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Digital Childhood: Electronic Media and Technology Use Among Infants, Toddlers, and Preschoolers

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ABSTRACT

OBJECTIVES. The objectives of this study were to describe media access and use among US children aged 0 to 6, to assess how many young children fall within the American Academy of Pediatrics media-use guidelines, to identify demographic and family factors predicting American Academy of Pediatrics media-use guideline adherence, and to assess the relation of guideline adherence to reading and playing outdoors.

METHODS. Data from a representative sample of parents of children aged 0 to 6 ($N = 1051$) in 2005 were used. Descriptive analyses, logistic regression, and multivariate analyses of covariance were used as appropriate.

RESULTS. On a typical day, 75% of children watched television and 32% watched videos/DVDs, for approximately 1 hour and 20 minutes, on average. New media are also making inroads with young children: 27% of 5- to 6-year-olds used a computer (for 50 minutes on average) on a typical day. Many young children (one fifth of 0- to 2-year-olds and more than one third of 3- to 6-year-olds) also have a television in their bedroom. The most common reason given was that it frees up other televisions in the house so that other family members can watch their own shows (54%). The majority of children aged 3 to 6 fell within the American Academy of Pediatrics guidelines, but 70% of 0- to 2-year-olds did not.

CONCLUSIONS. This study is the first to provide comprehensive information regarding the extent of media use among young children in the United States. These children are growing up in a media-saturated environment with almost universal access to television, and a striking number have a television in their bedroom. Media and technology are here to stay and are virtually guaranteed to play an ever-increasing role in daily life, even among the very young. Additional research on their developmental impact is crucial to public health.

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Key Words

early childhood, media use, pediatric, AAP media guidelines

Abbreviations

AAP—American Academy of Pediatrics
MANCOVA—multivariate analysis of covariance

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RECENT YEARS HAVE seen an explosion in electronic media marketed directly at the very youngest children in our society: a booming market of videotapes and DVDs aimed at infants aged 1 to 18 months, the launching of the entire television networks specifically targeting children as young as 12 months, the development of a variety of handheld video game players for preschoolers, and a multimillion-dollar industry selling computer games for children as young as 9 months. Despite this plethora of new media aimed at the very young, little is known about young children's use of such media or the impact of such media use on children's development. Few existing studies focus on the media use of children who are younger than 5.¹

The striking dearth of empirically based knowledge stands in stark contrast to popular, policy, parental, and academic interest in the impact of media on young children. The American Academy of Pediatrics (AAP) has recommended that pediatricians advise parents to avoid television-viewing entirely for children who are younger than 2 years and to limit the viewing time of older children to no more than 2 hours a day.² The AAP recommendation states that pediatricians should "discourage television-viewing for children younger than 2 years and encourage more interactive activities that will promote proper brain development, such as talking, playing, singing, and reading together."² These guidelines also specify that television has no place in children's bedrooms. At the time when these recommendations were made, no comprehensive study of the actual amount of electronic media of various types that are used by very young children existed. Likewise, the extent of television placement in young children's bedrooms was unknown at the population level. Some extremely limited data on the use of television (but not other electronic media) by young children exist in the National Longitudinal Study of Youth,³⁻⁵ but by and large, even existing data on television use have focused on children at least 2 or 3 years of age,⁶⁻⁸ with the vast majority focusing on children of school age or older.^{9,10}

This study represents an effort to address the distinct paucity of population-level data regarding the media use of a more current generation of children aged 6 months to 6 years, the very cohort that has experienced much of the marketing and explosion in availability of new media designed for their age group. The data used here were collected by the Kaiser Family Foundation in 2005 and represent the most recent and in-depth information available to date on the extent of access to and use of media among very young children in America. Our goals in this article were fourfold: (1) to describe the media exposure and media use of the current generation of very young children, (2) to assess how many of these young children fall within and outside the AAP guidelines regarding young children's media use, (3) to identify important demographic and family predictors of

whether children fall within or outside the AAP guidelines for television-viewing, and (4) to examine whether children who fall within versus outside those guidelines differ with respect to 2 activities that often are thought to be related to television-viewing: time spent reading and time spent playing outdoors.

METHODS

The survey was designed in consultation with media experts who were convened by the Kaiser Family Foundation and the University of Texas Children's Digital Media Center. The initial questionnaire was refined through pretesting, and the data were collected through telephone interviews by Princeton Data Source from September 12 through November 21, 2005.

