Published in final edited form as:

Child Indic Res. 2014 June ; 7(2): 421–436. doi:10.1007/s12187-013-9212-8.

Screen Time at Home and School among Low-Income Children Attending Head Start

Erica N. Fletcher, MPH^{1,2}, Robert C. Whitaker, MD, MPH³, Alexis J. Marino, MPH¹, and Sarah E. Anderson, PhD^{1,*}

¹Division of Epidemiology, College of Public Health, The Ohio State University, Columbus, OH

²Nationwide Children's Hospital, Columbus, OH

³Center for Obesity Research and Education, Temple University, Philadelphia, PA

Abstract

Objective—To describe the patterns of screen viewing at home and school among low-income preschool-aged children attending Head Start and identify factors associated with high home screen time in this population. Few studies have examined both home and classroom screen time, or included computer use as a component of screen viewing.

Methods—Participants were 2221 low-income preschool-aged children in the United States studied in the Head Start Family and Child Experiences Survey (FACES) in spring 2007. For 5 categories of screen viewing (television, video/DVD, video games, computer games, other computer use), we assessed children's typical weekday home (parent-reported) and classroom (teacher-reported) screen viewing in relation to having a television in the child's bedroom and sociodemographic factors.

Results—Over half of children (55.7%) had a television in their bedroom, and 12.5% had high home screen time (>4 hours/weekday). Television was the most common category of home screen time, but 56.6% of children had access to a computer at home and 37.5% had used it on the last typical weekday. After adjusting for sociodemographic characteristics, children with a television in their bedroom were more likely to have high home screen time [odds ratio=2.57 (95% confidence interval: 1.80–3.68)]. Classroom screen time consisted almost entirely of computer use; 49.4% of children used a classroom computer for 1 hour/week, and 14.2% played computer games at school 5 hours/week.

Conclusions—In 2007, one in eight low-income children attending Head Start had >4 hours/weekday of home screen time, which was associated with having a television in the bedroom. In

*Corresponding author: 336 Cunz Hall, 1841 Neil Avenue, Columbus, OH 43210, sanderson@cph.osu.edu, 614-688-3600.

Author contributions:

Erica N. Fletcher^{1,2}, MPH contributed to the design and conceptualization of the research, carried out the initial analyses, and drafted the initial manuscript.

Robert C. Whitaker³, MD, MPH conceptualized the research, contributed to the interpretation of the analyses, and critically reviewed and revised the manuscript for important intellectual content.

Alexis J. Marino¹, MPH contributed to the analysis of the data, and reviewed and revised the manuscript.

Sarah E. Anderson¹, PhD conceptualized the research, designed and interpreted the analyses, and critically reviewed and revised the manuscript for important intellectual content.

the Head Start classroom, television and video viewing were uncommon but computer use was common.

Keywords

television; computer; video games; screen time; low-income preschool-aged children

BACKGROUND

Many preschool-aged children in the United States view screens more than two hours each day, the maximum recommended by the American Academy of Pediatrics (AAP) for this age group (Anderson and Whitaker 2010; Common Sense Media 2011; Christakis et al. 2004a; Mulligan 2011; Rideout and Hamel 2006; Sisson et al. 2009; Vandewater et al. 2007). The relationship between socioeconomic status and screen time in young children is not well characterized, but studies of young children in the US suggest that low-income children spend more time viewing screens than do higher-income children (Anderson and Whitaker 2010; Certain and Kahn 2002; Common Sense Media 2011; Sisson et al. 2009). Few studies have examined both home and classroom screen time, or included computer use as a component of screen viewing, and little is known about media use within preschool classrooms.

High levels of screen time, particularly television (TV) viewing, have been associated with poorer outcomes for preschool-aged children in several areas, including cognitive development (Christakis et al. 2009; Vandewater et al. 2005; Zimmerman and Christakis 2005), externalizing behavior problems (Verlinden et al. 2012), inattention (Christakis et al. 2004b), aggression (Christakis and Zimmerman 2007; Mistry et al. 2007; Robinson et al. 2001), poor sleep (Garrison et al. 2011; Owens et al. 1999; Thompson and Christakis 2005), and obesity (Jordan and Robinson 2008; Mendoza et al. 2007). Many of these outcomes, including those related to cognition (Chase-Lansdale et al. 1997), attention (Froehlich et al. 2007), aggression (Tremblay et al. 2004), and sleep (Owens 2008), are more prevalent among low-income children (Duncan et al. 1998; Spencer 2003). Therefore, to reduce early life socioeconomic disparities in screen viewing and its related outcomes, it is important to understand patterns and correlates of screen time among low-income preschool children. Key aspects of this pattern are the setting (home and school) and the type of screen viewing, neither of which has been described well in this population. To target prevention efforts it is important to identify correlates of high screen time. Having a TV in a child's bedroom is a modifiable behavior that has been shown to be associated with high screen use (Dennison et al. 2002; Rideout and Hamel 2006; Sisson et al. 2011) and is more common among low-income children in the US (Common Sense Media 2011; Sisson et al. 2011).

