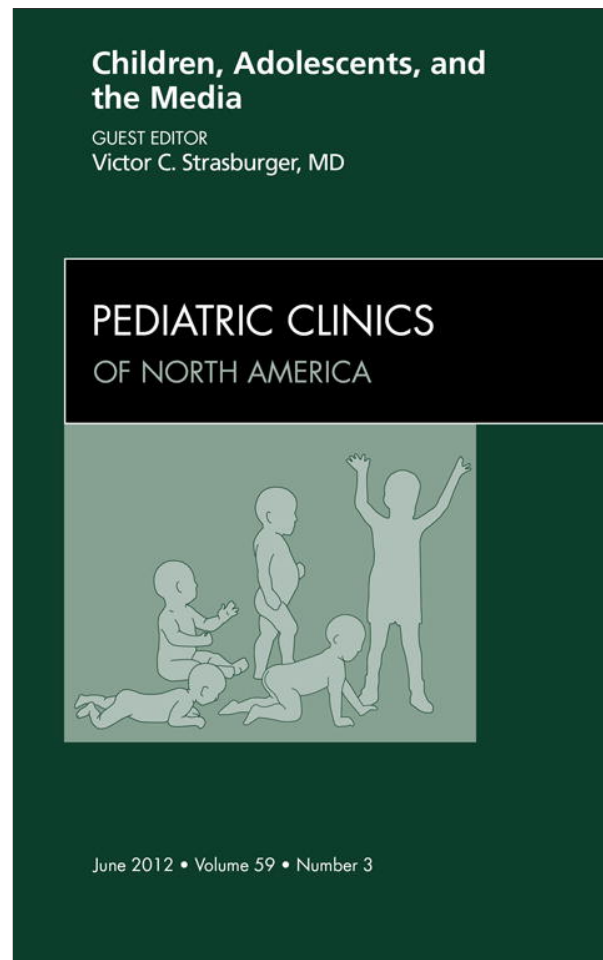


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# Should Babies Be Watching Television and DVDs?

Ellen A. Wartella, PhD\*, Alexis R. Lauricella, PhD

## KEYWORDS

- DVD • Developmental outcomes • Hypotheses • Infants • Learning • TV
- Video deficit

## KEY POINTS

- Infants and toddlers are regular viewers of television and DVD content.
- Research related to infant media use is increasing but evidence is mixed.
- It is important for infants to learn how to watch and learn from screen media.

## SHOULD BABIES BE WATCHING TELEVISION/DVDs?

It has been 15 years since the first *Baby Einstein* video came on the market. Since 1997, there has been a proliferation of a variety of screen media developed for babies (eg, DVDs, cable television channels, Web sites, apps, e-books).<sup>1</sup> Marketing campaigns for infant-directed products have insinuated that children learn from DVDs like *Baby Einstein* and *Brainy Baby*, convincing many parents that these products are educational. On the other hand, the American Academy of Pediatrics (AAP) originally recommended that parents “avoid TV- and video-viewing for children less than age 2”<sup>2</sup> and more recently the AAP<sup>3</sup> “discourages media use by children younger than 2 years.” These conflicting messages, along with the proliferation of digital technology in our daily lives, makes the question of whether babies should be watching television and DVDs a reasonable one to ask but a difficult one to answer.

First, regardless of these conflicting messages, infants and toddlers are watching television and DVDs, and many children were watching even before the boom of infant-directed media.<sup>4</sup> According to parental reports of media use in the early 1990s, 1-year-old infants watched an hour of television on an average day.<sup>5</sup> More recent media use studies have noted that babies are watching television more regularly than before.<sup>6</sup> For 1-year-olds, about half watched television in the mid-1990s compared with 60% in 2003.<sup>6</sup> In 2006, the Kaiser Family Foundation survey<sup>7</sup> found

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Communication Studies, Northwestern University, 2-148 Frances Searle Building, 2240 Campus Drive, Evanston, IL 60208, USA

\* Corresponding author.