Sample

The survey included 1051 parents of children who were aged 6 months to 6 years. Participants were selected by random-digit telephone dialing and completed a telephone survey. Interviewers made up to 10 attempts to contact each sampled telephone number; the response rate was 33%. Calls were staggered over times of day and days of the week. For each household that was eligible, interviewers asked to speak with the parent who spent the most time with the target child. If neither parent spent more time with the child, then 1 was randomly chosen for the interview. The vast majority (81%) of respondents were mothers. The study was approved by the Institutional Review Board at the University of Texas at Austin. Six children were excluded from this study because they were missing essential age information. Therefore, the sample used comprised information from 1045 parents (for children aged 0-2, $n = 412$; for children aged 3-4, $n = 304$; for children aged 5-6, $n = 329$).

The sample was weighted to yield nationally representative estimates in statistical analyses. Sixty percent of the sample were identified as non-Hispanic white, 14% as black, 20% as Hispanic/Latino, and the remainder as other. With respect to income, 6% of the sample reported annual incomes of \$10 000 or less, 10% of \$10 000 to \$19 999, 13% of \$20 000 to \$29 999, 21% of \$30 000 to \$49 000, 18% of \$50 000 to \$74 999, 11% of \$75 000 to \$99 999, and 11% of \$100 000 or more (10% were either unsure or declined to answer). Forty-one percent of mother's worked full time, 17% worked part time, and 38% were not in the paid-labor force. Seventy-six percent of children were in 2-parent family homes, and 23% were in single-parent family homes; the sample mapped extremely well to demographic characteristics of the US population on the basis of Current Population Survey estimates for 2005 (<http://pubdb3.census.gov/macro/032006/hhinc/toc.htm>).

Media Measures

Household Media Ownership and Access

Respondents were asked to indicate whether they had a television in the household, whether they had cable or satellite television, and the number of televisions in the household. They were also asked to indicate in terms of presence (do you have?) and number (how many?) for the following types of media: portable DVDs, VCR or DVD players, video game consoles (eg, X-box, Playstation), handheld video game players (eg, GameBoy), and computers (desktops and laptops). They were also asked whether they had Internet access on their home computer and whether the access was high speed. Finally, respondents were asked whether their child had a television in the bedroom or not and, if they did, whether that television gets some cable or satellite channels, gets only regular channels, is used only for watching videos or playing games, or is not currently working or used. Respondents were also asked about the presence of the following in their child's bedroom: VCR/DVD, video game console, computer, and Internet access.

Media and Technology Use

Respondents were asked to report whether their child did the following on the previous day: watched television, watched a video or DVD, played video games on a console, played hand-held video games, played computer games, used the computer for something other than games, read electronic books, and listened to music. Respondents were then asked to report on the amount of time their children spent using these various media on the previous day. The response categories were 5 minutes, 15 minutes, 30 minutes, 45 minutes, 1 hour, and 1.5 hours and up, in half-hour increments. For these questions, when the previous day was atypical, parents were asked to think about the last day they followed their typical routine.

AAP Guideline Groups

To assess whether children fell within the AAP guidelines² (no television for children younger than 2 years, no more than 2 hours per day after that), we combined reports on the amount of time that children spent watching television and videos or DVDs the previous day. For children who were aged birth to 2, those who did not watch television or videos/DVDs were classified as lying within the guidelines, whereas those who watched any television were classified as lying outside the guidelines (0: within guideline; 1: outside guideline). Children who were older than 2 years were classified as within the guidelines when they watched <2 hours of television or videos/DVDs the previous day and outside the guidelines when they watched ≥ 2 hours (0: within guideline; 1: outside guideline).

Factors That Predicted Membership in AAP Guideline Groups

We identified 2 overarching categories of variables as possible important predictors of whether children would fall within the AAP Committee on Public Education guidelines: (1) demographic factors and (2) family media access and orientation factors.

Demographic Factors

Respondents reported on demographic variables such as their ethnicity, their educational level and employment status, and their spouse's educational level and employment status. Demographic factors included parent's ethnicity, indicated by 4 dummy variables: black (0: no; 1: yes), Latino (0: no; 1: yes), white (0: no; 1: yes), and other (0: no; 1: yes); maternal education, measured using a 7-point scale that ranged from 1 (none or grades 1–8) to 7 (postgraduate training or professional schooling after college); maternal employment, indicated by 3 dummy variables: full-time employment (0: no; 1: yes), part-time employment (0: no; 1: yes), and nonemployment (0: no; 1: yes); family income, measured on a scale ranging from 1 (less than \$10 000) to 7 (\$100 000 or more); family structure: (0: 2-parent family; 1: 1-parent family); and child gender (1: girl; 0: boy).

