CHAPTER 3

The Effects of Parent-Child Interaction and Media Use on Cognitive Development in Infants, Toddlers, and Preschoolers

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Decades of research have illustrated the importance of considering the content of media, such as games, apps, and television programs, when evaluating effects on children (e.g., Anderson, Huston, Schmitt, Linebarger, & Wright, 2001). More recently, researchers have also emphasized the context in which children's media use occurs (e.g., Barr & Linebarger, 2010). In general, one important contextual factor for early development is positive engagement with parents. A considerable body of research documents the importance of parent-child joint engagement in the first years of life for a variety of beneficial cognitive outcomes (e.g., Vygotsky, 1978) such as language development (e.g., Hart & Risley, 1995; Tamis-LeMonda, Bornstein, & Baumwell, 2001) and emotional development (e.g., Clark-Stewart, 1973). While the importance of parent-child engagement is well established in the child development literature, this chapter considers how the rapidly evolving media landscape in which young children are being raised may impact the relationship between parent-child interaction and media use. Greater media access may result in increased use by young children, either alone or jointly with parents. Greater access may also result in increases in parents' own media use, which may draw their attention away from their children. This chapter addresses both the role of parental engagement in children's media use and the influence of media on parent-child interaction. We focus primarily on early development in discussing the relationship between parent-child interaction and media use by infants, toddlers, and preschoolers.

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PARENT-CHILD INTERACTION

Research has demonstrated the importance of positive parent-child interactions across the first few years of life for cognitive development as well as social and emotional growth (e.g., Carew, 1980; Clark-Stewart, 1973; Hart & Risley, 1995). Two specific cognitive activities influenced by engagement with parents are play and language skills. The classic theory of cognitive development proposed by Lev Vygotsky underscores how social interaction can facilitate the development for play, language, and other cognitive skills, such as attention and memory. While Vygotsky's theory focuses on social interaction with any individual more advanced than the child, his position is pertinent to the types of engagement that may occur between parents and children. Of particular relevance, Vygotsky discusses the zone of proximal development, or the distance between the child's current developmental level and the level of their potential development (Vygotsky, 1978). Vygotsky proposed that, within the zone of proximal development, interactions with others lead to internalization of cognitive processes first achieved in the social context (Vygotsky, 1978). The child will be able to utilize these cognitive skills on their own in new contexts once they are mastered through social interaction. Vygotsky's theory is reflected in modern research findings demonstrating that interactions with a parent can provide "scaffolding" to enhance the child's cognitive abilities (e.g., Dodici, Draper, & Peterson, 2003; Fiese, 1990; Slade, 1987).

In this way, parent-child interaction plays an important role in the development of early language and literacy skills. Hart and Risley's (1992, 1995) seminal longitudinal study of language exposure during the first 3 years of life found that greater amounts of parental language input correlated with better language outcomes in their children, such as larger vocabulary size and stronger cognitive abilities in general. Similarly, the amount of language used during the first 3 years, along with parental responsiveness and guidance, has been associated with positive literacy outcomes for low-income children entering kindergarten (Dodici et al., 2003). Beyond the amount of parental language input, the quality of social exchanges is also important for language acquisition. In particular, many studies have indicated that parental language input is most beneficial when it is contingent to the child's communicative bids, as demonstrated by positive effects of sensitive and responsive parenting behaviors and conversational turn-taking (e.g., Golinkoff, Can, Soderstrom, & Hirsh-Pasek, 2015; Hoff-Ginsberg, 1990; Masur, Flynn, & Eichorst, 2005; Tamis-LeMonda et al., 2001;

Zimmerman et al., 2009). Hart and Risley (1999) describe the combination of parental responsiveness, turn-taking, and talkativeness when engaging with their child in conversation as the "social dance" of American families. They argue that this dance between parent and child is crucial for children's successful language development.

A second area in which parent interaction can have a significant impact is young children's play. Play is a valuable activity that yields positive outcomes for cognitive, social, emotional, and physical development (for a review, see Ginsburg, 2007). Parents may enhance the positive effects of play by engaging with their child. In fact, parent-child interaction has been shown to increase both the quantity and quality of play in young children. For instance, both free-play and structured play sessions with the mother led to more advanced symbolic play compared to solitary play for children between 1 and 2 years of age (Fiese, 1990). Similarly, for preschoolers, maternal behaviors such as physical and verbal stimulation, involvement, and positive tone were associated with more mature play and better interactions with peers and caregivers (Alessandri, 1992). Active parental interaction (e.g., focusing on the child, showing interest, initiating, or extending play) has also been associated with longer play episodes and move advanced symbolic play (Slade, 1987). Thus, early cognitive development appears to be enhanced to the extent that parents enrich the play experience by actively engaging their children in these ways.

