle with

self-regulation, who are in a state that craves hyperarousal, well, those characteristics are more than unhelpful when it comes to learning to read. And they're actually doing studies on this, studies of mice in Seattle Children's Hospital, it's kind of a what do mice look like on technology study. In 2012, there was a study that looked at the impact of overstimulation, similar to technology in the early developmental period, what they did is they took mice at 10 days of life, they gave them six hours to exposure of lights and sounds that would mimic what technology looked like for children, and they did this for 42 days, which is essentially the entire childhood of the mouse. When they tested them 10 days later, what they found was a significant increase in hyperactivity and risk-taking, and the control group mice without all the stimulation, they spent 75% more time on novel objects, which would be equivalent to what we consider as learning. And the mice on technology struggled to even distinguish that there was a new object out of a choice of two.

All right, next, we're gonna talk about myelin, okay? So let me preface this with saying a newborn's brain is 33 grams, and the first two years of life, it triples in size, and this is unparalleled growth to any point in time over the course of our lives. And by the age of three, the brain is nearly 85% complete. Now, we're born with a lifetime supply of brain cells that gain neurons, but that's not what grows. It's the connections or the synapses that account for this growth. And we start with 2,500 synapses at birth, and it increases to 15,000 synapses by the age of three. And over time, these become pruned, more refined, and they become faster and more efficient. And these synapses, here's a big one, these synapses form based on early experiences, meaningful experiences, not just repetitive experiences like we see on many apps. And research has shown us that it takes approximately 400 repetitions to create a new synapse in the brain unless it's done through play, in which case, it only take 10 to 20 repetitions. So myelin, myelin is what allows these synapses to become faster and more efficient. Myelin is a fatty coating that forms a sheathe around the synapse, kind of like the wire or the plastic coating around a power cord. That forms a protective coating around a myriad of wires

within that power cord. The myelin sheath performs in a similar way for synapses. However, the brain cells that produces cholesterol for myelination are very easily damaged by things like head trauma or stress, toxins, certain drugs, and the wrong kind and the wrong amount of stimulation. So when I explain this to parents, I use this example. Myelin is like a sled on a snowy hill. The first time we are exposed to something, it's kind of slow and effortful to sort of get down the hill through the snow, but with every try after that, we are now building those grooves in the snow which makes it easier and easier and faster and faster every time we go down that same groove with the sled. Now when infants are exposed to the complexities of language those neural pathways for language myelinate. These are the tracks being made in the snow. This makes language acquisition permanent and pretty much effortless, but without language stimulation during critical periods and critical years, they aren't making these snow tracks, and the window to do this closes or actually becomes much, much smaller.

So when we are providing too much stimulation, and the wrong kind of stimulation, the ability to grow the brain way in such a way that makes it easy and efficient to do things like learn new words, understand complex sentences, focus our attention on learning new things, or even engage with others in play, this overstimulation stops these synapses from growing and impacts the creation of that special covering that makes it easy use what they do know. All right, next, we're gonna talk about play skills. Play skills can seem like one of the last things we need to think about in terms of academic readiness until you have a child who can't play or isn't on the same level of play as their peers, because kids learn through play, they learn how to interact in groups, how to lead, how to share, how to solve problems, how to resolve conflicts. And Gayler and Evans in 2001 found that the level of involvement in pretend play by preschoolers with their parents was positively linked with their capacity for emotional regulation, which we're gonna talk more about in a moment because of the guidance and coaching that parents offer during play. But compared to virtual reality, play with another two year old

or four year old is kind of boring 'cause you have to share your stuff, you have to take turns with someone who also wants to be the fireman, and your friends don't want to do everything you want them to do the moment you want them to do it, so seriously, how can Candyland compete with that? And I'm seeing a great deal of children starting K-4 and K-5 without the ability to play, or even mastery of the most basic play skills from simple to complex, going from onlooker play to parallel play, associative play and cooperative play. Well, one little girl that I just started working with, she just moved to our school and she's in second grade, she's verbal, but I had to start with her, I had to start my therapy with her at the most basic level of play before I could even get her to engage, and all of the other things we needed in therapy. Now what's interesting about this is how much progress she made in school, how much progress she made all the way up until winter break and she slid backwards because as her parents would readily admit, they don't know what to do with her and so at home, she stays on her iPad.

