

Screen Sense: Setting the Record Straight

Research-Based Guidelines for Screen Use for Children Under 3 Years Old

Claire Lerner, LCSW, ZERO TO THREE and Rachel Barr, PhD, Department of Psychology and Director of Georgetown Early Learning Project at Georgetown University

A robust body of research shows that the most important factor in a child’s healthy development is a positive parent–child relationship, characterized by warm, loving interactions in which parents and other caregivers sensitively respond to their child’s cues and provide age-appropriate activities that nurture curiosity, exploration, and learning.^{1,2,3,4,5}

The research is also clear about what constitutes quality early learning experiences: ones that build skills, character, and the ability to be successful in school, relationships, and life. These experiences engage children’s minds and bodies; encourage exploration, experimentation, problem solving, and creative thinking; and build “academic” skills such as cognitive, language, executive functioning, and social–emotional skills.⁶ Language-promoting experiences including storytelling, reading, and pretend play are three such activities that take place with parents, other caregivers, and peers that have been extensively studied and have demonstrated these positive impacts.

These rich, multidimensional experiences typically take place in the real, three-dimensional (3-D) world through hands-on exploration and interactions with peers and adults. Picture a 5-month-old learning about the back-and-forth of communication and the joy of interaction as his mom shakes a rattle and then hands it to him when he reaches his hands out to show that he wants to take a turn. Or the 20-month-old who is learning about problem solving and persistence as her dad guides her to test where the pieces fit into the shape sorter. Or, imagine two 3-year-olds building a home out of blocks for their stuffed animals, using their language, imagination, and growing social skills to develop a story together.

Two-dimensional (2-D) screen experiences—whether via TV, tablets, smartphones, or computers—do not inherently provide these rich opportunities for whole mind–body learning or the type of social interaction and shared exploration that real-world experiences offer so seamlessly. The reality is that young children now grow up in a world of technology. Not only are screens enticing, but children see their parents, caregivers, and teachers using them, so naturally they are drawn to them. Parents should be provided with the guidance and tools they need to

become “media literate” so that if they choose to make screen media a part of their children’s lives, they can do so in a way that enhances learning and development as much as possible.

Use of Screens by Infants and Toddlers

Screen-based 2-D media are everywhere and are used extensively by families with children as young as 6 months old. Recent research shows:

- On average, children from birth to 23 months old are watching 55 minutes of TV a day, and 2- to 4-year-olds are watching 90 minutes a day.
- Use of mobile media starts young: More than a third (38%) of all children less than 2 years old have now used a mobile device for any media activity compared to 10% 2 years ago. Among 2- to 4-year-olds, the rate has grown from 39% to 80%; and among 5- to 8-year-olds, mobile media usage has risen from 52% to 83%.
- Smartphones are the most frequently used device among children 8 years old and younger; 51% have used smartphones for a media activity, although tablets are close behind at 44%.⁷

Despite the fact that the majority of young children are using screen media, parents are confused about how to assess content: what is and isn’t educational, how much time they should allow their child to spend using screens, and what role screens play in their child’s overall development. Research findings on screen media are rarely translated in a way that parents can use to make good decisions. Furthermore, the majority of research is about TV, and is correlational, and therefore cannot by itself prove causality. In addition, research on mobile devices is still in its infancy; much work still needs to be done in order to truly understand the developmental impact of these ubiquitous devices.

When it comes to screen media, **there is no research showing that when children younger than 2 years old use these**

devices independently it enhances their development. And the large number of studies on the impact of TV viewing suggests potential for harmful effects on children’s attention, learning, sleep, and even obesity. That being said, research also suggests that screen media can become tools for learning if two critical factors are taken into consideration: **content and context**. When children are exposed to content that is specifically designed for their age-group, and, even better, content that is interactive—providing contingent responses to a child’s actions—learning can take place. It is not surprising that when parents make screen use a shared experience—talking with children about what they are viewing and extending the learning from the screen to the child’s real world—the potential negative effects of screen use are mitigated and the benefits enhanced. This finding is critical because, for many families, screen media may serve as a low-cost tool for play and learning when used in a mindful way and not relied on as an electronic babysitter.

This resource—developed in partnership with leading researchers in the field of media and young children—describes what is known at this time about the effect of screen media on young children’s learning and development. We hope it will serve as a useful tool in guiding parents and professionals in making informed decisions about screen media use with young children.

Factors That Affect Learning From Screen Media

Every day, young children are learning about their world from a variety of sources. They then apply this knowledge to their day-to-day experiences. Consider a 2-year-old who sees a giraffe on a TV show. A few days later, while visiting the zoo, she points to the tall, spotted animal with the long neck and says, “Giraffe!” This is called *transfer of learning*, or the application of information from a 2-D object (in this case, the TV) to a 3-D object (the actual animal). Transfer of learning is critical because it means that the child is able to apply knowledge to her real-world experiences. Another example might be a child learning numbers and then using them to count the blocks in his tower. This is quite different from rote memorization, in which a child may memorize the name for an object or a sequence of numbers but is not able to apply that knowledge in a new situation.⁸

THE TRANSFER DEFICIT

Children do learn from TV and touchscreens, starting very early. Research shows that babies as young as 6 months old can imitate simple actions they see on TV. By 14 months old, they can imitate specific actions with toys that they see performed by adults on video, immediately afterward and even up to 24 hours later^{9,10}; and by 18 months, toddlers can remember brief sequences that they saw on TV or in a book for 2 weeks. By 2 years old, they can remember these sequences for 1 month.¹¹