We examined patterns of screen viewing in a nationally representative sample of low-income preschool-aged children attending Head Start in spring 2007. Head Start is the largest federally funded early childhood education program in the US and it predominantly enrolls children from low-income families (U.S. Department of Health and Human Services 2012). We describe components of children's weekday screen viewing at home and school, including computer and video game use in addition to TV/video/DVD viewing, and examine

the relationship between the presence of a television in the child's bedroom and high home screen time.

METHODS

Head Start Family and Child Experiences Survey (FACES) 2006

We analyzed data from FACES 2006, a longitudinal study funded by the US Department of Health and Human Services to measure Head Start child and family outcomes (West et al. 2010). Head Start provides services annually to almost 1 million low-income children and their families across the US (U.S. Department of Health and Human Services 2012). FACES 2006 was designed to be nationally representative of 3- and 4-year-old children entering Head Start in fall 2006; the sampling design has been described (West et al. 2010). Briefly, a 4-stage clustered, stratified sampling design was used; sixty Head Start programs were randomly selected from the 2004–05 Head Start Program Information Report with the probability of sampling proportional to program size (U.S. Department of Health and Human Services 2011; West et al. 2010). Within each program, 2 centers and 3 classrooms per center were sampled, and approximately 10 children per classroom were randomly selected. A total of 3315 children with parental consent were enrolled in fall 2006 and 2914 of these children were assessed in spring 2007.

Study subjects

We restricted our analysis to 2221 of the 2914 children assessed in spring 2007. Children were excluded from our analyses if they did not have parent assessment data for spring 2007 ($n = 380$), or data for both home and classroom screen time ($n = 23$). To focus analysis on low-income children, we excluded children whose annual household income-to-poverty ratio was >1.85 ($n = 290$). Parent interviews were conducted in person or by telephone if the parent was unable to meet face-to-face. Most respondents (89.3%) were mothers (biological, adoptive, or step) and the remainder were fathers, grandparents, or guardians. Each child's classroom teacher was also interviewed.

Study variables

Screen time—Parents reported their child's home screen time and each child's classroom teacher reported school screen time. With reference to the last typical weekday in which the child's daily routine was followed, the parent was asked, in five separate questions, "Did your child spend any time {(1) watching TV, (2) watching a video or DVD, (3) playing video games like X-Box, PlayStation, or Game Boy, (4) playing computer games, or (5) using a computer for something other than games}?" A follow-up question was then asked about time spent for each category of screen viewing to which the parent had responded affirmatively. There were three response options: more than 2 hours, 1 to 2 hours, or less than 1 hour. If a device (TV or computer) was not present in the home or the child was reported to not have spent any time using it on the last typical weekday, we coded this as zero hours. We sought to identify children whose total home screen time was high, and defined high home screen time as 4 or more hours per weekday, which is twice the AAP recommendation. High home screen time was based on children's aggregated duration of exposure across the five screen categories. For this purpose, the categorical response options

(0 hours, <1 hour, 1–2 hours, >2 hours) were re-coded as 0, 0.5, 1.5, and 2.5 hours. Using these approximations, we defined a child as having high home screen time if their sum across screen categories was 5 hours or more. Thus a child who was reported to have watched >2 hours of TV and played video games for >2 hours would be classified as having high home screen time, but a child who watched 1–2 hours of TV, played video games for 1–2 hours, and used the computer for 1–2 hours would not. We conservatively estimate that children identified as having high home screen times by this method have typical weekday screen times of at least 4 hours.

Teachers were asked for each category of screen viewing, “Think for a moment about a typical week in your classroom during the last month. About how many hours in that week did the children in your classroom spend {(1) watching television programs, (2) watching movies, videos, or DVDs, (3) playing games on computers, (4) playing video games, or (5) using a computer for other purposes}?” Response options were: less than 1 hour, 1–2 hours, 3–4 hours, 5–9 hours, or 10 or more hours per week.