While some parental behaviors directed toward children appear to be beneficial for their early development, others lead to negative outcomes. For instance, behaviors by parents such as intrusiveness and questioning or instructing in a way that directs the child's attention have been associated with decreases in children's symbolic play (Fiese, 1990). Likewise, restricting children's behavior by terminating their activity or redirecting their attention to a new task has been associated with slower rates of cognitive and social development, which contrasts with supportive behaviors, such as maintaining children's focus on an activity, that are associated with faster rates of cognitive and social development (Landry, Smith, Miller-Loncar, & Swank, 1997).

Taken together, research and theory on early parent-child interaction point to many ways in which parental engagement can benefit cognitive growth. The social interaction between parents and children during the early years of development has a powerful influence on children's development of cognitive skills, such as language. Certain parental behaviors support children's development during play as well, which can be crucial for

development since children spend much of their day in this activity. While there is opportunity for parent-child interaction to be supportive, parental behaviors such as interrupting or redirecting attention can be detrimental.

PARENT-CHILD INTERACTION & MEDIA USE

Given these findings for language and play, we would expect parental engagement with young children in the context of their exposure to media to influence similar developmental outcomes. However, before we review the relevant literature, it is important to note that, for children under 3 years of age, two distinct types of media exposure have been associated with dramatically different outcomes. As described by Anderson and Evans (2001), *foreground* exposure occurs when the child is actively attending to content designed for young children whereas *background* exposure occurs when the child is present while age-inappropriate media content is being consumed by an older user. In the latter case, exposure is incidental, and the child pays little active attention to the media content. This distinction is important because background media exposure has been shown to lead to negative effects for young children, whereas foreground media exposure can produce positive effects under certain conditions. For this reason, we divide our review of parent-child interaction in the context of young children's media usage on the basis of foreground versus background exposure.

Parent-Child Interaction and Foreground Media Exposure

Content produced for child audiences first became popular in the 1950s with the *Howdy Doody Show*, and continued to thrive with preschool programs such as *Sesame Street, Mister Roger's Neighborhood, Dora the Explorer,* and *Blue's Clues*. By the late 1990s, with the introduction of infant-directed programs such as the *Baby Einstein* video series, foreground media had become widely available to very young children (Anderson & Pempek, 2005). Not surprisingly, given the ubiquity of media content designed for young users, many families today provide their children with access to media from very early ages. A recent report from a nationally representative sample indicated total screen media use of approximately 2 h per day for children 0–8 years, with television accounting for about an hour of this time (Rideout, 2013). Nearly 60% of these children reportedly watched television every day, approximately equal to the number who read on their own or who were read to on a daily basis (Rideout, 2013).

Researchers have focused on two ways in which parent-child interaction and foreground media influence one another. First, parents may interact with their child such that they engage in media use together as a joint activity. Here, we refer to this physical and verbal interaction while jointly using media as "joint engagement." Second, foreground content designed for infants and parents to use together may facilitate parent-child interaction beyond the effects seen during media exposure by producing positive changes to parent-child interaction after the viewing session. Findings in both of these areas are reviewed here.

Joint Engagement With Foreground Media

Research on parent-child interaction and foreground media often considers joint engagement during media use. While researchers have considered joint engagement for children of all ages (e.g., Gentile, Reimer, Nathanson, Walsh, & Eisenmann, 2014; Nathanson, 2001, 2002, 2013; Valkenburg, Krcmar, Peeters, & Marseille, 1999; Valkenburg, Piotrowski, Hermanns, & Leeuw, 2013), we focus our review primarily on research including children of ages 5 years and under. We first consider frequency with which various forms of joint engagement with media occur and later address the impact these efforts have on learning and cognition.