Researchers who study how children learn have concluded, however, that it is easier for young children to comprehend information from real-life experiences with people and objects compared with information delivered via a screen. For example, studies show that, for children 12, 15, and 18 months old, the ability to imitate a multistep sequence from televised images lags behind their ability to learn from a live demonstration of the same action. This is known as the *transfer deficit*; in other words, for very young children, learning through a real-life interaction is a more effective and efficient means of gaining new information.¹²

One relevant series of studies also looked at this phenomenon. They had one group of 2- to 2½-year-old children watch on a live video monitor as a person in the next room hid a stuffed dog. Another group watched the exact same scene unfold directly, through a window between the rooms. Both groups of children then entered the room to find the hidden toy. Almost all the children who viewed the hiding of the dog through the window found the toy, but only half of the 2-year-olds who watched on the monitor successfully located it.¹³ These scientists believed that the root of this transfer deficit is that children less than 2 years old do not have the symbolic thinking skills necessary to understand that what they see on the screen is a stand-in, or symbol, for the real thing.

THE ROLE OF REPETITION

Repetition of 2-D experiences reduces the transfer deficit. Research shows that repeated exposure to specific actions in videos and books leads to greater imitation and, thus, learning in children 1 to 5 years old.

When young children first view a page of a book or an image on screen, they focus on one aspect of it; but when the book or program is repeated, they focus on different features of what they are viewing. Over time, toddlers start to build a more complete memory by piecing together information from the multiple repetitions. When a more complete memory has formed, young children are better able to use information they take in from the 2-D world and transfer it to 3-D, real-world situations. For example, when toddlers repeatedly view a TV demonstration of how to make a rattle, they are able to make the rattle as well as if they had learned to do so through a face-to-face interaction. However, learning from face-to-face interactions requires fewer repetitions because it is easier for toddlers to observe and process more complete information in real life.¹⁴

IMPLICATIONS

- **Limit viewing time to ensure lots of time for interactive play in the real, 3-D world** because young children learn more quickly through interactions that take place during exploration of their actual, physical world. This limit is especially important because babies and toddlers are awake only so many hours a day, and most should be spent exploring their real world with parents, caregivers, and peers.

❑ **Help children make the connection between what they see on a screen and the real world.**

Play games with them afterward using objects similar to what they have seen on the device, such as blocks or a ball. Point out and label objects in real life that they have seen on TV or on touchscreens, such as animals and flowers.

❑ **Create ways to extend children’s learning from media;** for example, acting out a story based on the content of the show they recently watched on TV, or applying the colors they have learned from an app by labeling the colors of the family’s clothes as you sort laundry together.

❑ **Keep in mind that repetition can support learning.** Point out different aspects of the touchscreen activity or TV show when interacting with it on multiple occasions. For example, if the show is about counting fruits, focus on naming and describing the fruits during one viewing and on counting the next time you watch.

Parent Involvement

A growing body of research shows that learning from TV and touchscreens can be enhanced when parents participate with their children to create a social, interactive experience. This interaction is especially important in light of one recent survey which found that parents watch with their children about half the time the child is watching and use other media (mobile devices, video games, and computers) with their child about a quarter of the time the child is using these technologies.¹⁵ Another survey found that parents talk and interact with their children during less than half of the child-directed programs their children view, missing the opportunity to expand their children’s learning.¹⁶

Research also shows that children 6 to 18 months old are more responsive and engaged with the media they are using, rather than just passively watching, when parents provide descriptive language that matches the televised content.^{17, 18}

Research with 15-month-olds shows that when parents actively engage their children while using a touchscreen—talking about what they are seeing and doing—the toddlers are 22 times more likely to transfer learning from the device to a real object, as compared with children whose parents who do not provide an interactive learning experience.¹⁹

When parents engage their babies in verbal interaction while watching age-appropriate, educational programming together, there is a positive effect on children’s language development. One study of immigrant low-income mothers and their infants showed that this kind of language-rich interaction around media use can mitigate or reduce the negative impact media has been shown to have on language development.²⁰

However, one study showed that parent interaction during the viewing of commercially produced DVDs for infants and toddlers did not enhance language development. The researchers studied this by looking at how many new words 12- to 18-month-olds learned from viewing these DVDs several times a week for 4 weeks. They identified 25 common words used in the video as the basis for their “test.”

There were four conditions:

- In the first condition, the children did not view the DVD at all. Their parents were given the list of 25 words from the DVD and were instructed to use them in their everyday interactions with their child.
- In the second condition, parents were instructed to watch the DVD with their child in whatever way they would typically do so.
- In the third condition, children watched the DVD without parent participation.
- The fourth condition served as the control and involved no intervention. It provided a baseline of normal vocabulary growth for children this age used to measure against the performance in the three intervention groups.

The children who learned the most words were in the first group, which involved specific parent–child interaction without any DVD viewing. The children who watched the DVD with parent interaction did not do any better than the children who watched the DVD without parental interaction or the children in the control group. In fact, the researchers discovered that parents who reported liking the DVD overestimated how many words their child had actually learned.²¹

IMPLICATIONS

❑ **When children are watching TV, co-view and make it a language-rich, socially interactive experience.** Ask questions. Label and provide descriptions of what they are seeing. Talk about the storyline. Having support to interpret the content enriches children’s experiences and expands their learning.

❑ **Help children make the connection between what they see on a screen and the real world.**

If an app involves counting, incorporate counting into your everyday routines, such as counting napkins together as your child helps set the table or counting the steps it takes to get to the car. Or, act out a story about the bear family they watched on TV.

