



Published in final edited form as:

Arch Pediatr Adolesc Med. 2008 May ; 162(5): 411–417. doi:10.1001/archpedi.162.5.411.

Infant Television and Video Exposure Associated With Limited Parent-Child Verbal Interactions in Low Socioeconomic Status Households

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Abstract

Objective—To assess verbal interactions related to television and other electronic media exposure among mothers and 6 month-old-infants.

Design—Cross-sectional analysis of 154 mother-infant dyads participating in a long-term study related to early child development.

Setting—Urban public hospital.

Participants—Low socioeconomic status mothers of 6-month-old infants.

Main Exposure—Media exposure and content.

Main Outcome Measures—Mother-infant verbal interaction associated with media exposure and maternal covieing.

Results—Of 154 low socioeconomic status mothers, 149 (96.8%) reported daily media exposure in their infants, with median exposure of 120 (interquartile range, 60-210) minutes in a 24-hour period. Among 426 program exposures, mother-infant interactions were reported during 101 (23.7%). Interactions were reported most frequently with educational young child-oriented media (42.8% of programs), compared with 21.3% of noneducational young child-oriented programs (adjusted odds ratio, 0.4; 95% confidence interval, 0.1-0.98) and 14.7% of school-age/teenage/

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Additional Contributions: Members of our project team contributed to this study, including Virginia Flynn, MS, Gilbert Foley, EdD, Susan Linker, MEd, Jessica Urgelles, BS, Cori Green, MD, Margaret Wolff, BA, Leyla Almanza Peek, MD, Brenda Woodford, MA, Ingrid Luchsinger, MA, Melissa Acevedo, BA, Cindy Caceres, BA, Lena Huberman, and Jennifer Zucker.

Financial Disclosure: None reported.

adult-oriented programs (adjusted odds ratio, 0.2; 95% confidence interval, 0.1-0.3). Among coviewed programs with educational content, mothers reported interactions during 62.7% of exposures. Coviewing was not reported more frequently for educational young child-oriented programs.

Conclusions—We found limited verbal interactions during television exposure in infancy, with interactions reported for less than one-quarter of exposures. Although interactions were most commonly reported among programs with educational content that had been coviewed, programs with educational content were not more likely to be coviewed than were other programs. Our findings do not support development of infant-directed educational programming in the absence of strategies to increase coviewing and interactions.

THERE HAS BEEN A DRAMATIC increase in television programming directed toward young infants.¹⁻³ This has occurred despite recommendations from the American Academy of Pediatrics that children younger than 2 years should not watch any television.⁴ Much of this programming is marketed toward parents as “educational,” despite limited data to support this assertion.³

It is therefore not surprising that infants are exposed to a substantial amount of television. A study by the Kaiser Family Foundation showed that 61% of infants younger than 2 years are exposed to television on a typical day, and that exposed infants spend on average 1 hour 20 minutes in this activity.⁵ Zimmerman et al⁶ found that the median age at the onset of regular media exposure is 9 months. Exposure is greatest in children whose mothers have low levels of education and whose families have low levels of income.^{5,7}

There is a paucity of data regarding the impact of media exposure in infancy, in part owing to methodological challenges specific to this age group.² Much of the exposure is directed toward older siblings and adults and may not be viewed by the infant; such exposure is considered to be background.^{2,6} Even when programming is directed toward infants, attention to content is not consistent.^{8,9} It is therefore difficult to define and assess exposure in infancy.

The existing data suggest that early exposure may have adverse long-term consequences and limited potential for benefit. Media exposure before 3 years of age has been linked to symptoms of inattention and lower levels of reading achievement in early elementary school^{10,11}; although controversial,^{12,13} these findings are consistent with those in older children.¹⁴⁻¹⁶ In very young children, there is limited documentation of benefit from media with educational content. Experimental studies have demonstrated that children do not learn well from televised social cues before 12 months of age¹⁷ and that imitation of television is reduced in children younger than 30 to 36 months.^{18,19} Furthermore, infant educational television viewing has been associated with inconsistent effects on language development.²⁰ These findings diverge from those in older children, for whom educational television is associated with increased school readiness skills.^{21,22}

Parent-child interactions are likely to moderate the impact of media exposure by reducing adverse effects and increasing the possibility of benefit.^{4,23,24} In older children, interactions with parents around media exposure are associated with improved behavioral and learning outcomes.²⁵⁻²⁷ However, media exposure may reduce the like-lihood of interactions with parents.²⁸⁻³¹ This is especially important for infants and young children, for whom inperson verbal interactions have a substantial effect on developmental outcomes,³²⁻³⁹ and for whom comparable language exposure from media is less likely to be associated with beneficial effects.^{19,40} Verbal interactions are likely to be facilitated by coviewing, in which the parent and child watch programs together.⁴¹ However, coviewing and verbal interactions around media tend to be limited, especially in families with low socioeconomic status (SES).⁴²⁻⁴⁵