E-mail address: [ewartella@gmail.com](mailto:ewartella@gmail.com)

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that children younger than 1 year spent on average just less than an hour a day (49 minutes) with screen media. According to the most recent Common Sense Media survey,<sup>8</sup> 66% of children younger than 2 years have watched television and almost half watch television or DVDs in a typical day. Children younger than 2 years who did watch television spent about 1 hour a day watching television, which is consistent with the amount of time infants were watching in the late 1970s.<sup>9</sup>

Second, although total amount of time children are watching television and DVDs is important, past research with older children shows that the content they are watching on television is also crucial.<sup>10,11</sup> A national representative survey of parents found that most children (83%) watched programming that was created for children around their own age.<sup>7</sup> Parents of children younger than 2 years reported that their children mostly watched programming for children, but 19% of parents reported that their children watched a mix of programming for both children and adults.<sup>7</sup> The most recent nationally representative survey did not report the specific types of television and video content that very young children were watching,<sup>8</sup> so it is unclear what content young infants and babies are currently watching on television.

Television is ubiquitous in American homes, and babies are attending to television and videos, especially to the growing number of media products developed for them. As a result, scientists and researchers have begun to research infants' media use. Rather than examining the literature to explore evidence that is for or against early television viewing, here we explore the current hypotheses and evidence about infants' media use at home more generally.

### ***Attention Hypotheses***

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Historically, there were 2 theories regarding children's attention to television. Anderson and colleagues<sup>12</sup> theorized that attention was driven by the comprehensibility of the content, known as the comprehensibility hypothesis, whereas Huston and Wright<sup>13</sup> theorized that formal features that occur on television, such as auditory and visual changes, drive attention, which became known as the formal features hypothesis. Both of these theories were originally based on the understanding of preschool-aged children's viewing of television programming but have been applied to the understanding of infant and toddlers' attention to television programming as well.

#### ***Comprehensibility hypothesis***

Anderson and colleagues<sup>12</sup> discovered in the early 1980s that young children's (ages 2, 3.5, and 5 years) attention to television was driven by the comprehensibility of the content, meaning that if children understood the content they attended more. In the new century, Pempek and colleagues<sup>14</sup> applied this same theory and tested it on a younger audience of infants younger than 24 months. Evidence from this study found that infants as young as 18 months old are sensitive to changes in comprehensibility of programming. For example, 18-month-old and 24-month-old infants attended less to segments of *Teletubbies* that had been edited to decrease their comprehensibility (random shot sequences and backward speech) than those that were not distorted.<sup>14</sup>

#### ***Formal features hypothesis***

An early study by Hollenbeck and Slaby<sup>9</sup> found infants' attention was highest when they watched a traditional type of television program that included both sound and picture compared with either sound-only or picture-only experiences. More recently, Valkenburg and Vroone<sup>15</sup> found that infants' attention was attracted to the screen when there were salient auditory and visual features, such as applause, a child's voice, bright colors, or visual surprises on the screen. These studies have examined infants'

attention to formal features but did not specifically test the formal features hypothesis. Other research has begun to examine the extent of formal production features used in infant-directed videos,<sup>16</sup> but again this study did not examine infant attention to these various types of formal features.

### ***Developmental Outcomes Hypothesis***

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Historically, new technology and change in family routines bring concerns about the possible harmful consequences.<sup>17</sup> When television and video programs were first created and marketed directly for infants and toddlers, concerns about the impact of such early exposure were ignited. In response to the creation of infant-directed products and reports that infants and toddlers were watching television, the AAP issued a policy statement in 1999<sup>2</sup> recommending that parents avoid television viewing for children younger than 2 years. As part of this recommendation, the AAP stated that “there is concern that overstimulation from high levels of media use might lead to attention deficit disorder or hyperactivity.” As a result, there has been a hypothesis that early media exposure is associated with longer-term developmental outcomes such as attention and other cognitive deficiencies.