❑ **Create ways to extend your child’s learning from media.** If a program focuses on animals—such as an armadillo—when it’s over, make up a pretend story about armadillos that you can act out together.

- **Take an interactive approach with all 2-D objects—TV and touchscreens.** Although there is not a reliable body of research yet on the use of touchscreens, the early findings suggest that there are positive effects when parents actively participate and make screen use an interactive experience.

The Effect of Background TV

A significant body of research shows that background TV interferes with both learning and parent–child interaction. Background TV is defined as not being child-directed and mostly incomprehensible to young children.²² Background television includes adult-directed programming which is not designed for young children and includes news, sports, comedy, and drama shows. It may disrupt cognitive processing indirectly because it distracts young children from focusing on exploration and play.²³

These findings are very important in light of the fact that a recent survey of U.S. families showed that, on average, young children less than 3 years old are being exposed to 5½ hours of background TV per day, which represents approximately 40% of a child’s waking life.¹⁵ Another study reported that children less than 2 years old are more likely to watch inappropriate background media (programs that have adult-directed content or that had not been turned on for them to watch) than children 2 years old and older.²⁴

BACKGROUND TV INTERFERES IN CHILDREN’S PLAY AND LEARNING

According to several studies tracking children over time, exposure to background TV is associated with a negative effect on children’s language development, cognitive development, and executive functioning skills.²⁵ Executive functioning refers to a set of mental processes that helps people apply past experience to present action, including the ability to plan, organize, strategize, and pay attention to and remember details.²⁶

Researchers believe that, when exposed to background TV, children’s minds are busy trying to figure out what is going on; but because the scenes and characters are appearing fast, are set in unfamiliar contexts, and contain complex language that children can’t fully understand, this experience taxes their thinking skills. If this exposure is happening an average of 5½ hours per day every day, cognitive functioning may be continuously challenged and result in negative effects.

Related studies show that children’s play-based exploration is negatively affected in the presence of background TV. Children spend significantly less time exploring a toy when the TV is on than when it is off, even if the child is not looking directly at the TV. The sudden noises, loud voices, and flashes of light from the TV distract from their play.²⁷

BACKGROUND TV IS ASSOCIATED WITH POORER PARENT–CHILD INTERACTION

When the TV is on, both the quantity and quality (as measured by how actively parents and children play together) of parent–child interaction decreases.²⁸ This effect is particularly important, considering the significant body of research showing how critical healthy parent–child interaction is for optimum overall child development. As described previously, studies show that when parents interact with their children during educational, child-directed programs and talk with their children about what they are watching, the negative effects of media on toddlers’ language development can be reduced.

IMPLICATIONS

- **Limit having the TV on in the background** when children are playing.
- **Turn the TV off when no one is watching.**
- **Reserve time to watch adult-directed TV when children are not present.**

Amount and Quality of TV Exposure

AMOUNT OF TV EXPOSURE AND THE EFFECT ON LANGUAGE AND COGNITION

Research has demonstrated an association between higher levels of TV exposure and poorer cognitive and language development. However, it is important to note that many of these studies did not evaluate content (i.e., whether it was developmentally appropriate and educational) or the context in which children viewed programs—such as whether a parent was co-viewing or not. These factors are important, as it is well established that both content and context can make a significant difference in the quality of the viewing experience and can mitigate some of the potential negative effects of screen use.

One study that was based on a nationally representative sample found that more TV exposure before children reach 3 years old was associated with poorer memory and reading scores when they were 6 to 7 years old.²⁹ The researchers postulated:

It might be that children younger than 3 years who spend more time watching television spend less time in other activities, such as imaginative free play, interactions with adults, and so forth, that would be beneficial to their cognitive development. Or, it may be that the content of the television they watch is deleterious to their cognitive development. Finally, it may be that the medium itself is deleterious, whether because of aspects of the production (e.g., the pacing and rapid scene changes) or the simple fact of looking in a single direction at a single stimulus for a long time. (p. 623²⁹)

Another study of 6-month-olds from low-income families found that duration of daily TV exposure predicted lower scores on tests of cognition and on expressive and receptive language

development at 14 months.³⁰ Researchers hypothesized that the reason for this negative effect may be due to TV viewing time replacing parent–child interaction that includes back-and-forth conversations and playing and reading together.

However, research with children living in middle-class homes showed that the amount of TV viewing between birth and 2 years old was not associated with scores on tests of language ability at 3 years old.³¹ In other words, TV viewing was not related to language development in this study. This finding points to the fact that the way TV is used, and the effect of TV viewing on children, may vary based on a family’s demographics.³²

AMOUNT OF TV VIEWING AND THE EFFECT ON CHILDREN’S CAPACITY TO PAY ATTENTION

The findings on the association between TV exposure and attentional problems are mixed. One study of 1- and 3-year-olds found that children who were exposed to TV more than 5 hours a day had an increased chance of their parents reporting a greater incidence of attention problems at 7 years old than children who were exposed to TV for less than 5 hours per day.³³ However, researchers who conducted a reanalysis of the same data reported that negative effects on attention were only associated with very high media usage—more than 7 hours per day.³⁴

These researchers also found that content matters. When they more thoroughly examined the programs, they reported that the viewing of “entertainment” TV—both violent and nonviolent—before 3 years old was associated with more attention problems 5 years later. However, viewing educational TV programming was not linked to attention problems.³⁵