Existing evidence suggests that the vast majority of young children experience media jointly with a parent at least some of the time. For example, in a questionnaire and diary study of infants 6–18 months of age, a parent was reported to be present 77% of the time infants were exposed to television in families with more than one child and 85% of time in families with no other children (Barr, Danziger, Hilliard, Andolina, & Ruskis, 2010). In a more recent analysis (Connell, Lauricella, & Wartella, 2015), approximately a third of parents with children 0–8 years reported jointly engaging with their child during media use "all or most of the time" for television (31%), computers (29%), and smartphones (29%), although fewer reported doing so for tablet use (21%). An additional 58% reported joint engagement "some of the time" for television, 42% for computers, 35% for smartphones, and 42% for tablets. Another study found that parents were more likely to engage with media with younger children (under age 6), noting a decrease in parent-child joint engagement with media for children of 6–8 years of age (Wartella, Rideout, Lauricella, & Connell, 2013).

Researchers assessing parent-child joint engagement with television sometimes draw a distinction between *mediation* and *co-viewing* (e.g., Valkenburg et al., 1999, 2013), with mediation referring to active

intervention by the parent, such as limiting time or providing explanations, and *co-viewing* referring to watching alongside the child without necessarily intervening. In a study of parents with children of ages 1–18 years (Warren, Gerke, & Kelly, 2002), *restrictive mediation*, which was defined as a focus on media-use rules that limit the amount of time children are permitted to view or prohibit children from viewing specific content, was frequently reported (see also Valkenburg et al., 1999). Another commonly reported strategy was *instructive mediation* (i.e., active mediation), defined as explanations or discussions with children aimed at countering or endorsing a media message (Valkenburg et al., 1999; Warren et al., 2002).

Researchers have assessed the frequencies with which parents employ each of these techniques. In one study, parents of Dutch schoolchildren (ages 5–12 years) reported co-viewing most often, followed by instructive mediation and restrictive mediation (Valkenburg et al., 1999). Other studies have noted developmental differences in the types of mediation strategies used with children. For instance, restrictive and instructive forms of mediation were reported to be more common with children younger than 6 years of age, while co-viewing was more common with older children and adolescents (Warren, 2003; Warren et al., 2002). In a more recent study targeting infants and toddlers, the majority (75%) of parents of children 6–18 months of age reported placing restrictions on their infants' television viewing (Barr, Danziger et al., 2010). These included rules focused on limiting time use (57% of parents), allowing only nonviolent content (21%) or child-directed content (20%), or banning television use entirely (9%; Barr, Danziger et al., 2010). Importantly, a recent study of adolescent reports of parental mediation found that the style used by parents to implement restrictive and instructive (i.e., active) mediation was more important than frequency of use for determining its effect (Valkenburg et al., 2013), which suggests that researchers may need to consider how these techniques are employed by parents in their assessments of impact on the young child as well.

Other studies have assessed the parent and child verbal interactions during joint television viewing to identify ways in which parents engage their young children. In a longitudinal study that followed 16 young children (ages 6–30 months) for 6–8 months (Lemish & Rice, 1986), analyses of parent and child conversations during naturally occurring television viewing in the home indicated that both children and parents actively participated by labeling objects, asking questions, and discussing content. In another study, Stoneman and Brody (1982) asked mothers of preschoolers to record

conversations at home with their children while viewing *Sesame Street* and again while viewing a situation of comedy. They observed that mothers adjusted how they engaged with their children during joint viewing depending on the program content. For instance, mothers spoke more often during *Sesame Street*, while also helping their children focus on the relevant educational content and assessing their understanding. In contrast, during the situation comedy, mothers were more likely to discuss characters' intentions and attributes.

In addition to documenting how often various types of parental engagement with media occur, researchers have also studied the effects of parental engagement on learning and other cognitive outcomes. A large body of research has demonstrated the effectiveness of educational programming for children from preschool age onward (Fisch, 2004). This research indicates that joint engagement with an adult is not a necessary condition for learning from television, at least for children of preschool age and beyond (Fisch, 2004). On the other hand, adult mediation may serve children by scaffolding their learning of educational content. For example, adults may individualize the child's viewing experience by drawing connections between television lessons and the child's own experiences, or they may provide elaboration that aids children in understanding information that might otherwise be too complex (Fisch, 2004). In light of Vygotsky's (1978) theory, if parents are able to engage their child within the zone of proximal development during joint media experiences, then cognitive development may be promoted by allowing the child to achieve more advanced understanding and learning than possible through independent media use.