In this study, we sought to assess verbal interactions related to media exposure in low-SES mothers of young infants. We tested 2 hypotheses. First, we hypothesized that although the overall rate of interactions during programs would be low, it would vary by program content, with the highest frequency among programs with educational content. Second, we hypothesized that maternal coviewing, given its role in facilitating interactions, would also be increased in association with educational content.

METHODS

STUDY DESIGN

We performed a cross-sectional analysis of mother-infant dyads participating in the Bellevue Project for Early Language, Literacy and Education Success, a randomized, long-term study assessing the role of primary care interventions^{46,47} in promoting child development. This analysis included mothers and infants who had been enrolled from November 1, 2005, through September 30, 2006.

STUDY SAMPLE

Enrollment of consecutive eligible mother-infant dyads was performed in the postpartum unit of Bellevue Hospital Center, New York, New York, an urban public hospital serving at-risk families. Inclusion criteria were intention to receive pediatric primary care at our institution for at least 3 years, English or Spanish as the primary language, an uncomplicated full-term delivery, no Early Intervention eligibility, the mother as the primary caregiver, ability to contact the mother, mother's age at least 18 years, and no significant maternal medical problems. This analysis includes families in the lowest 2 categories of the Hollingshead SES index.⁴⁸

We obtained written informed consent from parents before participation. Approval for studies involving human subjects was obtained from the New York University School of Medicine institutional review board and Bellevue Hospital Center Research Committee.

STUDY VARIABLES AND ASSESSMENTS

The independent variable was media content. For the first hypothesis, the dependent variable was mother-infant verbal interaction related to media exposure; this was based on whether the mother reported speaking to the infant about each program. For the second hypothesis, the dependent variable was maternal coviewing. We also assessed potential confounders, including home environmental factors and family sociodemographic characteristics.

MEDIA EXPOSURE

We assessed electronic media exposure in the home using a 24-hour recall diary based on an interview with the caregiver, a widely used method.^{21,32,49-52} We asked the mother to provide information about all electronic media (television, videos, movies, and games) to which the infant had been exposed on the most recent typical day, including the name and duration of each program. We asked the mother to include all programs from the time the infant first woke up in the morning until the infant went to sleep for the night.

Our primary measure was overall media exposure, defined as all programming for which the infant was present in the room and awake, based on criteria used in other studies.²² To further differentiate programming to which the infant had been exposed from background programming,² we also assessed media perceived by the mother to have been watched by the infant; this was calculated on the basis of programs reported by the mother to have been "sometimes" or "mostly" watched by the infant. Because the mother's perception of whether

the infant had watched the program is subjective,²² this was considered a secondary measure.

We assessed program content on the basis of information obtained from industry rating systems and a consumer media publication.⁵³⁻⁵⁵ Content was categorized with masking to interactions and coviewing and using a classification system developed by two of us (S.T. and A.L.M.). Although there is no definitive approach to categorizing media content, this approach has been shown previously to have good interrater reliability ($\kappa=0.91$) and to be associated with parenting behaviors³² and behavioral outcomes.⁵⁰ We used the following categories of programs:

1. *Educational young child-oriented programs* represented media with educational content intended for children younger than 7 years, including live action and animated programs. Examples include *Sesame Street* and *Blue's Clues*. We also subcategorized educational programs as being directed at infants and toddlers on the basis of descriptions of content.⁵⁵ However, the limited number of exposures in this subcategory precluded analyses beyond descriptive data.
2. *Noneducational young child-oriented programs* represented media intended for children younger than 7 years or otherwise considered by industry as appropriate for young children but without educational content. Examples include common young children's action cartoons that have little or no violence, such as *Spongebob Squarepants*.
3. *School-age/teenage/adult-oriented programs* represented programs considered appropriate for school-aged children or teenagers but not appropriate for preschool children on the basis of violence and other content. Adult programming included all television programming not oriented toward children, including news, sports, game, talk, variety, soap opera, drama, and comedy programs oriented toward adults. Examples included *Xiaolin Showdown* (school-age program), *Good Morning America* (talk show), *La Fea Más Bella* (soap opera), and *Law and Order* (drama).
4. *Unknown programs* represented instances in which we were unable to categorize a program owing to incomplete information.

