

VIEWPOINT

Interactive Media Use at Younger Than the Age of 2 Years

Time to Rethink the American Academy of Pediatrics Guideline?

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In 2011, the American Academy of Pediatrics (AAP) reaffirmed its original statement on infants and media, leaving the 1999 recommendation essentially unchanged stating "we discourage the use of media by children under the age of two."¹ Although published in October 2011, the policy statement had been completed much earlier owing to the lengthy internal review process of the AAP.^{1,2} The timing is notable because the iPad debuted in April 2010, meaning that the statement was drafted with no knowledge that such a device would ever exist. Now, 3 years later, we still know surprisingly little about how iPads and other interactive media technologies affect children's cognition—research is simply unable to keep up with the pace of technological advances—and these devices are increasingly popular. The salient question then is whether the discourage media verbiage of the 2011 statement should be applied to them.

I should disclose that I am a member of the executive committee of the AAP Council on Communications and Media and a co-author of the 2011 statement but that I speak only for myself in this Viewpoint. I should also point out that much of the science underpinning that recommendation is based on research with which I have been involved. Although I and others are currently studying the effects of these new technologies, it will be years before we have robust data about their effects. Accordingly, I want to offer my opinion on what the recommendation regarding them should be based largely on theoretical, rather than empirical, grounds.

By way of background, I believe that there is a direct and an indirect pathway by which media affect child behavior and development. The direct pathway is based entirely on the content viewed and its formal features. That is, what we watch affects how we act, and, at least in the case of young children, the rapid pacing of the programs can impair executive function.³⁻⁵ The indirect pathway is mediated by displacement. Simply put, there are only so many hours in a day, and time spent with media (even educational programming) comes at the expense of some other—potentially developmentally salubrious—activity (eg, playing or reading).

To be sure, an iPad (or other interactive device) can function as nothing more than a video screen in which case the data acquired from research on televisions surely applies. But if it is being used in the context of one of the thousands of interactive applications currently designed for children, there are significant theoretical and practical differences that warrant consideration. Consider the following. We recently published a study that

examined neuroendocrine responses to block play vs infant DVD viewing.⁶ Children aged 15 to 18 months were randomized to one activity and we collected serial salivary cortisol levels in our laboratory. Cortisol and performance have an inverted *u* relationship, meaning that at both high and low levels, performance is impaired.⁷ There are no existing reference standards for what constitutes good or healthy levels of cortisol in infants this age. Accordingly, we chose block play as our comparator because we know from prior experimental work that it is good for language development and therefore any observed levels in the setting of this activity should be construed as acceptable and healthy.^{6,8} The children in the block play had significantly higher cortisol levels than those in the DVD group during the time that reflects engagement with each activity.⁶ The question at hand then might well be: are interactive touch-screen technologies more likeable to passively watching a screen or to playing with blocks? My hunch is that they are more akin to block play and here is why: the one thing a child never says (or thinks) when he or she interacts with passive media is "I did it!" This is, of course, quite different than what might be experienced in the context of using a well-designed interactive app.

The Table summarizes key features of traditional toys (eg, a jack in the box), a touch-screen device, and old media. The first feature is *reactivity*, meaning whether the device can respond to something a child does. The second feature is *interactivity*, meaning whether the device can prompt reactions from a child based on actions that he or she took. The third feature is *tailorability*, meaning whether the device can behave differently based on particularities of the child (eg, age and stated preferences). The fourth feature is *progressiveness*, meaning whether the device can move a child along a continuum such that it begins where he or she last left off, advancing in complexity as understanding deepens. The fifth feature is *promotion of joint attention*, meaning the device can enable or facilitate adults and children interacting with one another. The sixth feature is *portability*, that is, how easy is it to transport the device and make it readily available in different venues. And the final feature is 3-dimensionality, namely, can the child engage the device across space by manipulating it with his or her hands. As can be plainly seen, there are many ways in which iPads and traditional toys differ from traditional passive media. Therefore, there is a strong theoretical foundation to posit that the AAP recommendations regarding media for children younger than the

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Table. A Comparison of Features of 3 Different Devices Used by Children Younger Than the Age of 2 Years

Feature	Traditional Toys	Touch-Screen Devices	Television
Reactive	✓	✓	
Interactive		✓	
Tailorable		✓	
Progressive		✓	
Can promote joint attention	✓	✓	
Highly portable	✓	✓	
3-Dimensional	✓		

age of 2 years should not be applied to these newer media. Lest one take from this Table the idea that iPads are in fact superior to all play devices, it should also be pointed out that the simple act of reading a book to a child has all 7 features.

Despite of these distinguishing features, there are, at least from my perspective, 2 caveats about the use of these devices. The first is that, as discussed previously, they can displace other activities that are crucial to child development. In particular, caregivers should always ask themselves what their child would otherwise be doing were it not for the omni-available touch screen. For example, I cringe when I see families at restaurants together and each member has their eyes glued to their personal device, thereby bypassing an increasingly rare opportunity for familial engagement. On the other hand, given that 90% of children younger than the age of 2

years currently use television and DVDs regularly, there is the real possibility that interactive media will displace traditional media, which I would support at least from a harm reduction standpoint.⁹ The second is derived oddly enough from the interactive nature of the device itself. The "I did it!" response, whether stated or felt, manifests itself on a neuronal level with the secretion of dopamine as part of the reward pathway. Think B. F. Skinner's famous rat experiments. The delight a child gets from touching a screen and making something happen is both edifying and potentially addictive. In much the same way as we have seen the emergence of problematic Internet use in older children and adolescents, we may now begin to see compulsive use of iPads among our youngest patients. Therefore, limits on use are in order.

In conclusion, while many of you wait for us to build an evidence base before this technology too is supplanted by some new one, I believe that judicious use of interactive media is acceptable for children younger than the age of 2 years. And finally, the question I will surely be asked is how long should children be allowed to do so each day. My answer is half an hour to 1 hour and here is how I arrived at what is, admittedly, an arbitrary number. First, children that age are only awake for about 8 to 12 hours per day. There is much to be done and much to be learned in those precious few waking hours (displacement concerns). Second, children that age typically engage with other, traditional toys for about half an hour to 1 hour per day on average, and it seems prudent that these devices be used an equivalent amount (compulsion concerns).⁸ In the meantime, there is much work to be done in the laboratory.

ARTICLE INFORMATION

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Correction: This article was corrected online on March 10, 2014, to fix a council name in the second paragraph.

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