Evidence for this hypothesis is mixed. One of the first scientific studies to be released about the effects of early media exposure claimed to find an association between early television viewing and later attention problems for children.<sup>5</sup> This study quickly gained attention in the popular press, causing concerns that exposure to television at early ages might lead to attention problems later in childhood. However, a reanalysis of the same national longitudinal data set identified major flaws in the original analyses of the study.<sup>18</sup> Foster and Watkins suggested that Christakis and colleagues<sup>5</sup> failed to include adequate control variables in their original analysis of the data. When Foster and Watkins included mother’s academic achievement and family’s poverty status as control variables in their regression analysis, the association between television viewing and attention problems was no longer statistically significant. Overall, Foster and Watkins state “modest levels of television viewing do not appear to be detrimental, even for young children”.<sup>18(p374)</sup> A study by researchers in Denmark<sup>19</sup> also found no association between early television viewing (ages 8 months and 3½ years) and behavior problems related to attention-deficit/hyperactivity disorder at age 10 and 11 years old.

Multiple studies have examined language development as a function of early media exposure. Zimmerman and colleagues<sup>20</sup> found that viewing DVDs created for infants between 8 and 16 months of age was associated with worse concurrent language scores on the Communicative Development Inventory (CDI). Exposure for older toddlers (17–24 months) was not associated with CDI language scores. In contrast, a longitudinal study of infants from age 6 months to 3 years showed that when a range of other demographic variables were controlled for, there was no association between hours of early television viewing and language scores as measured by the Peabody Picture Vocabulary Test at age 3 years.<sup>21</sup> In addition, smaller-scale studies indicate no association between early television and video viewing and language or other cognitive outcomes. Specifically, language scores as measured by the CDI were not significantly predicted by the DVD viewing frequency of infants.<sup>22</sup>

In addition to frequency of viewing, studies have examined the potential influence of media content on later outcomes. A small study found that language development varied based on the specific educational programs children watched before age 2 years.<sup>23</sup> The importance of content was evident in a low-risk sample: early exposure to infant-directed programming had no association with later cognitive, school readiness, or executive functioning skills; however, exposure to content created for adults at early ages was associated with worse executive function skills.<sup>24</sup>

### ***Educational Hypotheses***

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The proven success of planned educational programs such as *Sesame Street* to teach preschool-aged children language and mathematical concepts gave rise to an explosion of preschool television, video, and digital products claiming to be educational for children.<sup>1</sup> However, even with substantial evidence that preschoolers could learn from video, early on researchers were skeptical that television and DVD products could be educational for younger children, specifically infants and toddlers. This skepticism was reinforced by evidence of a video deficit in baby's learning from video<sup>6</sup> and only recently has evidence shown that although there may be constraints on babies learning from video, such learning can and may occur under certain circumstances. Richert and colleagues<sup>25</sup> recently suggested that the challenges that infants face when learning from screen media may be a result of their lack of understanding of the social significance of screen media. More specifically, infants need to learn that what they view on a screen can provide them with information about their world and can be a tool for learning.<sup>25</sup>

#### ***Video deficit hypothesis***

Initial research of infant and toddler media found that infants and toddlers learn better from a real-world adult than they do from a video presentation, thus coining the term the video deficit.<sup>6</sup> Evidence in support of this hypothesis has been shown in a range of experimental studies until infants are between 2 and 3 years old.<sup>26–28</sup> Imitation studies conducted with infants from 12 to 30 months old have shown that learning of a 1-step to 3-step imitation task is significantly better when the infant views the demonstration performed live by an adult compared with the same demonstration performed on a screen.<sup>29,30</sup> Similar evidence has been found using object-search tasks, showing that toddlers are better able to find hidden objects when information about their hiding places is provided by a live adult compared with when it is given on screen.<sup>27,31–34</sup> Evidence also shows that infants and toddlers learn language skills better from a live experience than from a video or televised presentation.<sup>22,35,36</sup> Together this evidence does support the theory that there is a video deficit effect for infants and toddlers and that infants may view characters on a screen differently than they view people in live interactions.<sup>22</sup>