Here's another example, I had another little friend that was new to me this year that I recently evaluated, he was a third grader, and he was the first to tell me that the whole thing he did all summer long, the only thing he did all summer long was play video games. And I pressed him about it, "Did you go to the playground, the beach?" Nope, he played video games all summer long. Now, when he came to my office and he started to engage in the toys, pirate ships, and if you know me, appreciate how much I love pirates, he said, "If I had these toys at home, "I wouldn't play my video games." So we started talking about alternatives such as playing Tic-Tac-Toe or Hangman or I-Spy. And here was he said, he said, "My parents don't have time to play with me." So again, we really need to talk with parents about how important play is for healthy brain development. All right, next, we're gonna talk about theory of mind, which is that understanding that people have different perspectives from our own, and development of theory of mind is negatively impacted when they don't have the opportunity to develop the skill through interacting with actual people, looking at their facial expressions, interpreting their body language, hearing people say what they're actually

thinking because you cannot develop theory of mind or the ability to think about what other people are thinking through the screen. So deficits of theory of mind results in difficulties such as understanding that different people have different expectations, understanding nonverbal language, being unaware that their behavior affects how other people think and feel, that inability to see their future self, and then how I act in this moment has an impact on things that may happen later, and the ability to develop empathy. Now, let me explain empathy a little bit. Empathy requires the ability to recognize emotions in others and then know how to respond. Empathy is what prevents us from hurting other people, therefore an absence of empathy makes hurting other people possible. And empathy is feeling with people, empathy drives connection when people, so a lack of empathy or connection with people impacts trust. Now listen to me on this, we often think of growing into adulthood is becoming independent and autonomous, but in fact, it's more related to becoming someone that others can depend on, such as trusting you to show up on time and do the job you're being paid to do in an efficient and effective manner.

Now the way to develop that, the way to develop trust is through spending small moments with other people, talking with them, sharing stories with them, demonstrating care for them. Now interestingly, I want to point out something that actually was a magical tool in the development of empathy, it was developed in the 1440s. It was the printing press. The printing press was when we started to be able to have mass production of books, and with the mass production of books, we were able to inhabit the minds of people that weren't like ourselves. While this may sound trite, it was actually a seismic innovation for people in the pre-industrial age who never saw, heard, or interacted with people outside of their own villages. Now, what's interesting to this is readers of fiction tend to have better abilities of empathy and theory of mind. This isn't what most of our buddies read, is it? And reading can be a simulation of various social experiences you might not otherwise be exposed to, and the same social cognitive processes employed in real world social comprehension are similarly

found in reading. So repeated simulation of that kind then can hone these social and empathetic processes, which in turn could be applied to other contexts outside of reading, but I daresay, empathy was not being demonstrated in September 2019 in New York where there was a 16 year old boy that was stabbed in front of 50 other teenagers who filmed him while he bled to death. Instead of helping him or comforting him, they were more concerned about being the one to post it on a screen. Now, theory of mind develops early in infants age three to 18 months, following the direction of the gaze, turning head, pointing or gesturing, attending the facial features and following the light of regard, this is based on interactions with people. Then you have pre-first order that develops around of three, first order around age of four to five, second order around the age of six to eight. So keep in mind what happens when we're putting obstacles in the way of that, and again, it's important to consider all of these things, including emotional and self-regulation. Now, emotional regulation is the ability to move appropriately across various emotional states. Self-regulation is what provides us with the capacity to do so. Emotional regulation supports positive interaction with peers, so again, to have friends, friends have to see you as stable, and when you are emotionally stable, friends want to spend time with you, which builds your social opportunities.