We assessed mother-infant interaction related to media for each program on the basis of answers to the following question: "Did you talk to the child about the program during it or was it mostly for watching?" The mother was asked to select a response from among "mostly for watching," "some talking," "a lot of talking," "not together with child during program," "background noise," and "other." Mothers who answered that there had been a lot of talking or some talking were considered to have had verbal interactions related to the program. We are not familiar with any existing measure that assesses verbal interactions at the level of specific programs; however, this question captures information at a program level very similar to that collected at a global level in other studies.^{56,57}

We assessed maternal coviewing for each program on the basis of answers to the following question: "What were you doing during the program?" The mother was asked to select a response from among "mostly watching with child," "sometimes watching with child," "mostly doing something else," or "watching, but not with child." Mothers who answered mostly or sometimes watching with the child were considered to be coviewing. As with interactions, we are not familiar with existing measures of coviewing at the level of specific programs. Again, the question that we used captured information at a program level very similar to information collected globally in previous studies.^{44,56}

CONTROL VARIABLES

We collected information about the following 2 home environmental factors as control variables: shared reading aloud and maternal depression. Shared reading is an important source of mother-child verbal interactions and is associated with children's language development and measures of early school readiness.^{32,33,58-60} We assessed parent-child reading activities using the StimQ-READ, an interviewer-administered scale that assesses the frequency of reading activities, children's books read to the child, and interactions around reading.^{61,62} Maternal depression is common in parents with low SES and is associated with reduced interactions.⁶³⁻⁶⁵ We assessed maternal depressive symptoms using the Patient Health Questionnaire-9.⁶⁶⁻⁶⁹ We used a cutoff score of 5 to define the presence of symptoms, corresponding to "mild depression."

We also collected sociodemographic data from maternal interviews conducted during the postpartum period. This information included the mother's education, occupation, ethnicity, language spoken, country of origin, and marital status; the father's education and occupation; and the child's sex and birth order. The SES was determined on the basis of parental education and occupation.⁴⁸

STATISTICAL ANALYSIS

We analyzed associations between the independent variable (program content) and the dependent variables (verbal interactions and maternal coviewing) at the program level. These analyses were performed with multiple logistic regression analyses in which generalized estimating equations were used to account for repeated measures (multiple programs) within individual mother-infant dyads. The GENMOD procedure in SAS⁷⁰ was used, with multiple programs treated as repeated measures and compound symmetry specified as the correlation structure among these repeated measures. In these models, we adjusted for all control variables described (except ethnicity because most Spanish-speaking participants self-identified as Latino or Hispanic) and exposure to interventions within the larger study. All analyses relate to our primary measure of exposure (programs for which the child was present in the room and awake) except where noted.

RESULTS

STUDY SAMPLE

From November 1, 2005, through September 30, 2006, 325 mother-newborn dyads were identified as eligible, of whom 243 were enrolled in the study (74.8%). Those who elected not to enroll primarily cited time constraints or partner reluctance. One hundred seventy-three of these families (71.2%) underwent assessment when the infants were a mean (SD) age of 6.6 (1.0) months. The remaining families were not available for follow-up at the time of this assessment or completed it after the infant was 9 months of age (7 cases) and considered too old to be included. Families who underwent assessment were similar to those that did not on the mothers' education level, marital status, language spoken, country of origin, and SES; the child's sex; and whether the child was born first. One hundred fiftyfour of the families (89.0%) were in the lowest 2 categories of SES and included in this analysis. Descriptive data are given in Table 1.

MEDIA EXPOSURE

Using our primary measure (exposure while present and awake), we found that the 154 infants had a median of 120 (interquartile range, 60-210) minutes of exposure in a 24-hour period. One hundred forty-nine mothers (96.8%) reported that the infant was exposed to electronic media, with 426 total exposures. This included 139 exposures (32.6%) to educational young child-oriented programs, 46 (10.8%) to noneducational young child-

oriented programs, 205 (48.1%) to school-age/teenage/adult-oriented programs, and 36 (8.5%) to unknown programs. No exposure to movies outside the home or to videos or computer games was reported. Of the 139 educational young child-oriented programs, 9 were specifically directed toward young infants. Mothers reported coviewing 266 programs (62.4%) with their infants.

Using our secondary measure (programs perceived to have been watched by the infant), we found that the median exposure was 60 (interquartile range, 30-150) minutes, with 122 mothers (79.2%) reporting media exposure. Mothers perceived that the infant had actually watched 291 of the 426 programs to which infants had been exposed (68.3%). This included watching 117 of 139 educational young child-oriented programs (84.2%), 36 of 46 noneducational young child-oriented programs (78.3%), and 118 of 205 school-age/teenage/adult-oriented programs (56.7%).