However, there is also evidence that under certain circumstances this video deficit effect can be ameliorated or may even fail to exist for some audiences. First, repetition of the video presentation helped to increase learning and ameliorate the video deficit effect with 12-month-old and 18-month-old infants.<sup>37</sup> For 15-month-old infants, increasing the repetition of the video and spreading the exposures over 2 days ameliorated the video deficit effect.<sup>37</sup> In addition, with object-search tasks, young children who had 2 weeks of exposure on their home television screen before testing were better able to use a video presentation as information to successfully find a hidden toy.<sup>34</sup> When the test task is changed and infants are tested on their ability to learn a task from a two-dimensional (2D) screen and replicate it on a 2D touch screen, infants show learning and do not show the video deficit effect.<sup>38</sup> Research also shows that the video deficit effect may not occur for very young infants. For instance, 6-month-old infants learned as well from a video as from a live demonstration.<sup>39,40</sup>

#### ***Learning hypothesis***

Decades of research with preschool-aged children have shown that educational media have benefits for preschoolers' development of literacy, mathematics, science, and prosocial behavior.<sup>41–43</sup> Given that older children can learn from quality educational media and marketers push products as educational,<sup>1</sup> it has been hypothesized that infant-directed media may be educational for infants and toddlers as well.



Since the creation of infant-directed media in the late 1990s, studies have begun to examine the ways in which infants and toddlers may learn from commercially produced and experimentally created video presentations. Infants can learn a cognitively meaningful seriation task (ordering objects according to size) better from a video presentation when the character on the screen is familiar compared with when the character is unfamiliar.<sup>44</sup> In addition, infants can learn to successfully complete an object-search task when they are given training and experience using screens as a source of information. For example, children who engaged with an adult on a closed-circuit television were better able to find a hidden object than children in the control group who did not experience the interactive television condition.<sup>45,46</sup> In addition, by providing toddlers with training experiences at home where they saw themselves on a television screen, they were then able to learn from a video presentation when they came to a laboratory to complete the object-search task.<sup>34</sup>

Other studies have shown that 2-year-olds can learn from video presentations even when tested 24 hours after exposure.<sup>26,28</sup> Toddlers in the Barr and Wyss study<sup>26</sup> successfully imitated the behaviors shown on video when the video contained a voice-over that provided labels during the demonstration. There is some evidence that infants may be able to learn language from programs created for them. An experimentally controlled study showed that infants who were exposed to *Baby Einstein* around age 1 year showed greater learning of specific words from the DVD compared with children in the control group who did not view the video.<sup>47</sup> In contrast, other studies examining infants' language learning from commercially created infant-directed videos have failed to find learning gains.<sup>22,35,48</sup> Thus, it is possible that infants and toddlers develop the skills necessary to comprehend and learn from television as they get older either because of increased experience or practice watching television or as a function of cognitive development factors.

### **Scaffolding hypothesis**

According to Vygotsky's theory,<sup>49</sup> social interaction plays a key role in children's cognitive development. Specifically, Vygotsky focuses on the important role an adult can play by scaffolding an experience for a child, meaning that the adult can provide help and support through verbal interactions and directions to engage the child in the experience to increase learning. Considerable research has examined the positive role of parent interaction and scaffolding on joint book reading with young children, and the hypothesis that parent interaction could also support learning from a television program has been suggested and studied as well.<sup>50</sup>