Now, I have a little buddy that I work with who was in a constant rollercoaster state of emotion. Once within a 10-minute span of time, 10 minutes, we saw compliance, flight, he ran out of the room, aggression, anger, really big anger, then regret, emotional lability, lots and lots of tears, and then happiness. Now think about that for a minute, how ready to learn follow directions, you read stories about Abraham Lincoln or do multiplication can you be if you're feeling aggressive, angry, tearful, happy all within almost the same moment? Probably not very ready at all. And our digital interactions are not teaching children to self-regulate, to calm, to persevere or pay attention to things that aren't full of bells and whistles because screen time is predictable and within their control at a time when children need to be learning how to deal with

situations that are out of control because I can promise you, once you start kindergarten, it's now gonna be Miss Patterson's kindergarten classroom, Miss Patterson's world, and she's the one in control. And by the age of two, most toddlers have learned some self-regulation or should have learned self-regulation skills such as being able to wait for a short period of time for something they want. Paying attention when someone is talking to them, persevering through things that are new and challenging, but that doesn't happen if you spent your entire childhood swiping right if things get too hard. Now, I shouldn't have to mention the negative impact of emotional regulation as it relates to sleep, and when kids stay up on their iPads for hours, but that happens. We once had a second grader who, short version of a long story who was having meltdowns by 9:30 in the morning, we backed it all up, He was having meltdowns 'cause he was having difficulty getting into school. He was having difficulty getting into school 'cause they couldn't get him out of the car. Why couldn't they get him out of the car? 'Cause he has difficulty getting up in the morning.

Why was he having difficulty getting up in the morning? He was going to be with his iPad and staying up until 2:00 a.m. I daresay all of us struggle with that when we're up 'til 2:00 a.m. All right, so now let's talk about speech and language. The Hart and Risley study was the one led that to the description of the 30 Million Word Gap for children of low socioeconomic status, but now we're seeing similar results not due to socioeconomic status, but coming from what I consider low language environments. Now, know this, conversations between children and parents are the most influential contributors to vocabulary before school entry, and this has profound implications long-term because the amount of talk that kids hear through the age of three predicts their language skills and school test scores at the age of nine and 10. And children don't learn words by having each one explicitly taught, they learn words indirectly through daily conversation, being read to or reading on their own, which becomes a really big deal in upper elementary ages. So there's a negative impact when these activities don't take place at critical stages of development, and we know what the

impact of vocabulary is on academic learning, not to mention the development of pre-reading skills like phonological awareness. Remember, we're born to learn from interacting with people. It's that beautiful dance of facial expression, tone of voice, body language, and lots and lots of words. So the impact of being part of a language-rich environment or not has been well-documented. When kids haven't engaged in conversation as often, the result is they don't alert to when they don't hear words that aren't familiar to them, they aren't listening as carefully when they're read to, and later on, they don't become good readers on their own, they also struggle with complex grammar and sentence structure like we read in books. So it's important to consider exposure to interactions with actual humans during any of your assessments. In a workshop I've done before on speechpathology.com, I noted a few of my favorite questions to ask when teasing apart autism from other disabilities such as ADHD or emotional disabilities, one of my favorite questions to ask is what opportunities has the child had to be exposed to or learn social rules and expectations?

Because some children struggle with social interactions due to environment, or the level of expectation, or the opportunity or exposure to social interactions as we're talking about today. Now this may or may not necessarily be indicative of a language impairment, and we really have to give careful consideration to the amount of time on a questionnaire of how much time a child is spending engaged in digital interactions now and how much time they spent before they started school. Now we spoke earlier about the impact of reading comprehension when children are being read to digitally, now I want to speak to more of our upper elementary-age children who are using digital tools for reading, such as Chromebooks, and the impact that can have on literacy. Now, let's believe that tech is awesome and wonderful and it's necessary for learning, how did we ever learn without it? Yet humanity has survived a millennia without it. We've built the Pyramids of Giza, we have maps of the galaxy, we discovered new planets, we have modern day airplanes, we put a man on the moon, all without the help smart gadgets in the classroom. And yes, these things makes life easier and faster, but we must first,

first, we must teach students the underlying principles. Now am I saying Chromebooks are bad? No, what I am saying is we must teach the basic skills to mastery first. Typing, keywords, how to study, how to annotate. And I'll say this, the students that I see on Chromebooks, okay, the students I see on Chromebooks, what do I see? I don't see them reading to learn from a Chromebook, I see them playing games on their Chromebook. Now, how does this relate to Kindle? Okay, there's a lot of us that read a lot, and a lot of us read digitally on a Kindle. Now remember, keep in mind if you're doing that, you're reading as a mature, efficient reader, not a novice reader. Also, mature readers have already developed deep comprehension strategies, and we can alert when we realize, "Oh wait, I just skimmed that, "and there was something important there, "I need to go back." Novice readers have not developed these skills. And consider that the purpose of reading in school is not to read for pleasure. We're not browsing social studies books, we're gaining knowledge from the textbook, and so we're flagging them, highlighting, making notes, dog-earing them, bringing attention to certain key facts.