Family Media Access and Orientation Factors

Media access and orientation factors included whether there was a television in the child's bedroom (0: no; 1: yes) or a video game player in the child's bedroom (0: no; 1: yes); whether the child was in a constant television household (0: no; 1: yes) in which the parent reported that the television was on always or most of the time, even when no one was watching; parents' report of their perception that television mostly helps children's learning (0: does not help; 1: helps); parents' report of their perception that television mostly hurts children's learning (0: does not hurt; 1: hurts); parents' report of whether they had rules about the amount of time they allowed their children to spend watching television (0: no; 1: yes); and parents' report of whether they had rules about the types of programs they allowed their children to watch on television (0: no; 1: yes).

Time Spent Reading and Playing Outdoors

Reading and playing outdoors are 2 activities that generally are deemed to be developmentally crucial for healthy development in childhood. Because time spent with electronic media is commonly believed to interfere with these 2 important activities, we examined mean differences in reading and playing outdoors between children who fell within versus outside the AAP media guidelines. As with media use, parents were asked to report the amount of time their child spent reading or being read to and playing outside. Response categories

were 5 minutes, 15 minutes, 30 minutes, 45 minutes, 1 hour, and 1.5 hours and up, in half-hour increments.

Analysis Plan

Our first 2 goals were to describe the media exposure and media use of the current generation of very young children and assess how many of these young children fell within and outside the AAP guidelines regarding young children's media use. These issues were examined via descriptive statistics.

Our next 2 goals were to identify important predictors of whether children fell within or outside the AAP guidelines for television-viewing and to examine developmental outcomes that were associated with falling within or outside those guidelines. To ascertain factors that were related to whether children fell within the AAP guidelines, we conducted logistic regressions using 2 broad categories of predictors to predict AAP guideline group membership: demographic factors (parents' ethnicity, maternal education, maternal employment, family income, family structure, and child gender) and family media access and orientation factors (television in child's bedroom, video games in child's bedroom, constant television, parental perceptions of television, and parental rules about television).

To analyze the relations between being in the AAP-guideline groups and time spent reading or being read to and playing outside, we conducted multivariate analyses of covariance (MANCOVA) to protect against type I error. In these analyses, all of the demographic and media access and orientation factors were included as covariates.

Partly because children who are aged 6 months to 6 years reflect very different developmental stages and partly because the AAP recommendation focuses on children who are younger than 2 years, all analyses were conducted separately for 3 age groups: (1) 0 to 2 years; (2) 3 to 4 years; and (3) 5 to 6 years.

In the logistic regression and MANCOVA models, 4% of the data points were missing. Multiple imputation methods were used to address missing data. The basic idea behind multiple imputation methods is to create several complete data sets, each of which has missing values suitably imputed. Each of these imputed data sets is then analyzed independently and estimates of parameters of interest are averaged across data sets, resulting in a single robust estimate.^{11,12} Standard errors are computed according to Rubin's rules, devised to allow for the between- and within-imputation components of variation in the parameter estimates.¹²

Stata's user-written program ICE (Imputation by Chained Equations) was adopted to implement the multiple imputation.¹³ Ten data sets were imputed for the logistic regression and MANCOVA models, respectively. Because the Stata-based ICE program does

not support analysis of variance, the imputed data sets were converted to SAS (SAS, Chicago, IL) and SAS was then used to conduct MANCOVAs on the imputed data sets.¹³

RESULTS

Household Media Ownership and Access

Table 1 presents descriptive statistics regarding household media ownership and access. This table clearly shows that very young children are growing up in a media-saturated environment. Television ownership among these families was nearly universal (99.5% for children aged 0–2, 98.4% for children aged 3–4, 98% for children aged 5–6). Among households with a television set present, the average number of working televisions was 2.53, 2.78, and 2.98 for the 3 age groups, respectively. VCR/DVD players were also nearly universal, computer ownership was ~80%, and approximately half of the households had a video game console. Given their age, a fairly large proportion of these very young children had televisions in their bedrooms. This was true of almost one fifth (18%) of the 0- to 2-year-olds and more than one third of 3- to 4-year-olds (43%) and 5- to 6-year-olds (37%). Half (51%) of all children with a television in their bedroom had access to cable or satellite channels. In a similar vein, of the children with a television in their bedroom, extremely small percentages of parents (0%, 0.3%, and 0.9%, respectively) reported that this television was not currently working or being used. Taken together, this indicates that when young children have a television in their bedroom, it is generally a working television, actively in use.