THE QUALITY OF THE PROGRAM’S CONTENT HAS AN EFFECT ON LANGUAGE DEVELOPMENT

Studies show that program content matters when it comes to language development. Researchers have concluded that programs “in which onscreen characters speak directly to the child, actively elicit participation, label objects, and provide opportunities to respond, such as *Dora the Explorer*, are positively related to expressive language production and vocabulary.” (p. 639³⁶) “[This is also true for]...programs that are storybook-like in nature, that have a strong narrative, are visually appealing, and contain opportunities to hear vocabulary words and their definitions, see the visual representation of the vocabulary word, and see interactions between characters modeled.” (p. 639³⁶)

In another study on TV viewing, researchers found that watching commercially produced DVDs targeted at babies was associated with poorer language in babies 8–16 months old, but viewing educational children’s TV was not.³⁷ When the data was reanalyzed, viewing baby videos did not contribute to language development either negatively or positively and, overall, avoiding all screentime was actually associated with lower language development.³⁸ This result is not surprising in light of the fact that when another set of researchers reviewed all of the commercially available infant-directed DVDs and coded

them for language-promoting strategies, pacing, and quality of interactions depicted, they found that the vast majority (80%) of the baby DVDs did not show examples of quality interactions or language-promoting strategies.³⁹ Together, these studies support the findings that content matters.

PACE AND CONTENT OF PROGRAMS CAN AFFECT EXECUTIVE FUNCTIONING SKILLS

Research shows that executive functioning is critical for success in school. Exposure to fast-paced programs, such as *SpongeBob SquarePants* (which is not a program designed for children under 5 years old), is shown to have a negative effect on 4-year-olds’ executive functioning.⁴⁰

In this study, researchers randomly assigned 60 4-year-olds to one of three groups. One group watched a fast-paced TV cartoon (*SpongeBob*), another watched an educational, slower-paced cartoon (*Caillou*), and another drew for 9 minutes. Then all were given four executive function tasks that assess children’s ability to plan actions, control impulses, use their memory, and delay gratification.

Children who watched the fast-paced TV cartoon performed significantly worse on the executive function tasks than children in the other two groups, when controlling for the child’s capacity to pay attention, age, and TV exposure at home.⁴⁰ This finding is especially important, given that current usage data show that 20% of children from birth to 23 months old and 48% of children 2–4 years old watch children’s entertainment shows such as *SpongeBob*.⁷

It is important to note that this study did not measure children’s executive functioning *before* they watched the programs. Without a baseline, it is not possible to prove that watching the show resulted in a decline in the children’s executive functioning. Furthermore, this study did not measure long-term effects, but only observed the children during the 20 minutes necessary to complete the executive functioning tests. However, researchers hypothesized that, if young children are watching this type of programming every day—and in many cases, several times a day—the negative effect may be cumulative.

Furthermore, the researchers argued that the fantastical nature of the content of *SpongeBob* was a more significant factor accounting for the negative impact, even more so than the show’s pacing. Programs that are fast-paced *and* fantastical have a more negative effect on executive functioning than fast-paced shows that are more realistic in nature, for example, those that show puppets or other characters engaged in the kinds of experiences and social interactions that reflect young children’s daily lives. This effect is likely due to the fact that children less than 3 years old, and especially less than 2 years old, find it particularly difficult to comprehend the fantastical elements of the plot that are not grounded in their understanding of everyday experience, so these programs further tax their emerging executive functioning skills. Researchers describe this phenomenon as similar to the

mental exhaustion students tend to experience after taking a challenging exam.

IMPLICATIONS

- ❑ **Choose content very carefully.** Be sure that the content reflects the child's experiences in the real world. Programming should provide a context that children can relate to, that is organized around everyday themes, and that depicts positive interactions between people and characters that serve as models for young children.
- ❑ **Choose programs that have interactive components** that elicit children's participation and use strong story lines.
- ❑ **Avoid fast-paced programs,** as they may at least temporarily impair young children's executive functioning.

Inherent Interactivity of the Screen Medium

The more active children are as they engage with screen media, the greater their learning. In one study, researchers randomly assigned children 30 to 36 months old to one of three groups. All the groups viewed a scenario that took place in a laundry room in which puppets popped out from baskets or from behind pajamas hanging on a clothesline. The first group watched a live enactment of the show. The second group watched on a video monitor. The third group also watched on a video monitor but had to touch a keyboard whenever they wanted the puppets to appear from their hiding place.

After the viewing, each child entered the actual room to find the puppets. The children who had watched the video went through a process of trial and error before they succeeded, whereas both the children who watched the live demonstration and who had played the interactive game were much more likely to head directly to the correct place where the puppets were hidden. These results were observed even with the younger, 2½-year-old children and suggest that actively interacting with the content—in this case, pressing that space bar to make puppets appear from their hiding places—seems to improve children's ability to learn from the screen.⁴¹ Indeed, programs in which characters speak directly to the child—actively eliciting their participation—have been found to encourage expressive language production and vocabulary.³⁶

THE DANGER OF TOO MUCH INTERACTIVITY

There seems to be a point of diminishing returns for interactivity. A study involving e-books showed that as children click around the screen they can easily become distracted from the storyline. Research has shown that, when using e-books, parents tend to focus more on the technology and less on the story, guiding their children to click on e-readers' different features, such as touching a picture to make a sound. This type of interaction results in children recalling very little about what was read, reducing their story comprehension.⁴²

In contrast, another study found no difference in comprehension levels between an e-book and a paper book and reported that children's engagement levels were actually higher for e-books.⁴³ The researchers concluded that e-books can be useful tools in early learning, as long as parents guide their children to focus on the story and do not allow the technology to drive the experience. Another significant potential advantage of e-books is that they can be delivered directly onto mobile devices, including phones, and onto computers as well. They are also cheaper than paper books. This means that they have the potential to greatly expand the available literacy resources for many families.