So what we're seeing is for children third grade and up, the research is showing a negative impact for digital reading for learning. Difficulty with sequencing details, difficulty taking time to understand the plot, and even difficulty making inferences. Now, let's talk about red flags and when there's a reason to be concerned, so here's a few of them, here's some red flags. When kids are not able to balance screen time with time spent in actual human interactions, when they demonstrate extreme irritability or aggression when they have to turn the screens off or they have to be removed, when kids view the world from the lens of a specific game, app, video, or they rush through tasks in order to return to that world, also of course sleep as we talked about, when they struggle to have the same amount of attention, problem-solving and stamina for activities that are not technology-related, when they show symptoms of impaired social interaction with peers, and they have difficulty controlling their emotions or they need technology to calm down or they consistently request technology over other free time

and play activities. And when these concerns occur, there's a need to reset a hyperaroused nervous system, and to accomplish this, the brain often needs four to six weeks of time spent without any screens. Now, when I talk with parents about language, I tell them that with the exception of books which are free from the library, they have everything they need within them to raise a happy, healthy child. Reading to your child, getting outside, and playing costs nothing, they are technology-free, fun and easy, and that is what a digital diet is. It is meant to imply that we put, what we put in our brain contributes to healthy brain development, and what it needs to develop appropriate skills. And make no mistake, most of what is on screens is nothing but mental junk food. So pose this question to parents, you wouldn't feed your child Cheetos, Oreos, and Cheez Whiz a few hours each day, no, so don't feed their brain mental junk food either because there is a negative impact on their otherwise healthy development.

So also with parents, we need to establish a why, and I think we've established the why it's important to go on a digital diet pretty extensively. Now, I also remind parents too as I said earlier that technology is a tool, not a toy, and screams are not free babysitting, it's not free at all. The payment is just waiting around the corner. We will have to pay in the impact on our children's brain development, social development, and academic readiness, but we also need to be clear on what is the expectation, and the expectation is the American Academy of Pediatric Guidelines, and we need to talk about creating tech-free times and locations. My favorite ones being in the car, at the dinner table, before bed because those are really those sacred times where it's really typical to engage in conversation. I also recommend that parents use apps that monitor and restrict the amount of time technology is used, apps like Forest or Moment or Freedom, and I'm sure there's a thousand other ones other than those. I also recommend change the phone setting or the iPad setting to grayscale, so you're not getting to over-stimulating colors that pop up. I also talk about replacement activities, also known as the things we did before we had technology. Now this is actually the

third page of your handout, and it includes games and activities kids can do independently, those they can do while waiting, and those that are really good for encouraging social interaction, so you don't have to reinvent the wheel, you've got a list there. Also, read books aloud, there's a tremendous benefit to reading books aloud with children. Have a game night, practice how to win, how to lose, how to take turns. Go on play dates, work on compromising, complimenting, basic social manners like please, thank you, and excuse me. Also train and practice delayed gratification, because to be able to delay gratification means to be able to function under stress, and our children are becoming gradually less equipped to deal with even minor stresses, which eventually becomes huge obstacles to overcome in their life. The ability to delay gratification is one of the key factors for future success and the inability to delay gratification is often seen in classrooms, malls, restaurants, and Toy Story not Toy Story, but toy stores the moment a child hears no because parents have taught their child's brain to get what it wants right away. We also need to teach kids to be comfortable. Teach them to do monotonous, mundane chores like fold the laundry, clean their room, hang their clothes and set the table, unpack groceries, empty the dishwasher, put toys in the toy box, make their bed, and so on. You also need to get them engaged in activities outside the home.