Research focusing on preschool and kindergarten children has found that adult-child interaction during media use can positively influence a variety of learning outcomes. For instance, an early study by Salomon (1977) assessed co-viewing of *Sesame Street* by Israeli mothers of low socio-economic status (SES) kindergarteners and reported co-viewing to be associated with higher levels of program enjoyment as well as more time spent viewing, which in turn led to greater rates of learning. Reiser, Tessmer, and Phelps (1984) assessed several types of adult engagement to determine which were most effective in facilitating children's learning of letters and numbers. In this study, 3- and 4-year-olds watched a compilation of video segments focusing on numbers and letters. While some children co-viewed with an adult who did not intervene, others experienced intervention with the adult drawing the child's attention to relevant content, asking the child to label the letters

and numbers, and providing feedback. Children who experienced adult intervention learned the target material better than those who did not receive the intervention. A follow-up study of 3- and 4-year-olds aimed to isolate these instructional components to assess their effectiveness (Reiser, Williamson, & Suzuki, 1988). In this study, questioning the child led to better performance regardless of whether feedback was provided. Directing the child's attention to relevant content without elaborating on the content, however, did not increase children's learning. Although Reiser and colleagues did not draw the distinction between mediation and co-viewing, the more effective methods used in their studies can be classified as mediation, whereas the less effective techniques can be classified as co-viewing.

In considering possible effects of parent engagement on media use in infants and toddlers, one must include the well-established finding that young children do not learn as well from traditional video as from equivalent experiences outside of the media context until approximately 30 months of age (see Anderson & Pempek, 2005; Barr, 2013 for a review). This finding is referred to as the *video deficit* (Anderson & Pempek, 2005) and, more recently, as the *transfer deficit* (Barr, 2013). Although we do not know of any research that has directly assessed the parent-child interaction as an approach for ameliorating the transfer deficit in infants and toddlers, a few studies have considered the means by which parent-child interaction during media use might be beneficial for early cognitive development. Parent engagement during television viewing has been shown to guide young children's attention and language. For example, research examining language use has shown that the types of behaviors employed by parents during television viewing with infants (e.g., asking questions, labeling objects) are similar to those seen during book reading with young children (Barr, Zack, Garcia, & Muentener, 2008; Lemish & Rice, 1986). In a study of parental co-viewing of infant-directed videos with 12- to 18-month-olds (Pempek, Demers, Hanson, Kirkorian, & Anderson, 2011), parents used program content as a means of stimulating engagement, for example by singing along with some videos and labeling objects with others. Another study found higher quality of parental speech during co-viewing (as compared to parent-child activities without media), resulting primarily from labeling of objects and actions on the screen (Lavigne, Hanson, & Anderson, 2015). Similarly, in a study assessing parents and their 12- to 25-month-old infants during viewing of an infant-directed DVD designed to teach language, parents with a "high teaching focus" (e.g., those more likely to present a variety

of words and label and describe content on the screen) had infants who were more engaged with the video and who showed a greater quantity and quality of target word use than parents with a moderate or low teaching focus (Fender, Richert, Robb, & Wartella, 2010). Moreover, in a study of low-income families, mothers' verbal interactions with their 6-month-old infants during co-viewing of educational child-directed programming were predictive of their children's language skills at 14 months (Mendelsohn et al., 2010).

Parents rely on various styles and behaviors when interacting with their children, which have been related to varying effects. For example, parents use of a "high scaffold" style in which they employ verbal behaviors such as labeling, providing descriptions, and questioning that directs their toddlers' attention to the screen was associated with higher levels of child responsiveness to the content (Barr et al., 2008). Parents also influence their children in more subtle ways. For instance, toddlers tend to follow their parents gaze to a television screen and look longer at the screen if their parent initiated the look (Demers, Hanson, Kirkorian, Pempek, & Anderson, 2013). This finding complements other research with preschoolers who were found to follow their mother's lead by producing utterances that mirrored the content-specific language she used during joint television viewing (Stoneman & Brody, 1982).

While much of the existing research has focused on the positive effects of parent-child joint engagement with television, some negative results have also been noted, especially in relation to language exposure. Parent speech directed toward the child decreases in quantity during viewing of child-directed television as compared to during structured and unstructured parent-child activities without television (Lavigne et al., 2015; Nathanson & Rasmussen, 2011; Soderstrom & Wittebolle, 2013). Other positive parenting behaviors may also decrease during joint media engagement. For example, the overall quantity and quality of parent-infant engagement was lower during viewing of infant-directed videos than during free-play without television (Pempek et al., 2011). It appears that the presence of infant-directed videos displaced parent engagement with their young child, as the data demonstrate a negative relationship between parent-child interaction and looking at the television for both parents and children (Pempek et al., 2011). The long-term effect of these decreases in interaction has not yet been experimentally tested. Thus, negative effects found during viewing, in theory, could be offset by longer term benefits from parent mediation. Conversely, considerable time spent co-viewing television could be problematic to the

extent that it displaces more beneficial parent-child engagement that may occur with the television off. More research is necessary to determine the short- and long-term effects of repeated joint media use at early ages.