IMPLICATIONS

- ❑ **If you use TV, apps, and touchscreens with children, focus on the story and less on the technological features.** Avoid jumping quickly from feature to feature, as children can become distracted which can negatively impact their comprehension of the story. The interactivity should be through the conversations you have with children about the narrative. Ask them to point to pictures on the screen; ask about what they think will happen next in the story; and help them connect what they are seeing in the story to their real-life experiences.
- ❑ **Check your local library to access e-books.** Many libraries are experimenting with free "check-out" systems for e-books and can provide access to online libraries of children's books. Another free source is the International Children's Digital Library: <http://en.childrenslibrary.org>.

Link Between TV and Sleep Problems

Studies have shown a relationship between TV viewing and sleep problems. In a study of 2,068 children, a greater amount of TV watched per day was associated with an increase in both irregular naptime and bedtime schedules.⁴⁴

Specifically, televisions in bedrooms appear to have a negative impact on sleep. Several studies have shown that children with TVs in their bedrooms watch more TV and are more likely to have sleep problems. One study of 495 school-age children looked at the association between TV viewing habits, sleep habits, and sleep disturbances. Findings revealed that the amount of TV viewing overall, and especially at bedtime for children with TVs in their bedrooms (which was the case for 25% of the children in the study), had the strongest association with sleep problems. The sleep domains that appeared to be affected most consistently by TV were: resistance to bedtime, later bedtimes, anxiety around sleep, and less overall sleep.⁴⁵ However, it is important to take into consideration that studies have not looked at the content of what children are watching before bedtime, which may be an important variable. Different types of content may have differing effects on sleep quality.

The amount of time spent viewing media in the evening before bedtime has also been associated with an increase in sleep problems for 3- to 5-year-olds. Not surprisingly, researchers have also established an association between exposure to violent content on TV and an increase in sleep problems in children 3 to 5 years old.^{46, 47}

IMPLICATIONS

- ❑ **Avoid screen media (TVs, tablets, mobile phones) in children's bedrooms.**
- ❑ **Limit media in the hour or two before bedtime,** as it can be stimulating, making it hard for children to calm themselves to go to sleep.
- ❑ **Do not expose young children to violent screen content.**

Link Between Use of Screen Media and Obesity

Media exposure has been found to be a risk factor for obesity in young children due to an increase in food intake, a reduction in physical activity, and exposure to poor quality food.

One study that measured physical activity and body fat in middle-class preschoolers showed that TV viewing was linked to higher body fat; each extra hour of watching TV was associated with an extra 1kg (more than 2 lbs) of body fat. Of note is that this relationship did not change when the researchers took into account children's physical activity rates. Thus, these researchers concluded that the key variable contributing to obesity was most likely to be food intake while viewing.⁴⁸

Another study of a representative sample of children in Greece looked at the association between TV viewing time and the diet of children 1 to 5 years old. Researchers found that children who spent 2 hours or more a day watching TV had a higher calorie intake compared with children who watched TV less than 2 hours a day. Furthermore, the children who watched more than 2 hours of TV a day consumed foods with more fat and carbohydrates, resulting in increased calorie intake.⁴⁹ It is important to note that this study did not show causality (i.e., that the TV viewing led to the increase in caloric intake) but noted that children who watched more TV were also more likely to consume more and unhealthier foods.⁴⁹

TV and computer use have also been associated with an increase in body mass index (BMI). A study of 4- to 7-year-olds whose BMI was above the 75th percentile demonstrated that a reduction in TV viewing and computer use was related to decreases in BMI. The intervention was most effective for children living in low-income homes.⁵⁰

A TV in a child's bedroom also proves to be a significant risk factor for obesity. Children who have a TV set in their bedroom

are more likely to be overweight and to have viewed more TV (more than 4½ hours more per week) than children without a TV in their bedroom.⁵¹ Furthermore, another study showed that the odds of obesity were 23% lower in 4-year-old children whose screen time was limited to less than 2 hours per day.⁵²

IMPLICATIONS

- ❑ **Limit unhealthy snacking and eating meals during screen time.**
- ❑ **Limit screen usage (TV, mobile phones, computers, tablets) in young children's bedrooms.**
- ❑ **Go out and play.** Playing inside or outside with children in an active way is vital for their physical and cognitive development.

The Effect of Parental Screen Use on Young Children

Finally, what about the effect of parents' use of screen devices on their young children? Researchers at Boston Medical Center did an observational study of 55 parents and their young children eating at fast-food restaurants. They reported that 40 of the 55 parents used a mobile device during the meal. Furthermore, the researchers found that the more time that parents interacted with mobile devices, the more likely their children were to act out, trying to get their parents' attention, which often led to angry reactions by the parents, including shouting and, in one case, kicking a child's foot.⁵³

Although this was an observational study, it suggests that many parents may be missing opportunities for valuable social interaction with their children during mealtimes, and that parental absorption in their mobile devices can result in an increase in negative child behaviors, leading to angry and punitive responses from parents.

IMPLICATIONS

- ❑ **Limit usage of mobile devices when with young children.** Try to reserve time for screen use when children are not present.
- ❑ **Use mealtimes as important opportunities to connect with children** through conversation and also by creating positive experiences and associations around food.