PROGRAM CONTENT AND MOTHER-INFANT INTERACTIONS

As hypothesized, the overall rate of interactions was low, with mothers reporting that they talked to infants about the programs during 101 of 426 (23.7%). Table 2 shows associations of verbal interactions with media content (excluding exposures that could not be categorized). Interactions were reported most frequently with educational programs (42.8%), compared with 21.3% of noneducational young child-oriented programs (adjusted odds ratio [AOR], 0.4; 95% confidence interval [CI], 0.1-0.98) and 14.7% of school-age/teenage/adult-oriented programs (AOR, 0.2; 95% CI, 0.1-0.3). In this model, interactions were more frequent in association with firstborn children (AOR, 5.7; 95% CI, 2.9-11.0) and mothers who read aloud to their child (AOR, 3.1; 95% CI, 1.4-6.9) and reduced in the presence of maternal depressive symptoms (AOR, 0.4; 95% CI, 0.2-0.9). Table 2 also shows similar analyses performed with the data limited to those programs coviewed by the mother. Among coviewed programs, interactions were reported during 62.7% of programs with educational young child content, compared with 45.5% of noneducational young child programs (AOR, 0.5; 95% CI, 0.2-1.5) and 20.3% of school-age/teenage/adult programs (AOR, 0.1; 95% CI, 0.1-0.3).

When we limited the analysis to the programs that mothers perceived had been watched by infants, the pattern of findings was generally similar. Even in this subgroup, interactions were reported for only 49.1% (57 of 116) of educational programs, 44.5% (89 of 200) of programs that had been coviewed, and 65.0% (52 of 80) of programs that were both.

Table 3 shows analyses related to our second hypothesis, that increased maternal coviewing would be found in association with educational young child-oriented media. Contrary to our hypothesis, we found that coviewing was not reported significantly more frequently for educational young child-oriented programs, with coviewing reported during 60.1% of educational compared with 46.8% of noneducational young child-oriented programs (AOR, 0.6; 95% CI, 0.3-1.3) and 72.7% of school-age/teenage/adult-oriented programs (AOR, 1.7; 95% CI, 0.9-3.1).

COMMENT

In this study, we found limited verbal interactions during media exposure in infancy, with interactions reported for less than one-quarter of exposures. Consistent with our first hypothesis, interactions were most commonly reported in association with educational content, especially among programs that had been coviewed. However, approximately half of the exposures consisted of programs not intended for young children; these were not associated with frequent interactions even when they were coviewed. We also found that

interactions were increased in firstborns and increased among mothers who shared reading aloud with their children, but reduced in the context of symptoms of maternal depression.

Contrary to our second hypothesis, we did not find educational content to be associated with increased coviewing. This finding suggests that the hypothetical benefits of educational media may be limited in the absence of strategies to increase coviewing. This is the only study, to our knowledge, to assess whether educational television is associated with coviewing in infancy. However, it is consistent with work in older preschool children that suggests that less coviewing takes place in association with child-oriented programs in general.⁷¹

This study is the first, to our knowledge, to assess parent-infant interactions as they relate to specific media content. The finding that interactions are limited is not surprising given other demands on parental time⁶ and the fact that parents are willing to expose even their young children to significant amounts of television.⁷² Previous work by Schmitt⁸ documented the limited degree to which interactions take place in general in the context of media exposure. In a naturalistic study of 20 children aged 7 to 33 months, verbal or nonverbal interactions were observed during approximately 40% of electronic media viewing time,⁸ with more than half related to another sibling. Our study builds on this work by documenting that verbal interactions with parents are limited regardless of content but are most frequent in association with educational content, especially when coviewed by the parent.

Our findings are important because parent-infant interactions are associated with long-term developmental-behavioral outcomes.^{37,39} Verbal responsiveness is frequently seen in association with reading and playing with toys.^{32,33,46,59,73} Given the large amount of media exposure and low frequency of reported interactions, additional study is needed to determine whether media exposure can facilitate interactions of sufficient quantity and quality to be associated with benefits for young children.

The limited interactions that were reported occurred in the context of substantial daily media exposure. Median overall exposure was 120 minutes, with school age/teenage/adult-oriented content present in more than half of the reported programs. Exposure to overall media and developmentally inappropriate content were greater than reported in other studies.^{5,6,20} This finding may have been related to our definition of overall exposure (present in the room and awake); when we counted only programs that mothers perceived infants to be watching, exposure was more consistent with other studies. Additional research on the assessment of media and the long-term effects of developmentally inappropriate media exposure in infancy is needed.