A series of follow-up questions were asked of parents to ascertain their reasons for putting a television in their young child's bedroom. These responses are presented in Table 2. The most common reason that parents named for having a television in their child's bedroom was that it frees up other televisions in the house so that other family members can watch their own shows, followed by it keeps the child occupied so that the parent can do things around the house, it helps the child fall asleep, and it is used as a reward for good behavior.

Media and Technology Use

Table 3 presents descriptive statistics regarding media and technology use among very young children. Most of the children watched television on a "typical day" (~63% of 0- to 2-year-olds, 82% of 3- to 4-year-olds, and 78% of 5- to 6-year-olds). On that typical day, children of all ages spent an average of 1 hour and 19 minutes watching television. Approximately one third of children watched videos or DVDs on a typical day, and they spent an average of 1 hour and 18 minutes viewing them. Very few children (2%, 13%, and 16% for ages

TABLE 1 Descriptive Statistics: Household Media Ownership and Access

Parameter	0- to 2-y-Olds (<i>n</i> = 412)	3- to 4-y-Olds (<i>n</i> = 304)	5- to 6-y-Olds (<i>n</i> = 329)
Television in household, %	99.5	98.4	98
No. of televisions in household ^a	2.53 (1.12)	2.78 (1.14)	2.98 (1.29)
Cable or satellite television in household, %	79	79	84
TiVo/other digital video recorder on television, %	21	18	23
Surround sound on television, %	41	38	41
Portable DVD in household, %	30	36	32
No. of portable DVDs ^a	1.49 (0.85)	1.27 (0.59)	1.44 (0.73)
VCR or DVD in household, %	94	93	93
No. of VCRs or DVDs ^a	2.08 (1.09)	2.31 (1.24)	2.24 (1.29)
Video game console in household, %	45	49	52
No. of video game consoles ^a	1.41 (0.92)	1.36 (0.69)	1.53 (0.97)
Hand-held video game in household, %	21	29	33
No. of hand held video games ^a	1.53 (0.78)	1.75 (1.01)	1.66 (0.92)
Computer in household, %	80	79	82
No. of computers ^a	1.47 (0.88)	1.45 (0.78)	1.72 (0.99)
Internet access on home computer, %	73	71	73
High-speed internet access on home computer, %	45	42	50
Television in child's bedroom, %	18	43	37
Bedroom television has some cable or satellite channels, % ^b	9	19	20
Bedroom television has only regular channels, % ^b	5	7	6
Bedroom television only used for watching videos or play games, % ^b	5	12	9
Bedroom television not currently working or being used, % ^b	0	0.3	0.9
VCR/DVD in child's bedroom, %	14	30	25
Video game console in child's bedroom, %	2	10	18
Computer in child's bedroom, %	3	3	8
Internet access on bedroom computer, %	2	2	4

^a Among those with respective media in the household. Weighted means and SDs are reported.

^b Among those with television in child's bedroom.

TABLE 2 Descriptive Statistics: Why Parents Put a Television in Their Child's Bedroom

Reason	0- to 2-y-Olds (<i>n</i> = 76), %	3- to 4-y-Olds (<i>n</i> = 118), %	5- to 6-y-Olds (<i>n</i> = 121), %
So the parent and other family members can watch their own shows	47	52	60
It keeps the child occupied in his or her room so that the parent can do things around the house	42	42	31
It helps the child fall asleep	28	34	26
As a reward for good behavior	16	25	31
Stops fights between siblings	16	20	31
Had an extra television set that they did not want to throw out	24	22	21
To get child to go to bed in his or her own room	18	21	16
All of child's friends have televisions in their bedroom	9	10	3

Among parents of children who have a television in their bedroom.

0–2, 3–4, and 5–6, respectively) played video games (console or hand-held) on a typical day. However, when they did play, they spent an average of 55 minutes playing. Approximately 4% of 0- to 2-year-olds, 20% of 3- to 4-year-olds, and 27% of 5- to 6-year-olds used the computer on a typical day (those who did spent an average of 50 minutes at the keyboard).