Conclusion

Although the body of research on the effect of screen media (beyond TV viewing) is still relatively limited, it clearly points to the following implications for parents and other caregivers:

- Be thoughtful about how you use media with young children.
- Set limits on screen time to be sure that children have plenty of time exploring the real, 3-D world with family and friends.
- Participate and make screen use interactive, talking about what children are seeing, and encouraging them to use their minds and bodies as much as possible to maximize learning.
- Help children bridge the gap between content they are exposed to on screens—new words and concepts—and their real-life experiences.
- Be sure that the content reflects the child’s everyday experiences. Ideally, the program or game should engage children interactively.
- Avoid having the TV on in the background. Turn the TV off when no one is watching.

- Avoid using screens as part of the bedtime routine.
- Remove screens from bedrooms to increase quality sleep.
- Be mindful of and limit your own screen media use when children are present.

Finally, establish a healthy “media diet” from the start, as research shows that early programming choices predict later choices and set future patterns of media viewing. While parents generally start out with limits on screen usage for young children—1 to 2 hours a day—with the vast majority of the programming being educational—media use tends to increase significantly as children get closer to 5 years old and to include fewer educational media choices.^{32, 54}

Because screen media is now a fact of life for millions of families with young children, expanding our knowledge of how these devices can serve as tools for learning, while mitigating any potential negative effects on young children’s development, is imperative. It is also critical that we keep parents informed about what researchers are learning and the implications of screen use with young children. To that end, this resource will be a “living document” that ZERO TO THREE will continue to update as new research findings in this area becomes available. Stay tuned.

CONTRIBUTORS

Lisa Guernsey, Director of the Early Education Initiative at the New America Foundation and author of *Screen Time: How Electronic Media—From Baby Videos to Educational Software—Affects Your Young Child*

Suzy Tomopoulos, MD, New York University School of Medicine, Bellevue Hospital Center

Alan Mendelsohn, MD, New York University School of Medicine and Bellevue Hospital Center, Department of Pediatrics, Division of Developmental-Behavioral Pediatrics, New York, NY

Rebecca Parlakian, MA, Ed., director of Parenting Resources, ZERO TO THREE, Washington, DC

Ellen Wartella, PhD, Al-Thani Professor of Communication, Northwestern University

REVIEWERS

John Love, PhD, past senior fellow at Mathematica Policy Research, ZERO TO THREE Board member

Ross Thompson, PhD, Distinguished Professor of Psychology, University of California, Davis

Robert Chang, ZERO TO THREE Board member

Victoria Rideout, VJR Consulting

Lesli Rotenberg, General Manager of Children’s Programming, PBS

RECOMMENDED RELATED RESOURCES

Technology and Interactive Media as Tools in Early Childhood Programs Serving Children From Birth Through Age 8: A joint position statement issued by the National Association for the Education of Young Children and the Fred Rogers Center for Early Learning and Children’s Media at Saint Vincent College www.naeyc.org/content/technology-and-young-children

Research Spotlight: Families and Digital Media in Young Children’s Learning by Harvard Family Research Project www.hfrp.org/var/hfrp/storage/fckeditor/File/HFRP_ResearchSpotlight_Families_and_Digital_Media021914.pdf

Screen Time: How Electronic Media—From Baby Videos to Educational Software—Affects Your Young Child by Lisa Guernsey www.lisaguernsey.com/Screen-Time.htm

The Elephant in the Living Room: Make Television Work for Your Kids by Dimitri Christakis and Frederick J. Zimmerman www.amazon.com/The-Elephant-Living-Room-Television/dp/1594862761#

Tell Me a Story: Sharing Stories to Enrich Your Child’s World by Elaine Reese <http://ukcatalogue.oup.com/product/9780199772650.do>

Children, Adolescents, and the Media (Policy Statement) by American Academy of Pediatrics <http://pediatrics.aappublications.org/content/132/5/958.full?sid=67b46340-0507-42b1-8a15-7b4cbb974525>