Golf is a personal favorite, not because I play it or I'm good at it, but because I love that golf deals a lot with the rules and how to be considerate of other players. And then another recommendation I like to make is talk more. My favorite recommendation is put a sticky note on the car dash, and on that sticky note, write these words: I remember, because this is where I want them to remind themselves to tell stories about when they were little, because stories are how we connect and make connections with other people. I actually consider myself to be very lucky, I was born into a house where we told lots and lots of stories, we'd sit at the dinner table for hours every time we get together, and actually, every year on my birthday, my dad still calls me to tell me the story of the day that I was born, which actually is kind of funny 'cause

they got lost on the way to the hospital, and I was born in less than 10 minutes after they got there. So finally, here are some references if you want to learn more, and I must close by saying thank you, thank you for your care and concern for children. Now, I'll take a few questions, but before I do, I'll leave you with this challenge. To share this information with parents, grandparents, pediatricians and schools because technology has become like Pandora's Box. Only now that it's been opened are we starting to realize the need for caution, especially as it relates to young developing brains. All right, so I'm going to start with some questions now. Here we go, this may be a silly question, but would you consider watching educational programs to be encompassed in the definition of screen time? Sometimes when I make dinner, I put my toddler in front of the thing on TV so that I can get finished. And I get it, I totally get it. The big thing is, it's all about balance. And the red flag needs to be is it's when you go to take that away, there's fussing and carrying on. Now because there are great things, Sesame Street has an amazing video, series of amazing videos on social emotional development. If you haven't seen 'em, look 'em up, they all star Cookie Monster, which is a great one.

So but again, it's all about balance, and keeping in mind still what is the recommended amount of time? All right, here's the next thing. I'm hoping you'll say screen time in teletherapy is part of a good digital diet. Yes, absolutely, and that also relates to if someone, or young children are doing FaceTime with a parent or grandparent. When you're engaged with actual people digitally, that's a simulated interaction there as well. So no, you're absolutely right, teletherapy and FaceTime with actual people is not considered part of this, it's a good thing. All right, does this relate to passive, non-interactive screen time? Yes, non-interactive screen time such as playing Candy Crush or Minecraft, even violent video games, those kind of things, so it's passive, they're not really getting any benefit from it, not really interacting with actual people. That's the crux of it, when you're not interacting with actual people. All right, what effects on frontal lobe development equates to the same effects as frontal lobe

damage, like from an acquired deficit? They're not saying that it's the exact same, and the reason I think there's caution for that is because you have to look at what the frontal lobe looks like over the period of time where it's developing. So no, it would not necessarily look the exact same as an acquired deficit, that's a great question. All right, how do you combat the argument of technology isn't going anywhere? There's no way to truly limit a child's exposure. You are absolutely right. It's like you're being a kid in a candy shop 24/7, but again, we have to really bring back to what is the impact, how are we changing their brain, how are we setting them up for success later, and how do we want them to teach, how do we want to teach them to use technology in a healthy way? All right, and a great resource for parents is PLAtime Box, which it looks like it's spelled P-L-A-T-I-M-E, also PLAtime on Facebook and Instagram if parents prefer that, that tells parents actual steps to play and connect with kids, you can use things on blog to help parents get on the same page as an SLP.

Thank you so much for sharing another resource, this is one of my favorite reasons to talk with other SLPs. I learn things from people every time I do a workshop, so this is great, I appreciate you sharing that resource. I'll read it again, 'cause I don't know if it'll, if it will show up in post, but it's called PLAtime, P-L-A-T-I-M-E, no Y, and it's on Facebook and Instagram. Thank you for that tip. All right, if using digital books, such as Epic and speech therapy sessions, is human interaction enough to overcome? Yes, because again what you're doing is you're not leaving them to their own devices. When you have that human interaction, you're pointing out specific things, you're pointing out specific vocabulary, you're making those text-to-self comparisons, and again, you're using it with them and you're engaging with them as part of an interactive tool. All right, four to six weeks without screen time to remedy when those red flags you mentioned in order to reset. Does this mean no screens at all in order to reintroduce it? No screens at all. And I know that's a hard one to swallow, but you are welcome to say, "Okay, well TV may be fine", but absolutely positively no phone, no smartphone, no iPads, but I'll leave that up to you if you want to see how they do if you just have TV. All