In modern households, television is not the only platform that very young children are using. In a short period of time, access to mobile devices has increased rapidly for families with young children, with ownership of tablet computers, in particular, rising from 8% in 2011 to 40% in 2013 (Rideout, 2013). Given the potential for continuous access to mobile technology, the increased opportunities for young children to engage with media may affect the quality of their interactions with parents and other family members. Recently researchers have begun to examine how parents and children interact around newer media technologies, such as comparing the interactions of parents and preschoolers around digital versus traditional storybooks. The initial studies (Krcmar & Cingel, 2014; Lauricella, Barr, & Calvert, 2014) suggest that parents more often engage in manipulating the book when reading a digital book and may be more engaged overall when reading an electronic book compared to a traditional book. Lauricella et al. (2014) failed to find any differences in other facets of parent-child interaction or in child attention, verbalizations, or story comprehension as a function of storybook type. However, another study (Parish-Morris, Mahajan, Hirsh-Pasek, Golinkoff, & Collins, 2013) reported that parent-child dialogic reading (i.e., techniques such as questioning that encourage parent and child active participation in the reading process) and child story comprehension were negatively impacted when reading digital as compared to traditional storybooks. Clearly, more research is needed on this important topic, as parent-child book reading is one of the most critical contexts for promoting children's language development (Whitehurst et al., 1988).

The findings reviewed above suggest that, for the most part, parental engagement in the context of child-targeted media can be beneficial for children below 5 years of age. However, parents may engage less with their children when in the presence of media than in contexts without media. These findings point to the value of encouraging parents to engage actively in their children's media use and, at the same time, to ensure that their children also experience parent-child interaction without media. Despite advances in research on parent-child interaction during early media use, more research is warranted to determine the types of engagement strategies that are most beneficial for children's cognitive development. For instance, researchers might evaluate whether parent engagement during media use might be

particularly influential before 30 months of age when children have difficulty in learning content from traditional, noninteractive video on their own.

The Effect of Foreground Media on Parent-Child Interaction

Media content specifically designed to educate parents may produce benefits for parent-child interaction that go beyond the immediate joint media experience. While most of the research on parent-child interaction and media has focused on joint engagement during media use, as described above, a handful of studies have assessed the effects of infant-directed videos aimed at improving long-term parent-child interaction. One study, in particular, compared interactions between parents and children 12–18 months of age after viewing videos from one of two infant-directed video series that addressed parent-child interaction in distinct ways (Pempek et al., 2011). The *Baby Einstein* video series presents entertainment content for infants and uses ancillary materials such as DVD inserts to encourage parents to label on-screen objects for their child; the *Sesame Beginnings* video series presents entertainment content for infants and educational content for parents. In particular, the *Sesame Beginnings* videos model the types of behaviors found to enhance early development, such as reading to and engaging in play with the child. Parents in each video condition were asked to view videos from one of the two series at home for 2 weeks prior to two laboratory sessions, while those in the control group participated in laboratory sessions without having watched the videos at home. The quality of parent-child interaction during free-play in the laboratory was higher with more co-viewing of the videos at home, especially for families who watched *Sesame Beginnings* as opposed to *Baby Einstein*. Furthermore, parents who had experience with the *Sesame Beginnings* videos prior to visiting the laboratory showed more engagement with their children and higher quality engagement during free-play immediately after viewing the video together. Families who saw *Sesame Beginnings* for the first time in the laboratory also showed higher quality parent-child interaction immediately after viewing than did those who had just watched *Baby Einstein*.

Another study utilized the *Sesame Beginnings* video series as part of an intervention aimed at enhancing the relationship between incarcerated teen males and their young children at 6–36 months of age (Barr et al., 2011). The training, which was performed either by facility staff or by volunteers, consisted of 10 sessions focusing on specific topics related to establishing a relationship, fostering communication, and social-emotional development.