Categorizing Children According to AAP Media Guidelines

The sample that was used to examine the predictors and outcomes associated with falling within versus outside the AAP media-use guidelines was restricted to those with complete data on AAP guideline variables

(*n* = 1044). For the other variables in the model, multiple imputation was conducted to impute the missing values. Therefore, for these analyses, there were 412 children aged 0 to 2, 303 children aged 3 to 4, and 329 children aged 5 to 6.

Among 0- to 2-year-olds, only 32% (*n* = 131) fell within the AAP media guidelines² for children of this age (no television), whereas 68% (*n* = 281) fell outside the guidelines. Among the older groups of children, 56% (*n* = 170) of 3- to 4-year-olds watched for 2 hours or less as recommended by the AAP, and 70% (*n* = 230) of 5- to 6-year-olds watched no more than this recommended limit.

TABLE 3 Descriptive Statistics: Media and Technology Use

Parameter	0- to 2-y-Olds (n = 412)	3- to 4-y-Olds (n = 304)	5- to 6-y-Olds (n = 329)
Watched television ^a	63	82	78
Minutes of television ^b	75.18 (67.30)	89.67 (57.97)	73.99 (53.45)
Watched video/DVD ^a	30	42	29
Minutes of video/DVD ^b	67.44 (47.70)	86.82 (49.47)	78.88 (43.08)
Played video game (console/hand-held video game) ^a	2	13	16
Minutes of video game (console/hand-held video game) ^b	51.21 (42.98)	60.50 (55.94)	51.59 (42.33)
Used computer ^a	4	20	27
Minutes of computer use ^b	60.76 (49.08)	45.81 (33.37)	50.50 (40.94)
Read electronic book ^a	12	20	10
Minutes of reading electronic book ^b	46.27 (49.68)	36.47(22.60)	47.20 (48.70)
Listening to music ^a	87	85	77
Minutes of music ^b	63.87 (60.65)	57.41 (54.65)	51.39 (64.05)

^a Whether children did the activity yesterday/on the last day that was a typical day. Percentages are reported.

^b Weighted means and SDs are reported; among those who used the respective media.

Demographic and Family Media Factors That Predicted Whether Children Fell Outside the AAP Recommended Guidelines

Descriptive statistics for all predictors and outcomes that were associated with AAP media guideline groups are presented in Table 4. Results for logistic regressions that predicted whether children fell outside the AAP media

guidelines are shown in Table 5. The logistic regression results indicate that among the youngest children (0–2), family media factors accounted for membership in AAP-guideline groups, whereas demographic factors were unrelated. Among the 2 older age groups (ages 3–4 and ages 5–6), family media factors continued to be important predictors of membership in AAP-guideline

TABLE 4 Descriptive Statistics: Predictors and Outcomes Associated With AAP Guideline Groups

Parameter	0- to 2-y-Olds (n = 412)	3- to 4-y-Olds (n = 304)	5- to 6-y-Olds (n = 329)
Demographic factor predictors			
Parent's ethnicity			
Black	13	9	10
Latino	18	16	16
White	64	69	71
Other	5	5	4
Maternal employment			
Full time	39	37	47
Part time	18	16	18
Not employed	40	43	33
Maternal education ^a	4.34 (1.71)	4.51 (1.63)	4.35 (1.58)
Family income ^b	4.17 (1.75)	4.33 (1.71)	4.42 (1.64)
Family structure ^c	0.24 (0.43)	0.26 (0.44)	0.21 (0.41)
Child gender ^d	0.48 (0.50)	0.48 (0.50)	0.48 (0.50)
Media access and orientation factor predictors ^e			
Television in child's bedroom	0.22 (0.41)	0.42 (0.50)	0.39 (0.49)
Video game in child's bedroom	0.04 (0.20)	0.14 (0.34)	0.28 (0.45)
Constant television	0.34 (0.48)	0.34 (0.47)	0.30 (0.46)
Parental perception			
Television helps	0.39 (0.49)	0.48 (0.50)	0.41 (0.49)
Television hurts	0.37 (0.48)	0.30 (0.46)	0.33 (0.47)
Television time rules	0.52 (0.50)	0.60 (0.49)	0.71 (0.46)
Television program rules	0.76 (0.43)	0.90 (0.29)	0.93 (0.26)
Outcome variables			
Minutes spent playing outside	65.54 (73.49)	95.99 (85.25)	94.55 (94.27)
Minutes reading/being read to	38.95 (43.18)	39.90 (34.20)	43.26 (44.29)

Data are weighted mean (SD) or percentage.