REFERENCES

- 1 Hoff, E. (2006). How social contexts support and shape language development. *Developmental Review, 26*, 55–88.
- 2 National Research Council & Institute of Medicine. (2000). *From neurons to neighborhoods: The science of early childhood development*. Committee on Integrating the Science of Early Childhood Development. In J. P. Shonkoff & D. A. Phillips (Eds.). Washington, DC: National Academy Press.
- 3 Darling, N., & Steinberg, L. (1993). Parenting style as context: An integrative model. *Psychological Bulletin, 113*, 487–496.
- 4 Bernier, A., Carlson, S. M., & Whipple, N. (2010). From external regulation to self-regulation: Early parenting precursors of young children's executive functioning. *Child Development, 81*, 326–339.
- 5 Landry, S. H., Smith, K. E., & Swank, P. R. (2003). The importance of parenting during early childhood for school age development [Special issue]. *Developmental Neuropsychology, 24*(2 & 3), 559–590.
- 6 Singer, D. G., Golinkoff, R. M., & Hirsh-Pasek, K. (2006). *Play = learning: How play motivates and enhances children's cognitive and socioemotional growth*. New York, NY: Oxford University Press.
- 7 Common Sense Media (2013). *Zero to eight: Children's media use in America 2013*. San Francisco, CA: Common Sense Media. Retrieved from <https://www.commonsensemedia.org/research/zero-to-eight-childrens-media-use-in-america-2013>
- 8 Barr, R. (2013). Memory constraints on infant learning from picture books, television, and touchscreens. *Child Development Perspectives, 7*, 205–210. doi: 10.1111/cdep.12041
- 9 Meltzoff, A. N. (1988). Imitation of televised models by infants. *Child Development, 59*, 1221–1229.
- 10 Barr, R., Muentener, P., & Garcia, A. (2007). Age-related changes in deferred imitation from television by 6- to 18-month-olds. *Developmental Science, 15*, 812–816.
- 11 Brito, N., Barr, R., McIntyre, P., & Simcock, G. (2012). Long-term transfer of learning from books and video during toddlerhood. *Journal of Experimental Child Psychology, 111*, 108–119. doi: 10.1016/j.jecp.2011.08.004
- 12 Barr, R., & Hayne, H. (1999). Developmental changes in imitation from television during infancy. *Child Development, 70*, 1067–1081. doi: 10.1111/1467-8624.00079
- 13 Troseth, G. L., & DeLoache, J. S. (1998). The medium can obscure the message: Young children's understanding of video. *Child Development, 69*, 950–965.
- 14 Barr, R., Muentener, P., Garcia, A., Fujimoto, M., & Chavez, V. (2007). The effect of repetition on imitation from television during infancy. *Developmental Psychobiology, 49*, 196–207. doi: 10.1002/dev.20208
- 15 Rideout, V. (2014). *Learning at home: Families' educational media use in America*. New York, NY: The Joan Ganz Cooney Center at Sesame Workshop. Available at www.joanganzcooneycenter.org/wp-content/uploads/2014/01/jgcc_learningathome.pdf
- 16 Mendelsohn, A. L., Berkule, S. B., Tomopoulos, S., Tamis-LeMonda, C. S., Huberman, H. S., Alvir, J., & Dreyer, B. P. (2008). Infant television and video exposure associated with limited parent-child verbal interactions in low socioeconomic status households. *Archives of Pediatric and Adolescent Medicine, 162*, 411–417.
- 17 Fidler, A., Zack, E., & Barr, R. (2010). Television viewing patterns in 6- to 18-month-olds: The role of caregiver-infant interactional quality. *Infancy, 15*, 176–196. doi: 10.1111/j.1532-7078.2009.00013.x
- 18 Barr, R., Zack, E., Muentener, P., & Garcia, A. (2008). Infants' attention and responsiveness to television increases with prior exposure and parental interaction. *Infancy, 13*, 3–56. doi: 10.1080/15250000701779378
- 19 Zack, E. A. (2010). *Infant transfer of learning across 2D/3D dimensions: A touch screen paradigm*. Unpublished doctoral dissertation. Georgetown University, Washington DC.
- 20 Mendelsohn, A. L., Brockmeyer, C. A., Dreyer, B. P., Fierman, A. H., Berkule-Silberman, S. B., & Tomopoulos, S. (2010). Do verbal interactions with infants during electronic media exposure mitigate adverse impacts on their language development as toddlers? *Infant and Child Development, 19*, 577–593.
- 21 DeLoache, J. S., Chiong, C., Vanderborcht, M., Sherman, K., Islam, N., Troseth, G. L., . . . & O'Doherty, K. (2010). Do babies learn from baby media? *Psychological Science, 21*, 1570–1574. doi: 10.1177/0956797610384145
- 22 Lapierre, M. A., Piotrowski, J. T., & Linebarger, D. L. (2012). Background television in the homes of US children. *Pediatrics, 130*, 839–846.
- 23 Ackerman, B. P., & Brown, E. D. (2010). Physical and psychosocial turmoil in the home and cognitive development. In G. W. Evans & T. D. Wachs (Eds.), *Chaos and its influence on children's development: An ecological perspective* (pp. 35–48). Washington, DC: American Psychological Association.
- 24 Tomopoulos, S., Cates, C. B., Dreyer, B. P., Berkule, S. B., Fierman, A. H., & Mendelsohn, A. L. (2014). Children under the age of two are more likely to watch inappropriate background media than older children. *Acta Paediatrica, 103*, 546–552.
- 25 Barr, R., Lauricella, A., Zack, E., & Calvert, S. L. (2010). The relation between infant exposure to television and executive functioning, cognitive skills, and school readiness at age four. *Merrill Palmer Quarterly, 56*, 21–48.
- 26 National Center for Learning Disabilities. (2014). What is executive function? Available at www.nclad.org/types-learning-disabilities/executive-function-disorders/what-is-executive-function
- 27 Schmidt, M. E., Pempek, T. A., Kirkorian, H. L., Lund, A. F., & Anderson, D. R. (2008). The effects of background television on the toy play behaviors of very young children. *Child Development, 79*, 1137–1151. doi: 10.1111/j.1467-8624.2008.01180.x
- 28 Kirkorian, H. L., Pempek, T. A., Murphy, L. A., Schmidt, M. E., & Anderson, D. R. (2009). The impact of background television on parent-child interaction. *Child Development, 80*, 1350–1359.
- 29 Zimmerman, F. J., & Christakis, D. A. (2005). Children's television viewing and cognitive outcomes. A longitudinal analysis of national data. *Archives of Pediatric and Adolescent Medicine, 159*, 619–625.
- 30 Tomopoulos, S., Dreyer, B. P., Berkule, S., Fierman, A. H., Brockmeyer, C., & Mendelsohn, A. L. (2010). Infant media exposure and toddler development. *Archives of Pediatric and Adolescent Medicine, 164*, 1105–1111.
- 31 Schmidt, M. E., Rich, M., Rifas-Shiman, S. L., Oken, E., & Taveras, E. L. (2009). Television viewing in infancy and child cognition at 3 years of age in a US cohort. *Pediatrics, 123*, e370–e375.
- 32 Linebarger, D., Barr, R., Lapierre, M., & Piotrowski, J. (2014). Parenting, media use, cumulative risk, and children's executive functioning. *Journal of Developmental and Behavioral Pediatrics, 36*, 367–377.
- 33 Christakis, D. A., Zimmerman, F. J., DiGiuseppe, D. L., & McCarty, C. A. (2004). Early television exposure and subsequently attentional problems in children. *Pediatrics, 113*, 708–713.
- 34 Foster, E. M., & Watkins, S. (2010). The value of reanalysis: TV viewing and attention problems. *Child Development, 81*, 368–375.
- 35 Zimmerman, F. J., & Christakis, D. A. (2007). Associations between content types of early media exposure and subsequent attentional problems. *Pediatrics, 120*, 986–992.
- 36 Linebarger, D. L., & Walker, D. (2005). Infants' and toddlers' television viewing and language outcomes. *American Behavioral Scientist, 48*, 624–645.
- 37 Zimmerman, F. J., Christakis, D. A., & Meltzoff, A. N. (2007). Associations between media viewing and language development in children under age 2 years. *Journal of Pediatrics, 151*, 364–368.
- 38 Ferguson, C. J., & Donnellan, M. B. (2014). Is the association between children's baby video viewing and poor language development robust? A reanalysis of Zimmerman, Christakis, and Meltzoff (2007). *Developmental Psychology, 50*(1), 129–137.
- 39 Fenstermacher, S. K., Barr, R., Brey, E., Pempek, T. A., Ryan, M., Calvert, S., . . . Linebarger, D. (2010). Interactional quality depicted in infant-directed videos: Where are the interactions? *Infant and Child Development, 19*, 594–612. doi: 10.1002/icd.714
- 40 Lillard, A. S., & Peterson, J. (2011). The immediate impact of different types of television on young children's executive function. *Pediatrics, 128*, 644–649.

