

Television Format and Children's Executive Function

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Theories regarding the impact of media on development can largely be grouped into content-based and content-independent categories.¹ Content-based theories argue that the impact of media on aspects of development differs depending on content. For example, media that involve prosocial themes (eg, helping) may positively impact children's behavior, whereas media that involve violence have the potential to negatively impact behavior. Content-independent theories argue that many of the impacts of media occur irrespective of the content children are exposed to. For example, irrespective of content, viewing media may displace other activities (eg, reading) that positively contribute to children's intellectual development. A third theory that contains both content-based and content-independent elements is based on media form. Briefly, form-based theories argue that specific features of media may negatively impact children's behavior. Although form-based theories are generally classified as content-independent,¹ many forms commonly intersect with certain types of content.

Concerns regarding form have largely focused on the pace of media (ie, the frequency of scene changes or cuts) and the impact pacing may have on aspects of executive function (EF). EF comprises a number of skills, including self-regulation, working memory, and problem solving. Empirical investigations of the potential link between pace and EF can be traced back to Anderson et al's² study on *Sesame Street* in 1977. Even when artificially ramping up the pace of *Sesame Street*, Anderson et al² found no evidence that pace impacted children's EF. A few decades later, Geist and Gibson³ investigated the impact of *Mighty Morphin Power Rangers* on children's EF. Similar to Anderson et al,² Geist and Gibson³ failed to find evidence that *Power Rangers* had any greater impact on children's EF than *Mister Rogers' Neighborhood*.

Of course, one could argue that the media children are exposed to today are faster paced than any media that have come before it, and therefore the impact of pacing on children's EF is still a cause for concern. Lillard and Peterson⁴ addressed this issue by comparing 2 modern-day programs: *SpongeBob SquarePants* and *Caillou*. *SpongeBob* chronicles the adventures of SpongeBob, an animated sponge who lives in a pineapple under the sea. *Caillou*, in contrast, is an animated program that focuses

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Dr Scarf conceptualized the manuscript and reviewed and revised the draft; Ms Hinten drafted the initial manuscript; and all authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

DOI: <https://doi.org/10.1542/peds.2017-2674>

Accepted for publication Oct 11, 2017

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PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

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FINANCIAL DISCLOSURE: The authors have indicated they have no financial relationships relevant to this article to disclose.

FUNDING: No external funding.

POTENTIAL CONFLICT OF INTEREST: The authors have indicated they have no potential conflicts of interest to disclose.

To cite: Scarf D and Hinten AE. Television Format and Children's Executive Function. *Pediatrics*. 2018;141(3):e20172674

on an inquisitive 4-year-old boy who lives in a normal house with his mother, father, and sister. Children were split into 3 groups: 1 group watched 9 minutes of *SpongeBob*, 1 group watched 9 minutes of *Caillou*, and a control group drew with markers and crayons for 9 minutes. After this, 2 types of EF were measured: cool EF and hot EF. Cool EF refers to nonemotional decision-making skills and is generally tested with working memory and problem-solving tasks. In contrast, hot EF refers to emotional decision-making skills and provides a measure of children's self-regulation in the face of tempting rewards or situations. On a composite measure of cool EF, children exposed to *SpongeBob* did not differ from those who watched *Caillou*. On a measure of hot EF, however, children who watched *SpongeBob* performed more poorly than children who watched *Caillou*. Mirroring the popularity of *SpongeBob* with children, the article received a great deal of media attention, and with slightly fewer than 85 000 PDF downloads in the 6 years since it has been published, it also appears popular among academics.

In his commentary on Lillard and Peterson's⁴ article, Christakis⁵ stipulated that despite some of the study's shortcomings, "the findings are robust" and that the impacts of fast-paced media on EF "... regardless of whether they are transient, has profound implications for children's cognitive and social development that need to be considered and reacted to."

But was it really the pace of *SpongeBob* that negatively impacted children's EF? As Lillard and Peterson⁴ noted, *SpongeBob* and *Caillou* not only differ in their pacing but also in their fantastical content. Indeed, fantastical content (eg, physically impossible events and scenarios) can be demanding for children to process and may

negatively impact EF in the short-term. Lillard et al⁶ recently set about testing this possibility by examining the impact of fast-paced and fantastical content on EF. In brief, Lillard et al⁶ failed to replicate their earlier finding that *SpongeBob* negatively impacted hot EF. With respect to cool EF, across 3 studies, the findings were largely consistent with their earlier work. That is, fast and fantastical cartoons generally differed from a control condition, but there was little consistent evidence that the fast and fantastical cartoons could be statistically separated from their slower and nonfantastical counterparts. Reflecting on earlier work in this area, Lillard et al⁶ noted that "... the results of this study are consistent with a much earlier study that used fast and slow episodes of *Sesame Street* (Anderson et al, 1977). Although that study's lack of (significant) results could have been because of the entire show being much slower in the 1970s than are TV shows today, the present study suggests instead that even today's very fast pacing is not problematic for children's EF."

Given Lillard et al's⁶ more recent findings and the periodic failure of earlier studies to demonstrate a consistent impact of pacing on EF, what advice should be given to parents? Recommendations must be based on the most up-to-date evidence. As it stands, the limited literature on the immediate impact of fast-paced media on EF does not support Christakis's⁵ claims. With pace aside, does the evidence regarding fantastical content warrant recommendations limiting children's exposure to fantastical content? Unlike pace, fantastical content is not limited to modern-day media. Children's books, including some of the most beloved books of all time such as Maurice Sendak's *Where the Wild Things Are*, abound with fantastical content. Digital immigrants likely have a soft spot

for books from their youth and, therefore, may be less likely to endorse a position that suggests we limit children's exposure to them. Similarly, with many digital natives now parents themselves, there is now a generation of parents who likely have an affinity for shows that they watched during their childhood, no matter the fast and fantastical content it may have contained.

In our view, it is suggested in the current evidence that parents need not be concerned about the form of the media their children choose to watch. Our view is consistent with recent longitudinal work in which it was demonstrated that, when taking into account other factors that do shape children's EF, such as the negative impact of extensive media use and the positive impact of a strong vocabulary, media form is simply not an important contributing factor.⁷ In closing, although programs like *SpongeBob* provide no benefit beyond entertainment, their fast and fantastical nature also does not pose any immediate or long-term risk to children's EF.

ABBREVIATION

EF: executive function

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Pediatrics 2018;141;

DOI: 10.1542/peds.2017-2674 originally published online February 21, 2018;

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