TV in the bedroom—Children were categorized as having a television in their bedroom if their parent responded affirmatively to the question, “Does {CHILD} watch TV or videos in the room where {he/she} sleeps?” No data were collected about computers or video game consoles in the bedroom.

Additional variables—Children’s age, gender, race/ethnicity, maternal education, maternal employment, household size, income-to-poverty ratio, family structure, primary language spoken at home, and the type of Head Start program (full-day or half-day) were reported in the parent interview. Children’s height and weight were measured by trained FACES staff using a standardized protocol (West et al. 2010). Body mass index was calculated as kg/m^2 and values of BMI that exceeded 3 standard deviations from the overall mean were not included in the FACES dataset (West et al. 2010). Gender-specific BMI-for-age percentiles were calculated based on the Centers for Disease Control and Prevention growth charts (Kuczmarski et al. 2002). Weight status was categorized as <85th or 85th percentile.

Data analysis

To account for the complex survey design our analyses included sampling weights that adjust for disproportionate sampling, non-coverage and non-response (West et al. 2010) and we used the SURVEY procedures in SAS version 9.2 (SAS Institute, Cary, NC) for statistical testing and variance estimation. We first describe the distribution of children’s home and classroom screen time by screen category. We then present the proportion (95% confidence interval [CI]) of children with high home screen time and TV in the bedroom by levels of sociodemographic covariates, measuring statistical differences with the Rao-Scott design-corrected likelihood-ratio χ^2 . We use logistic regression to estimate odds ratios (OR) for high home screen time associated with having a television in the bedroom and sociodemographic factors. We present unadjusted analyses, analyses that are adjusted for all covariates, and a reduced model that was adjusted for variables that were significant in the fully-adjusted model.

RESULTS

The mean (standard error) age of children was 4.4 (0.03) years. Half were male, almost three quarters (72.3%) had mothers with at most a high school education, and a third had a mother who was employed full-time (Table 1). Among these low-income children, more than a quarter had incomes below 50% of the poverty threshold. We estimated that 12.5% of low-income Head Start children had high home screen times (>4 hours per weekday) and that 55.7% had a TV in their bedroom.

Screen time at home

Children's reported time spent each weekday engaged in screen viewing at home and at school is shown in Table 2 by screen category. Television was the largest contributor to home screen time; almost 70% of children watched at least one hour per weekday, and only 7.7% of children had watched no television. A majority of children (56.6%; CI: 53.7, 59.5) had access to a computer in the home, and 37.5% (CI: 34.6, 40.4) had used it on the last typical weekday; parents reported computer use for games more often than for other purposes (Table 2). In total, 13.2% (11.2, 15.2) of children spent an hour or more per weekday using the computer at home.

Among the 287 children (12.5%) with high home screen time, 55.2% were reported to watch more than 2 hours of television per weekday, 33.6% watched more than 2 hours of videos/DVDs, and 11.9%, 9.8%, and 4.7%, respectively, played video games, computer games, or used a computer for something other than games for more than 2 hours/weekday.

Screen time at school

School screen time consisted almost entirely of computer use. Almost half of children (49.4%; CI: 39.8, 59.0) used a computer for at least 1–2 hours per week for games or something other than games, and 14.2% (8.6, 19.8) played computer games in the classroom for 5 or more hours per week (Table 2). It was rare for children to have watched television or videos/DVDs at Head Start, with only 3.5% (0.4, 6.5) and 5.5% (2.4, 8.7) of children, respectively, watching an hour or more per week.

Predictors of high home screen time

High home screen time was more than twice as common among children with a TV in the bedroom as those without (16.9% vs. 7.0%; $p < 0.001$) (Table 3). In bivariate analyses, male gender, race/ethnicity, higher maternal education, and English as the primary household language were associated with having high home screen time. However, of these sociodemographic variables associated with high home screen viewing, only race/ethnicity was associated with having a TV in the child's bedroom (Table 3). With control for all covariates, having a TV in the child's bedroom was associated with greater odds of high home screen time [odds ratio (CI) = 2.52 (1.71, 3.72)]. In this fully adjusted model, the sociodemographic characteristics associated with high screen time were child age, race/ethnicity, maternal education, household income-to-poverty ratio, and single parent status. In a reduced model adjusting for TV in the bedroom and these five significant sociodemographic characteristics, the factors associated with high home screen time were

having a TV in the bedroom (OR = 2.57), non-Hispanic black and other race/ethnicity, and maternal education of some college or more (Table 4).