Studies have shown that infants' attention to television increases with previous exposure and with increased parental interaction.<sup>51</sup> Specifically, when parents treated the on-screen images as something with relevant information for the child and identified this relevant information by asking on-topic questions or labeling, infants were more likely to interact with the video.<sup>51</sup> Similarly, word learning from a DVD was improved when parents interacted with their children during the viewing by directing the child's attention to the DVD and repeating the words from the DVD.<sup>22</sup> Scaffolding benefits have been shown to be equally as successful when the scaffolding is provided by an adult coviewer as when scaffolding is provided by a voice-over during the video presentation.<sup>26</sup> In both instances, toddlers learned to imitate the behaviors shown on a video.<sup>26</sup>

### **SUMMARY**

The 15 years of research since the creation of infant-directed television and video programs has consistently shown 2 important concepts. First, parents are letting young babies watch and use media technology<sup>8</sup> regardless of policy statements

urging caregivers to do otherwise. Second, although we have a better understanding of the ways in which infants use and learn from media than we did before, the evidence about the outcomes of early media use remains ambiguous and fails to provide conclusive evidence either for or against early media use. Rather, a review of the evidence seems to support the theory that infants must learn how to watch and how to learn from screens before successful learning or positive outcomes can be fully shown.<sup>25,52</sup>

As has been discussed, infants are watching television and DVDs, but they are also using interactive touch-screen technologies like iPads and smartphones.<sup>8</sup> The idea that screen use can be discouraged or in any way avoided seems almost impossible because of the extent to which screens are everywhere that children are: in the back-seat of minivans, at supermarkets, and in their parents' hands. Not only are screens pervasive in American society, the new types of media screens are also easier for infants and toddlers to manipulate, changing the media experience from one in which infants must simply watch to one in which infants can control and interact. Similarly, a screen is no longer just a screen. Television and DVDs allow infants and toddlers to watch a previously created program that was set in length and content and created largely to provide entertainment for children. Today, screens are used for a variety of purposes including communication, information retrieval, and joint play: grandparents in Boston use Skype to see and talk to their grandchildren in Chicago; preschoolers use computers to watch YouTube videos of African lions running in the Sahara desert; and toddlers play virtual tea party with their parents on an iPad. Infants and toddlers are watching television and DVDs and are already adapting to the new technologies that are becoming a part of the culture and world in which they are developing.

The world of technology that infants are now growing up in is one that is still new. The body of evidence and our understanding about infants' media use are growing, but we are still far from having enough scientific evidence to determine whether or not infants should or should not be watching. There is evidence both for and against the two theories of attention to television, suggesting that both comprehensibility and formal features play a role in infants' attention to television and videos. There is some conflicting evidence about the cognitive deficit hypothesis that suggests that we really do not know how early media exposure influences later cognitive outcomes. There is solid evidence in favor of the video deficit effect, indicating that infants and toddlers learn better from a live experience than from one portrayed on video, but does that mean that infants cannot learn from a video presentation? The evidence suggests that there are ways in which learning can occur even at very young ages, and there is evidence that adding a live adult or scaffolding experiences can help enhance infants' chances of learning.

This review suggests that infants need to learn how to learn from screen media. Like other experiences in their lives in which they learn, for example, that blocks can teach them about physics, coins can teach them about numbers and currency, and books can teach them to read, infants, through experience and practice, need to figure out that the material that they see on a screen is a symbol of something in the real world and something that could provide them with information to learn about the world around them.

Babies' interest in television and other screen media seems to be a natural outgrowth of their interest in the objects and activities of the adults in their lives. Screens of all sorts are everywhere that adults are. The phenomena of parent's passing back smartphones to keep their children amused, or having televisions available in the family car; or joint engagement around the iPad, computer, or television are typically examined for the parental motivations for bringing media to babies. It could

also be pointed out that in the process of learning about people, what motivates their actions, and how they behave, babies typically interact with the objects that occupy the adults in their lives, whether these objects are pots and pans, hats and shoes, or iPads and televisions. Screens, and most especially television, are such ubiquitous adult objects that even babies are watching.

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