Within the training sessions, clips from the *Sesame Beginnings* series were utilized to model desirable parent-child interactions. The intervention also included the development of a child-friendly space within the facility, with 10 father-child visits to allow participants to design and implement activities with their child based on content learned in the training. Results revealed an increase in the quality of parent-child interaction across sessions in several areas, including joint attention and turn-taking, with fathers' perceptions of the influence they had on their children's development also improving over time.

Of note, the *Sesame Beginnings* series targeted in these studies was designed to engage and teach parents while also entertaining children. This model may be useful because it allows parents to focus on the video while also engaging with their children. While successful parent training interventions have been developed in the past, limitations affecting their feasibility include cost, time involved in implementation, and poor attendance rates (Lim, Stormshak, & Dishion, 2005). The dissemination of information via video eliminates these problems, presenting an easy and cost-effective way to convey information to a wide audience (Barr et al., 2011; Pempek et al., 2011).

Parent-Child Interaction and Background Media Exposure

Background media refers to incidental exposure to (often age inappropriate) media by an infant or toddler. This may occur when an older family member is watching a television program and the young child is in the room. Compared to foreground exposure, far less research has addressed background media and parent-child interaction. Nevertheless, the studies that have been conducted generally point to negative effects.

Young children's exposure to background media is a common occurrence. In a large nationally representative survey, 36% of families with children 0–8 years of age reported that the television was on "all the time" or "most of the time" in their homes (Rideout, 2013). This rate was highest for lower income families (income less than $30,000), with 47% reporting that the television at home was on all or most of the time (Rideout, 2013). Given the relatively small amount of foreground exposure reported by parents in this same study (roughly 2 h per day), these data suggest that young children are exposed to a substantial amount of background television every day. Likewise, a study of infants between 4 and 19 months of age found that most mothers reported that their children were exposed to background television

more than half of the time during solitary and dyadic play (Masur, Flynn, & Olson, 2015). This was particularly true for children from lower income households (Masur et al., 2015). It should be noted that these authors define background exposure as the television or video on for half the time or more during the child's play activities regardless of whether the content was primarily directed at children or adults. This deviates slightly from the definition by Anderson and Evans (2001), which assumes that background exposure is likely to be age-inappropriate content.

These findings indicating high rates of background media exposure are corroborated by a large nationally representative survey of parents with children 8 months to 8 years of age that was specifically aimed at assessing background television exposure (Lapierre, Piotrowski, & Linebarger, 2012). These researchers used a diary measure in which parents were asked to report all activities their child engaged in during the most recent typical day. For any activity that involved the child in the same location as the parent and did not involve television viewing as the primary activity, the parent was asked if the television was on in the background. Overall, children were exposed to nearly 4 h of background television each day. Exposure was higher for African American children, children under 24 months, and children of parents with less formal education. Additionally, having a television in the child's bedroom was associated with significantly higher levels of background exposure.

By definition, young children do not pay active attention to background media. However, media in the background does elicit some attention, albeit infrequently. One laboratory study of background television exposure by infants between 12 and 36 months found that looking at the television occurred just fewer than 5% of the time the television was on (Schmidt, Pempek, Kirkorian, Lund, & Anderson, 2008). While rate of looking averaged about one to two looks per minute of exposure, these looks were short in length, at roughly 3 s each on average (Schmidt et al., 2008).

In theory, background media exposure can have an effect either by influencing the child's behavior or by influencing the parent's behavior directed toward the child. Some research has found negative effects of background television on young children's behavior (e.g., Nathanson & Fries, 2014; Nathanson, Sharp, Aladé, Rasmussen, & Christy, 2013; Schmidt et al., 2008; Setliff & Courage, 2011). However, here we focus exclusively on evidence in which exposure to media influences the parent's behavior, particularly with regard to interactions with the child.

The presence of adult television in the background has been shown to influence the overall amount of parent-child interaction. In an experimental

study, children of ages 12, 24, and 36 months engaged in an hour-long laboratory session with a parent (Kirkorian, Pempek, Murphy, Schmidt, & Anderson, 2009). The television was on for half of the session (playing a pre-recorded video chosen by the parent from a variety of popular programs) and was off for the other half of the session. Families were provided with an assortment of age-appropriate toys for the child as well as reading materials for the parent. Parents were asked to behave as they would in a similar situation at home. Detailed analysis of parent-child interaction across 10-s intervals indicated that parents interacted less with their children when the television was on and that the quality of these interactions was poorer than without television (Kirkorian et al., 2009). Thus, the use of television in the background interrupted the types of parent-child joint engagement which is demonstrated to be beneficial for children's development.