^a Seven-point scale ranging from 1 (none or grades 1–8) to 7 (postgraduate training or professional schooling after college).

^b Seven-point scale ranging from 1 (less than \$10 000) to 7 (\$100,000 or more).

^c 0: 2-parent family; 1: 1-parent family.

^d 0: boy; 1: girl.

^e 0: no; 1: yes.

TABLE 5 Logistic Regression Predicting the Likelihood of Falling Outside the AAP Recommended Television-Viewing Guidelines

Variables	0- to 2-y-Olds (n = 412)		3- to 4-y-Olds (n = 303)		5- to 6-y-Olds (n = 329)	
	OR	95% CI	OR	95% CI	OR	95% CI
Demographic variables						
Parent's ethnicity						
Black	1.09	0.47–2.55	1.02	0.38–2.75	1.02	0.39–2.65
Latino	1.05	0.54–2.04	1.71	0.80–3.65	1.29	0.59–2.84
Other	1.48	0.45–4.89	0.93	0.23–3.83	2.24	0.57–8.80
White	1.00	—	1.00	—	1.00	—
Maternal education						
Less than high school	0.87	0.35–2.18	1.32	0.49–3.57	0.93	0.31–2.80
High school	1.10	0.54–2.27	0.70	0.31–1.60	1.05	0.52–2.11
Some college	0.94	0.51–1.76	0.69	0.33–1.45	1.71	0.86–3.40
College degree	0.91	0.47–1.76	0.94	0.44–1.98	0.64	0.30–1.36
Graduate school	1.00	—	1.00	—	1.00	—
Maternal employment						
Full time	0.82	0.48–1.38	0.69	0.37–1.29	0.79	0.43–1.44
Part time	0.73	0.37–1.44	0.75	0.35–1.59	0.56	0.24–1.32
Not employed	1.00	—	1.00	—	1.00	—
Family income	0.99	0.83–1.19	0.84	0.68–1.04	1.03	0.83–1.27
Family structure ^a	0.83	0.41–1.68	0.52	0.22–1.27	2.27 ^d	1.07–4.83
Child gender ^b	0.79	0.49–1.27	1.89 ^d	1.09–3.27	1.61	0.94–2.78
Family media factors						
Television in child's bedroom ^c	4.45 ^e	1.99–9.99	1.45	0.80–2.64	0.71	0.36–1.38
Video game in child's bedroom ^c	1.01	0.34–2.97	0.74	0.30–1.78	1.35	0.59–3.11
Constant television ^c	1.21	0.69–2.11	2.12 ^d	1.13–3.97	1.33	0.71–2.49
Parental perception						
Television helps ^c	2.22 ^e	1.23–4.00	1.05	0.52–2.14	1.96 ^d	1.05–3.68
Television hurts ^c	0.90	0.49–1.66	0.56	0.24–1.27	0.81	0.38–1.72
Television time rules ^c	0.63	0.31–1.26	0.75	0.41–1.38	0.80	0.42–1.52
Television program rules ^c	1.90	0.94–3.85	1.93	0.65–5.71	0.33 ^d	0.12–0.90

OR indicates odds ratio; CI, confidence interval.

^a 0, 2-parent family; 1, 1-parent family.^b 0, boy; 1, girl.^c 0, no; 1, yes.^d $P < .05$.^e $P < .01$.

groups, with the addition of gender for 3- to 4-year-olds and being in a single-parent household for 5- to 6-year-olds.

0- to 2-Year-Olds

As mentioned, only family media factors predicted whether children fell outside the guidelines. Specifically, very young children with a television in their bedroom were >4 times more likely to fall outside the guidelines compared with those without a bedroom television. When parents perceived that television mostly helps learning, children were >2 times more likely to be outside the AAP guidelines (see Table 5).

3- to 4-Year-Olds

Both demographic and family media factors predicted whether 3- to 4-year-olds fell outside the AAP guidelines. Girls had greater odds of being outside the guidelines than boys. Three- to 4-year-old children who lived

in a constant television household were 2 times more likely to fall outside the guidelines compared with those who did not (see Table 5).

5- to 6-Year-Olds

Among 5- to 6-year-olds, children who lived in single-parent families were more likely to be outside the guidelines than children who lived in 2-parent families. Having parents who perceived that television is mostly helpful was associated with greater odds of falling outside the guidelines, whereas having parental rules regarding television content was associated with greater likelihood of falling within the AAP guidelines (see Table 5).