REFERENCES (continued)

- ⁴¹ Lauricella, A. L., Pempek, T. A., Barr, R., & Calvert, S. L. (2010). Contingent computer interactions for young children's object retrieval success. *Journal of Applied Developmental Psychology, 31*, 362–369. doi: 10.1016/j.appdev.2010.06.002
- ⁴² Parish-Morris, J., Mahajan, N., Hirsh-Pasek, K., Golinkoff, R. M., & Collins, M. (2013). Once upon a time: Parent-child dialogue and storybook reading in the electronic era. *Mind, Brain, and Education, 7* (3), 200–211. doi: 10.1111/mbe.12028
- ⁴³ Lauricella, A., Calvert, S., & Barr, R. (in press). Parent-child interactions during traditional and computer book reading for children's story comprehension. *International Journal of Child-Computer Interaction*. doi: 10.1016/j.ijcci.2014.07.001
- ⁴⁴ Thompson, D. A., & Christakis, D. (2005). Among children less than 3 years of age the association between television viewing and irregular sleep schedules. *Pediatrics, 116*, 851–856. doi: 10.1542/peds.2004-2788
- ⁴⁵ Owens, J., Maxim, R., McGuinn, M., Nobile, C., Msall, M., & Alario, A. (1999). Television-viewing habits and sleep disturbance in school children. *Pediatrics, 104*, e27. doi: 10.1542/peds.104.3.e27
- ⁴⁶ Garrison, M. M., Liekweg, K., & Christakis, D. A. (2011). Media use and child sleep: The impact of content, timing, and environment. *Pediatrics, 128*, 29–35. doi: 10.1542/peds.2010-3304
- ⁴⁷ Garrison, M., & Christakis, D. (2012). The impact of a healthy media use intervention on sleep in preschool children. *Pediatrics, 130*(3), 492–499. Available at <http://pediatrics.aappublications.org/content/130/3/492.full.pdf+html>
- ⁴⁸ Jackson, D. M., Djafarian, K., Stewart, J., & Speakman, J. R. (2009). Increased television viewing is associated with elevated body fatness but not with lower total energy expenditure in children. *American Journal of Clinical Nutrition, 89*, 1031–1036. doi: 10.3945/ajcn.2008.26746.
- ⁴⁹ Manios, M., Kondaki, K., Kourlaba, G., Grammatikaki, E., Birbilis, M., & Ioannou, E. (2009). Television viewing and food habits in toddlers and preschoolers in Greece: The GENESIS study. *European Journal of Pediatrics, 168*, 801–808. doi: 10.1007/s00431-008-0838-3
- ⁵⁰ Epstein, L. H., Roemmich, J. N., Robinson, J. L., Paluch, R. A., Winiewicz, D. D., Fuerch, J. H., & Robinson, T. N. (2008). A randomized trial of the effects of reducing television viewing and computer use on body mass index in young children. *Archives of Pediatric and Adolescent Medicine, 162*, 239–245.
- ⁵¹ Dennison, B. A., Erb, T. A., & Jenkins, P. L. (2002). Television viewing and television in bedroom associated with overweight risk among low-income preschool children. *Pediatrics, 109*, 1028–1035.
- ⁵² Anderson, S. E., & Whitaker, R. C. (2010). Household routines and obesity in US preschool-aged children. *Pediatrics, 125*, 420.
- ⁵³ Radesky, J. S., Kistin, C. J., Zuckerman, B., Nitzberg, K., Gross, J., Kaplan-Sanoff, M., Silverstein, M. (2014). Patterns of mobile device use by caregivers and children during meals in fast food restaurants. *Pediatrics*. Published online March 14, 2014. doi: 10.1542/peds.2013-3703.
- ⁵⁴ Anderson, D.R., et al., (2001) *Early childhood television viewing and adolescent behavior: The recontact study*. Monographs of the Society for Research in Child Development, 66.