Several studies have identified negative effects of background television exposure on parental language input (i.e., child-directed speech). Evaluations of parent and child vocalizations in the home environment found a 7% decrease in discernible words heard by the child for each additional hour of television exposure for children 2–48 months of age (Christakis et al., 2009). In an experimental study, both the quantity and quality of parental language directed toward the child were lower during free-play in the presence of background television as compared to when the television was off (Pempek, Kirkorian, & Anderson, 2014). Two studies also point to negative effects of exposure on the child's language abilities, implying that lower quality language environments seen with background exposure may translate into diminished language development. Specifically, exposure to background television was associated with lower levels of cognitive and language development for infants (Tomopoulos et al., 2010) and lower levels of receptive language for preschoolers (Barr, Lauricella, Zack, & Calvert, 2010). However, because the latter two studies are correlational, it is impossible to determine whether background exposure or other related factors led to the decreases seen in language learning.

Research on background media exposure and parent-child interaction has primarily focused on television; however, other forms of digital media may have similar detrimental effects on parent-child interaction to the extent that they draw the parent's attention away from the child. In particular, portable electronic devices such as cell phones and tablet computers have the potential to interfere with parent-child interaction, with the little evidence that exists pointing toward detrimental effects on parental engagement. For instance, preliminary findings from an experiment manipulating maternal

distraction indicated that toddlers' word learning was negatively affected when a cell phone call interrupted the learning experience (Reed, Hirsh-Pasek, & Golinkoff, 2012). Another study found that approximately 23% of low-income mothers spontaneously used their mobile devices during a structured parent-child task in which they were asked to try familiar and unfamiliar foods with their 6-year-old children (Radesky et al., 2015). This analysis revealed that active mobile device use was associated with reductions of both verbal and nonverbal interactions during the task. While children in the latter study were slightly older than the ages targeted in this review, the task utilized is similar to the types of parent-child activities that commonly occur with younger children.

Because of the ease of access to media content afforded by portable Internet-enabled devices, there is a growing possibility that parents will be distracted when engaging with their young children. Recent studies have documented the rapid adoption of cell phones and tablets by families of young children, with ownership of any type of mobile device (e.g., tablet, smartphone) rising from 52% to 75% between 2011 and 2013, respectively, in homes with children 0–8 years of age (Rideout, 2013). Recent assessment of low-income families with children between 6 months and 4 years of age found that 83% owned a tablet and 77% owned a smartphone (Kabali et al., 2015).

Collectively, these findings point to the possibility that background media may result in significant detrimental effects on parent-child interaction. Given the importance of active positive parental engagement for a variety of cognitive and social outcomes, this may be particularly problematic for children in households in which the television is on most or all of the time. However, more research is warranted to assess whether parent-child interaction is equally affected by background media exposure outside the laboratory setting and whether effects do, in fact, hold true for media beyond television. Likewise, longitudinal assessments are needed to determine whether negative influences have a long-term detrimental effect on important cognitive outcomes throughout early childhood and beyond.

CONCLUSIONS

The potential for active parent-child interaction to enhance cognitive development is well established (e.g., Carew, 1980; Clark-Stewart, 1973). There are also dramatic differences in the ways in which families interact and communicate with their young children (e.g., Hart & Risley, 1995;

Tamis-LeMonda et al., 2001). At a time when digital media technology has become a universal presence in the lives of young children and their parents, it is essential that we continue to investigate the complex relationship between media use and parent-child interaction.

The research reviewed here on parent-child interaction and media use illustrates the importance of both the content (e.g., foreground or background) and context (e.g., with a co-viewing parent or without) when considering media effects on cognitive development. Specifically, parent-child engagement with foreground media exposure, consisting of content designed for young children, may have both positive and negative effects on cognitive development. Studies have demonstrated that parents who actively engage with their child during media use help draw their children's attention to appropriate content (e.g., Reiser et al., 1988), increase enjoyment of the program (e.g., Salomon, 1977), and increase learning (e.g., Reiser et al., 1984; Salomon, 1977). However, other studies suggest that the quantity and quality of parent-child interaction and language spoken to the child are lower during co-viewing of television as compared to parent-child interaction in the absence of television (e.g., Lavigne et al., 2015; Nathanson & Rasmussen, 2011; Pempek et al., 2011). It is possible that these reductions may be detrimental, if extensive, because the types of parent behaviors affected are important for cognitive development. In contrast to the mixed results as a function of foreground media use, background media exposure, which by definition often includes content not designed for young children, has consistent negative effects on parent-child interaction, including decreases in child-directed speech (e.g., Christakis et al., 2009; Pempek et al., 2014) and in parent-child interaction overall (Kirkorian et al., 2009).

