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## EDITORIAL

# Interactive media use and early childhood development<sup>☆,☆☆</sup>



## Uso de mídia interativa e desenvolvimento infantil precoce

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The study by Juliana Nobre et al. in this issue introduces a novel instrument to assess interactive media use in children younger than 4 years.<sup>1</sup> The development of this instrument is well-timed. Society is confronted with an explosive increase in the use of interactive media. Recent data from the United States illustrate the changes in media use.<sup>2</sup> In 2011, 41% of American 0–8 year olds had a smartphone in the home, whereas in 2017 this number had increased to 95%. Despite the increase in mobile devices, children's overall screen time did not increase. Children continued to use screen media on average well over two hours per day. Yet, the relative time spent with mobile devices increased from 4% to 35% of total screen time. Also, the majority of the youngest children nowadays use mobile devices: in 2013–2014, 30–44% of children younger than 1 year used a mobile device, and 77–90% of 2-year-olds (studies in the United States<sup>3</sup> and France).<sup>4</sup> Unlike the computer's keyboard and mouse that require considerable fine motor coordination, the touch

screens of mobile devices are compatible with the fine motor skills of young children. At around 1 year of age most children are able to tap, touch, swipe, and pinch on the screen.<sup>5</sup> Due to the ubiquity of the accessible mobile devices, interactive media currently form an integral part of young children's daily life. Nevertheless, the effect of these media on child health and development is not well understood.

The large majority of studies on screen media use in children addressed passive forms of screen media use, such as watching television programs, prerecorded videos, and DVDs. These studies reported that increased screen time is associated with a higher risk of obesity.<sup>6</sup> This increased risk has been attributed especially to the effect of snacking while watching TV and to the exposure to advertising for high-calorie foods and snacks.<sup>7,8</sup> Increased screen time also has been associated with a negative effect on sleep, most likely caused by the screen's arousing content and its blue light suppressing melatonin and therewith affecting circadian rhythm.<sup>8</sup> Many studies showed associations between excessive television viewing during childhood and cognitive, language, and socio-emotional delay. Yet, it is important to realize that associations do not automatically imply causations, as it is well known that families that function less well, e.g., families with a low household income or a single parent, are prone to high media use.<sup>8</sup> Nevertheless, the longitudinal study by Madigan et al.<sup>9</sup> indicated that greater screen time when the child was 2 or 3 years

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old was associated with worse developmental scores at the age of 5 years. The study suggested that screen time functioned as an initial factor. However, the question remained whether increased screen time had induced worse development or whether children with less optimal development had received more screen time. The latter mechanism is known to play a role in the association between screen time and behavioral problems. Radesky et al.<sup>10</sup> showed that children with poor self-regulation during infancy were more likely to consume media at the age of 2 years than children with typical self-regulation. The study suggested that part of the association could be attributed to the caregiver's strategy to cope with the young infant's impaired self-regulation by placing the infant in front of screen media. Yet, a recent study suggested that moderately high levels of screen time are not associated with behavioral problems in young children or youth.<sup>11</sup>

The available studies regarding the effect of interactive media use on the development of infants and preschool age children have focused on language learning. Some of these studies used videos with and without interaction instead of interactive media. The studies indicated that infants of 15 months of age are not able to learn new words from watching video, even when the person on the video is talking to the watching infant, and even when the parent naturally interacts with the child during video watching.<sup>12,13</sup> In contrast, 15-months-old children are able to learn new words when parents teach the words in a usual way during every day activities.<sup>13</sup> Toddlers aged at least 19 months are able to learn new words by simply video watching, but only when the person on the video is talking to the observing and listening child.<sup>13</sup> Toddlers do not learn new words when the actor on the video is addressing another child.<sup>14</sup> Nevertheless, the learning of new words in toddlers is more efficient when the video requires them to touch the screen in a contingent way than when they watch a non-interactive video.<sup>15</sup> In addition, the study by Russo-Johnson et al.<sup>16</sup> suggested that word learning improved more when the toddlers had to drag the object labeled with the new word than when they had to tap on the screen or simply were watching the actions being performed on the screen – an effect that was especially found in girls and in children from lower class families. Four of the five described studies that assessed the child's ability to learn new words<sup>12–14,16</sup> evaluated the child's achievement by means of presenting the newly labeled object (the new word) on a screen. This means that the evaluations did not measure whether the child had been able to transfer the knowledge obtained during screen learning to the real world. It should be noted, however, that young children are hampered by a so-called transfer deficit.<sup>17</sup> This means that the children have more difficulties to recognize words that have been demonstrated to them in a picture book, on television, or on touch screens (in the absence of an interacting caregiver) than words that have been presented during face-to-face interactions. In infants the transfer deficit most likely can be attributed to perceptual difficulties (e.g., 3D images on a 2D screen) or contextual mismatch (e.g., inability to distinguish between the frame and the contents of the screen). From 2 years onwards, the transfer deficit may mostly be attributed to a lack of symbolic understanding – it takes developmental time before children understand

that a symbol is not only an object in itself but also is a representation of something else.<sup>17</sup>

The studies on screen-based language learning illustrate that children learn more from media in the following two conditions: (1) when caregivers join the activity and are actively engaged and (2) when it involves specific contingent interactions.<sup>5</sup> This means that learning is most effective when it mimics the real life situation of interaction with a caring adult. Patricia Kuhl suggested that the efficacy of this learning condition is not only mediated by its ability to enhance the child's attention and arousal, but also by the provision of multifaceted information, as the uttered words are accompanied by social cues, such as eye gaze and pointing gestures.<sup>18</sup>

The studies described above indicate that the effect of interactive media use on child development largely depends on the social context of its use and the type of activities performed. The novelty of the questionnaire developed by Nobre et al.<sup>1</sup> is that it pays explicit attention to these latter two aspects of interactive media use. The questionnaire results in a multicriteria index, in which higher scores reflect, for instance, the absence of excessive screen time, the use of a tablet (instead of a smartphone), performing activities requiring manual actions or consisting of educational applications, and caregiver attendance and monitoring. The authors demonstrated that a higher score on the multicriteria index – reflecting a higher quality of interactive media use – in Brazilian children aged 23–42 months was associated with higher scores on the language, cognitive, and fine motor scales of the Bayley Scales of Infant and Toddler Development.<sup>1</sup> The positive association between good quality interactive media use and language development corresponds to the above described literature. The positive association between good quality interactive media use and fine motor development agrees with the findings of a recent study reporting that tablet use at preschool age was associated with better fine motor skills.<sup>19</sup> The association between good quality interactive media use and better cognitive development is new. The findings of Nobre et al. imply that the multicriteria index offers new opportunities to evaluate the effects of interactive media use on early childhood development. Yet, I suggest that the authors may improve the sensitivity of the index by adding two items: one on the way in which the caregivers interact with the child during joint media activity and another on the child's predominant types of manual actions during interactive media use. Application of the multicriteria index will pave the way to a better understanding of the effects of interactive media use. This knowledge is required for adequate guidance and advice for caregivers on interactive media use in infancy and preschool age. Conceivably, interactive media when properly used, *i.e.*, with parental guidance and interaction, and not longer than 2 hours per day and not shortly before bedtime, may be one of the tools to promote early childhood development. Recall that explorative self-practiced activities are pivotal drivers of development!<sup>20</sup>

## Conflicts of interest

The authors declare no conflicts of interest.

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