Time Spent in Other Activities

There were no differences in time spent either with print media (reading or being read to) or playing outdoors between children who fell within versus outside the AAP media guidelines for any age group.

DISCUSSION

The impetus for this study came from the striking lack of empirically based knowledge about the extent of exposure to and use of media and technology by very young children. It is interesting that at the time the AAP Committee on Public Education made its media-use recommendations,² almost nothing was known about the extent to which very young children actually used media and technology or the extent to which young children had television in their bedrooms. This study is among the first to examine the full extent of very young children's media use at the population level. As such, it provides the most recent information available regarding the extent of media use and media access of infants, toddlers, and preschoolers in America.

Overall, the results indicate that the AAP Committee on Public Education was certainly correct in assuming that infants, toddlers, and preschoolers are using media and using it daily. In addition, the results of this survey make it clear that very young children today are growing up in a media-saturated environment. For this cohort of children and presumably for future cohorts as well, access to and use of media have become part of the fabric of their daily lives.

Much has been made of the vast array of media and technology that are used by children today, and it is clear that they have far more choices available to them than previous generations. However, it is also true that this study indicates that children's use of electronic media is still, by and large, dominated by television. However, when young children do play video games or use the computer, they use these media for just under an hour, which is not a trivial amount of time in a young child's day.

To state that television and VCR ownership was virtually ubiquitous in the homes of young children does not adequately capture the extent of media saturation in these homes. More relevant is that most of them are living in homes with at least 2 of each product; nearly one quarter live in home with ≥ 4 televisions. Eight in 10 children this age live in homes with access to either cable- or satellite-based channels. Taken together, this means that not only do children have many opportunities to watch televised programs, but also they have many televised programs from which to choose. Approximately half of the households had a video game console, and between one fifth (for the 0- to 2-year-olds) and one third (33% of the 5- to 6-year-olds) had access to a hand-held video game. Even more households (78%) reported having a computer, and nearly 7 in 10 of all households (69%) have Internet access.

Although none of this is perhaps surprising, we did find it surprising that many of these very young children have televisions in their own bedrooms. This was true of almost one fifth of the 0- to 2-year-olds and more than one third of the 3- to 4-year-olds and the 5- to 6-year-

olds. The most common reason that parents named for having a television in their child's bedroom was that it frees up other televisions in the house so that other family members can watch their own shows (cited by 54% of parents whose children have television in the bedroom). Other commonly cited reasons were that it keeps the child occupied so that the parent can do things around the house (38%), it helps the child fall asleep (30%), and it is used as a reward for good behavior (25%).

Whatever the reason, this trend is particularly noteworthy, not only because the AAP advises against this practice but also because there is increasing evidence that bedroom television in particular is linked to a number of poor outcomes, including academic, social, and physical activity.¹⁴⁻¹⁷ The question of why parents believe that putting a television in their young child's bedroom is appropriate deserves attention by both pediatricians and scholars. The 2 most commonly cited reasons—(1) that it frees up the television so that other family members can watch their own shows and (2) that it keep children occupied—are particularly noteworthy. These responses indicate that television-viewing may be an increasingly isolated experience, even for very young children. Given the evidence that especially for young children, parental involvement and participation in viewing increases the positive impact of educational shows,⁷ both the prevalence and the developmental impact of viewing alone are important areas of future inquiry.

The notion that television can be used to soothe infants to sleep is also of particular interest, given that television most certainly serves as an activator of the reticular activating system, which stimulates attention and alertness. As such, parents who use the television to put their children to sleep may actually be putting them at risk for a future of sleep disorders.^{18,19} Although speculative at this point, the possibility of this connection (and other implications of bedroom television) is urgently in need of empirical examination.

The results also indicate that very young children are comfortable using these media on their own, particularly television. More than half (54%) of the 0- to 2-year-olds and almost all (82% and 88%, respectively) of the 3- to 4- and 5- to 6-year-olds could turn on the television by themselves, and many could also put in a video or DVD by themselves. Although many fewer of these young children could use a mouse, it is noteworthy that roughly 71% of the 5- to 6-year-olds could. Overall, it seems clear that these children will be very different from previous generations of children with respect to their comfort with technology and the extent to which they use all forms of technology in their daily lives.