An innovative aspect of this study was the assessment of whether the mother perceived that the infant had viewed the program. Within the subgroup of programs perceived to have been watched by the infant, we found that the pattern of interactions was similar to that observed for the sample as a whole. However, because the mothers' perceptions of what the infants had been doing were potentially subjective,²² we performed our main analyses on the basis of overall exposure.

Our results have several limitations. There is no widely accepted approach to quantifying and classifying interactions related to electronic media exposure. Although we assessed whether interactions regarding program content occurred, we do not have information about the detailed interactions that took place. Assessment by parent report at the program level may have led to an overstatement of interactions; an observation method counting actual interaction time might have revealed fewer interactions. Social desirability also may have led to an overstatement of interactions. Our findings of limited interactions in the context of media exposure are therefore conservative; it is possible that mothers may talk with infants

even less than we reported. Alternatively, we did not assess interactions with siblings or other caregivers, and this could have led to an underestimation of interactions. Similar methodologic issues might have led to an overstatement of coviewing, which was reported at a higher rate than we anticipated. We performed analyses related to young child-oriented programming rather than infant-directed programming because there was limited exposure to the latter. Further study would be useful to assess the association between programming that is specifically directed toward infants and both coviewing and interactions. Also, results might differ in families with more education and resources. Finally, our results apply to infancy only. It is possible that mothers may increase interactions as infants transition to talking. Our ongoing work will help address questions about children's changing media experiences across early development.

CONCLUSIONS

We found that in low-SES families, most infants were exposed to television and videos. Median overall exposure while awake was 120 minutes, with approximately half of the exposures to programs not intended for young children and very little exposure to programs specifically directed toward infants. In the context of this substantial amount of exposure, we found limited interactions between parents and infants across different types of media content; the sole exception was educational young child-oriented media that had been coviewed. Given evidence that infant media exposure in the absence of inperson interactions is unlikely to have beneficial educational effects⁴⁰ and that parents are likely to expose their infants to unregulated amounts of television,⁷² our findings support American Academy of Pediatrics recommendations of no exposure before 2 years of age.⁴ However, the prominence of media in the home⁷² combined with the numerous responsibilities of parents of young children may make it difficult to successfully restrict media viewing in infancy.⁵⁻⁷

These findings have implications for health care providers working with parents of young children. It is important that providers take a media history even with parents of young infants, the majority of whom expose their infants to television and videos. Second, when exposure is likely to continue, providers should counsel parents that exposure should be limited to educational programming that is coviewed by the mother because this is most frequently associated with interactions. Third, our findings suggest that pediatricians should increase efforts to promote verbal interactions more generally, in the contexts of media exposure and other activities such as feeding, reading aloud, and play. Finally, our findings do not support the development of infant-directed educational programming unless there are concurrent, effective strategies to increase maternal coviewing and parent-child interactions.

Acknowledgments

Funding/Support: This study was supported by grant R01 HD047740-02 to the National Institutes of Health/ National Institute of Child Health and Human Development-funded study "Promoting Early School Readiness in Primary Health Care."

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Table 1Descriptive Data^a

Participants	Finding
Mother	
Completed high school	60 (39.0)
Latino or Hispanic ethnicity	141 (91.6)
Primary language Spanish	121 (78.6)
Country of origin outside United States	131 (85.1)
Married or living with partner	121 (78.6)
Depressive symptoms present	44 (28.6)
Child	
First born	63 (40.9)
Female, sex	78 (50.6)
Media exposure, median (IQR), min/d	
Overall	120 (60-210)
Child reported to be watching	60 (30-150)

Abbreviation: IQR, interquartile range.

^aIncludes 154 mother-infant dyads. Unless otherwise indicated, data are expressed as number (percentage) of dyads.

Table 3Associations Between Program Content and Maternal Coviewing^a

Program Content	No. of Programs	No. (%) of Programs Coviewed by Mother	AOR^b (95% CI)
Educational young child	138	83 (60.1)	1 [Reference]
Noneducational young child	47	22 (46.8)	0.6 (0.3-1.3)
School-age/teenage/adult	205	149 (72.7)	1.7 (0.9-3.1)

Abbreviations: AOR, adjusted odds ratio; CI, confidence interval.

^aIncludes 390 of 426 total programs (36 not categorizable).

^bBased on simultaneous generalized estimating equation model adjusting for maternal education, socioeconomic status, language, country of origin, marital status, whether child was born first, sex, depressive symptoms, mother-infant reading aloud, and intervention status.