right, is it possible that completely leaving out digital screen time may be detrimental to kids' development today, school-age? Again, I go back to the question of we have to make sure they have mastery of certain skills first. So for example, how many of our kids that we've given, third graders that we've given Chromebooks to are reading on a kindergarten level? So we have to really take into consideration a lot of things. So am I saying not to give kids Chromebooks? Absolutely not, my high schooler needs it and uses it and types on it and looks things up for research, so we do need to be teaching them skills, but I think we have to respect that along the developmental continuum. All right, how do we convince the adults to put down the devices they use? I go back to that emotional connection, and how important that emotional connection is. And yes, I know it's hard, but that is where you can also talk about if they might have an addiction where they're putting that technology over their child, over the importance of spending that time with their child. And what's interesting, there's a few videos you can look up, they have done videos where they've purposely given parents, put them in a room with their child, and they have child put the parent on the phone, and it's the saddest thing in the world to look at the faces of the children, because they know, they know that the phone is more important than they are.

All right, here we go, replace smartphones with flip phones, no internet. Funny story, I actually did that for my child who is now in college. He was getting in trouble for being on a smartphone in class so guess what? He got a flip hone. All right, how do we start conversations about use of technology and education in schools where we work or where our children attend? I think the way to start that is go back to the American Academy of Pediatrics. I will tell you this, I started it with our preschool special education programs, because we were having preschool special education circle time being led by some things called a story bot, so they weren't getting that direct face-to-face interaction and while yes, somebody was still leading it, there's something that's missing there. Can we use it to supplement? Absolutely, but again, we need to keep in mind a balance. We also need to keep in mind what this looks like long-term,

we also need to keep in mind that whatever they're watching on the Promethean board is generalizing, because if it's not generalizing carrying over, what's the point? All right, do you have any recommendations for middle school students related to both replacement activities and use of technology in the classroom setting? That handout has some good things for students. I'll give you an example of the third grader that I was telling you about, I'm not above a good bribe, and this child loved some flavor-blasted Goldfish, so that's why I on that page three of the handout, it says how many activities can you check off? So I would have him bring that paper back and forth every week to show me how many those activities he was able to do, but with the understanding that the purpose of doing this is to get him to be off of his video games more. All right, does the body stay in fight or flight when texting or on WhatsApp, or are these interactions with people so different? I think what we're really talking about with the body being in fight or flight is when kids are in adrenaline-producing states from video games, so keep in mind some of those, I can't think of it, not Minecraft, Fortnite, Fortnite and other military-style video games, they're in an adrenaline-producing state for an excessive period of time.

That's more of what we're talking about, I don't think we're talking at all about texting and WhatsApp. All right, a comment. Singing songs together is great too instead of screen time. Yes, ma'am. I'll give you another tip that I gave a parent, 'cause she, I had suggested singing because I love to sing, but she said she's not a good singer, so actually, I recommended that they download, this is great for little people, download sound effects, and you can find those on Spotify or Apple iTunes, but download sound effects. And so play those in the car and have them think about and identify what sound they heard and even pause it, then talk about those. "Hey, that sounds like a hammer. "Hey, dad has a hammer. "I was helping him do whatever with it." So those are some good, that's a great suggestion, I appreciate you saying the theme song one as well. All right, we are right at five minutes over, so I think we are going to close it down, but again, thank you so much for your care and concern for children and for

what you do every single day. And just email me if you have any questions. I'm looking for my email now and I don't see it, but it is wordnerdspeech@gmail.com, and of course, you can reach out to speechpathology.com and they can get in touch with me as well. Hey wait, there it is, thank you. So thank you so much for attending, and again, I hope you will share this information with pediatricians, schools, parent, grandparents, so on and so forth. And have a lovely day.

- [Operator] All right, thank you so much Angie, it's always a pleasure to have you with us, and such an important topic. I know we could probably have a lot more conversation about it, but we do thank you for sharing your knowledge, and so much great information with us today and some really good ideas for us to try to have those conversations with our parents and families and students. And thank you to all of our participants for joining us today, we certainly do appreciate your time and all the wonderful follow-up comments and questions, and I hope you have a great rest of the day. Take care, everyone.

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