Most of the very young children (0–2 years old) fell outside the guidelines recommended by the AAP (in a typical day, 68% of them watched television). This may

be at least partly because parents simply do not know about the recommendation. Eighty-five percent of parents surveyed indicated they had not talked to a pediatrician about their children's media use at all. An earlier survey²⁰ found that only 6% of parents of children who were age 2 years or younger were aware of the AAP viewing guidelines. However, approximately half (56%) of 3- to 4-year-olds and 70% of 5- to 6-year-olds fell within the AAP viewing guidelines. The reason that more of the older children fell within the guidelines may well be because for the very young children, no viewing is recommended; therefore, any viewing sets them outside the guidelines.

Different factors were implicated in whether children fell outside the AAP guidelines.² Among the youngest children (ages 0–2), demographic variables were not linked to adherence to the guidelines; rather, family media factors were significant predictors. Among older children, both sets of predictors—demographic (family structure and child gender) and family media factors—were important predictors of guideline group membership. These findings suggest that the youngest children's viewing is more directly related to their immediate environment, whereas that of older children is associated with both immediate and distal environments. Demographic predictors were particularly salient among the oldest age group (ages 5–6). Specifically, children who lived in a single-parent family were more than twice as likely to fall outside the AAP media guidelines compared with children who lived in a 2-parent family structure. Among 3- to 4-year-olds, girls were more likely than boys to fall outside the AAP guidelines.

It is noteworthy that ethnicity, family income, and parental education were not relevant to whether children followed the AAP guidelines. It could be that the widespread perception that these factors are important predictors of children's viewing has been because the vast majority of existing research has focused on older children. Our findings in this area are in fact consistent with some other research on very young children that documented similar patterns.²¹ Taken together with findings from other studies, our findings suggest that sociodemographic factors may not start to affect children's television-viewing until later in childhood. However, it may be that socioeconomic status and race/ethnicity are related to differences in the amount of time that young children spend using media but not specifically to whether they fall within or outside the AAP limits.

Media access and orientation factors operated differently among children of different age groups. An environment that directly exposes children to television—that is, being in a constant television household and having television in the child's bedroom—is related to higher chances of falling outside the guidelines. Having rules about how much time children can spend with

television decreased the likelihood of older children's (ages 3–4 and 5–6) falling outside the guidelines. This likely represents the direct effect of restrictions in viewing time for these age groups. We did not find any relation between time spent viewing and time spent reading or in outdoor play among these children. These findings echo those of Vandewater et al,²² who similarly found no relation between television-viewing and either of these activities. It may be that, contrary to popular belief (and although children may not be reading or playing outdoors as much as we would like), media use is simply unrelated to these activities.

As indicated, the sample was recruited via random-digit-dialing techniques. Although ensuring a random sample, it should be noted that the response rate was 33%. It is widely known that response rates to telephone surveys of all kinds have noticeably lowered in the past decade or so.²³ This study is no exception. However, confidence in the generalizability of the results is fostered in 2 ways. First, the characteristics of this sample are close to demographic characteristics from the 2005 Current Population Survey. Second, recent research has indicated that the effect of nonresponse on data is less critical than previously thought.²⁴ It also should be noted that only half (50%) of parents interviewed said that they spent all or most of the day with their child. Therefore, it is possible that parents' knowledge of their children's media use is somewhat limited.

CONCLUSIONS

It is clear that in many American families, television is an almost constant presence in daily life. Among young children, this means that they will watch more television. These data highlight that even very young children are exposed to all sorts of screen and electronic media on a daily basis. This study is among the first to demonstrate empirically something that parents have perhaps known for some time: that media use is a normative part of their young child's daily life.

Although the AAP made its media-related recommendations on the basis of concerns about the impact of media use on the very young, the question of media's effects on children this age is just beginning to be examined. A recent study using population data that were collected in 1997²⁰ found that time spent watching television without parents was related to significant reductions in time spent interacting with parents. This, of course, was 1 of the concerns cited by the AAP Committee on Public Education when it made its recommendations.

At this point, there are more "unknowns" than "knowns" in terms of the impact of exposure to screen and electronic media on very young children's development. There is some intriguing evidence that background television interferes with toddlers' ability to focus on play.²¹ There is also correlational evidence of a

connection between children's viewing and subsequent attentional problems.⁴ The question of the impact of this screen medium on very young children's neurologic and attendant cognitive development is in urgent need of additional examination. Questions regarding the developmental consequences of bedroom media for infants and toddlers and of its impact on sleep are also in need of additional attention. Although there is clearly much to be discovered, the findings of this study provide a compelling case for the importance of additional research on the impact of electronic media on very young children's developmental outcomes.

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