Despite advances in our understanding of parent-child interaction and media use by young children, additional research is warranted. Given the rapid increase in the number of media products being developed specifically for infants, toddlers, and preschoolers across all platforms, it is imperative that researchers continue to examine how such devices both support and hinder parent-child interaction. Specifically, the types of strategies employed by parents to engage their children with media as well as the effects that these strategies have on language and other cognitive outcomes should be considered further. Researchers should also investigate parent-child interaction throughout the developmental shift from toddlers' difficulty in learning from media (i.e., the transfer deficit) to preschoolers' relative ease in learning educational messages from well-designed content embedded in developmentally appropriate media. Longitudinal assessments of parent-child interactions surrounding media use during the first 5 years of life would capture this transition

so that potential changes in effective parent strategies can be examined and implemented in intervention studies. Assessments of later cognitive abilities and academic achievement should also be conducted to consider the longer-term impact of parent-child interaction during media use. In addition, documentation of the incredible rate at which new digital technologies are being adopted by families across the socio-economic spectrum points to the importance of moving beyond consideration of television to investigation of parental engagement with all types of media used by infants, toddlers, and preschoolers today, from video games to apps on portable devices.

Along with the increased availability of content intended for young children, there is an endless stream of information directed toward adults, with new technologies providing increased opportunities to engage with media, from text messages to fitness trackers that ping or vibrate to solicit attention. While directed toward parents, these technologies have the potential to influence all members of the household, including young children. Detailed assessments of the home media environment are necessary to capture how these relatively new forms of background media impact young children's everyday lives. As with foreground exposure, longitudinal assessments of possible compounding effects of media use on parent-child interaction over time are needed in order to draw more detailed conclusions. Furthermore, the extent to which negative effects of parents' own media use applies beyond television is yet unclear. In theory, any activity that draws parental attention away from the child could cause effects similar to those seen for background television. Importantly, researchers must address the methodological challenges of assessing young children's background exposure to new technology, which may be as fleeting as the parent pulling out his or her cell phone to quickly respond to a new text message.

While much work remains to better understand the relationship between parent-child interaction and media use during early development, existing evidence points to several key issues that may prove useful in recommending guidelines to parents about early media exposure. With respect to foreground media, active joint engagement of parents with young children in the context of media use should be promoted and supported. For instance, parents may be provided with descriptions and examples of techniques that are useful (e.g., drawing the child's attention to relevant educational content) as well as instructions for implementation. Likewise, parents should be informed about the strong evidence indicating that children do not readily learn from traditional, noninteractive video until about 30 months of age (see Anderson & Pempek, 2005; Barr, 2013). Thus, if parents choose to allow their infants and toddlers to use media, they might be encouraged

to engage with the child by using the media content as a way to stimulate their interactions with their young children, such as labeling objects on the screen or singing along. While active joint engagement during media use can lead to positive outcomes for children when compared to children using media on their own, initial studies point to decreases in the quality and quantity of parent-child interaction during media use as compared to activities without television. For this reason, parents should be told of the potentially detrimental effects of foreground media on parent-child interactions, particularly if this exposure is extensive and displaces a great deal of media-free parent-child interaction. Parent-child engagement without media should be encouraged.

With respect to recommendations for background media exposure, preliminary evidence of negative effects on child development should be emphasized. Interventions should aim to increase awareness among parents of their own media use habits and their potential effects on their ability to attend to and actively engage with their children. While it is impractical to ask parents to eliminate all background media exposure for young children, heightened awareness of potential negative effects may help parents to be more vigilant about minimizing this exposure whenever possible. For example, they might be encouraged to turn off the television when the young child is present and no one is actively watching.

Continuing research that incorporates assessments of long-term effects and new technologies will be necessary to increase our understanding of the complex relationship between the effects of parent-child interaction and media use on cognitive development in infants, toddlers, and preschoolers. With this knowledge, recommendations for parents can be refined. Given the vast research on the importance of parental engagement for positive development in many domains, including cognition, helping parents understand how their actions affect and are affected by media use may have lasting beneficial outcomes for development in infants, toddlers, and preschoolers.

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