DISCUSSION

The AAP recommends that parents of children age two and older limit their child's non-educational screen time to no more than 2 hours per day and avoid placing a television in the child's bedroom (American Academy of Pediatrics 2011; Mulligan et al. 2011). We found in a national sample of low-income 3- and 4-year-old children attending Head Start in 2007 that 1 in 8 children were exposed to more than 4 hours of screen time at home each weekday. Television and video viewing were the most common categories of children's home screen time, but these types of screens were largely absent from the Head Start classroom. In this population, having a television in the bedroom was strongly associated with high home screen time, and this association was not sensitive to adjustment for a large number of sociodemographic characteristics.

Within the Head Start classroom, screen time was primarily computer use. Consistent with available evidence from other studies, we found that few children were watching TV programs or videos in the classroom. A national survey conducted in 2008 found that 90% of Head Start programs used TV and videos <1 hour per day and only for instructional purposes (Whitaker et al. 2009). Tandon et al. reported that children attending Head Start rarely watched TV or videos in the classroom (Tandon et al. 2011). Neither study assessed computer use (Tandon et al. 2011; Whitaker et al. 2009). We are unaware of national estimates of computer use in preschool classrooms; we found that half of children were using a computer in their Head Start classroom for at least an hour per week and that approximately 1 in 7 children (14%) were using a computer for 5 or more hours per week (or >1 hour per day). We do not know the educational content of children's computer use at Head Start. Likewise, the value children, teachers, and parents place on classroom computer use is also unknown.

Many studies have documented high TV/video/DVD viewing among US preschool-aged children (Anderson and Whitaker 2010; Christakis et al. 2004a; Common Sense Media 2011; Dennison et al. 2002; Mendoza et al. 2007; Rideout and Hamel 2006; Sisson et al. 2009; Tandon et al. 2011). Fewer studies have incorporated additional categories of screen time, and defining and measuring all such categories can be challenging in the current, rapidly changing media environment (Bryant et al. 2007; Common Sense Media 2011). Analyses of home TV/video/DVD and computer use among US preschoolers studied in NHANES (1999–02) (Mendoza et al. 2007) and (2001–06) (Sisson et al. 2009) indicated that TV/video/DVD viewing comprised the majority of 2–5 year-olds' screen time, but computer use also contributes to preschool-aged children's screen time. This is consistent with our findings, but we also note that 13% of children used a computer at home for 1 hour/weekday. The most recent and comprehensive information on media use in young US children comes from a survey that was conducted in May/June 2011 with a representative sample of 1384 parents of children 8 years (Common Sense Media 2011). That study also found that TV/video/DVD viewing comprised most of preschool-aged (2- to 4-years-old) children's screen time, and that it was not uncommon for children this age to use a computer

(Common Sense Media 2011). For example, 12% of 2- to 4-year-old children used a computer daily and 53% had used a computer at least once in their lives (Common Sense Media 2011).

A challenge for population research on children's screen time is the speed with which new technology is introduced and adopted. The media landscape for young children in the US is rapidly changing and few studies are available to assess the use of portable media devices such as smart phones and tablet computers by preschool-aged children. The 2011 Common Sense Media study investigated these screen-viewing modalities and found that 9% of 2- to 4-year-old children regularly viewed media on a cell phone, iPod, iPad, Game Boy or other portable device (Common Sense Media 2011).

We found that more than half of low-income children attending Head Start had a TV in their bedroom. Others have reported somewhat lower estimates for populations that are more heterogeneous in age and socioeconomic status (Christakis et al. 2004a; Dennison et al. 2002; Rideout and Hamel 2006), and having a TV in the bedroom is more common in families of lower socioeconomic status (Common Sense Media 2011; Sisson et al. 2011). Our results are consistent with studies that find having a TV in the bedroom is associated with higher screen time (Dennison et al. 2002; Rideout and Hamel 2006; Sisson et al. 2011). In our study TV in the bedroom was the characteristic most predictive of high home screen time and it is also the most modifiable. Other sociodemographic predictors of high home screen time in this low-income population were race/ethnicity and maternal education. We found, as have others (Anderson and Whitaker 2010; Certain and Kahn 2002; Common Sense Media 2011; Dennison et al. 2002; Sisson et al. 2009), that non-Hispanic black children were most likely to have high screen time, but our results differ from others in that Hispanic children were least likely to have high screen time. Within our low-income population, we found that higher maternal education, (i.e., having some college or more education), was associated with children's high home screen time; this contrasts with other studies (Christakis et al. 2004a; Common Sense Media 2011; Dennison et al. 2002), including one in a low-income population (Dennison et al. 2002), which found that lower parental education was associated with children's higher screen time. However, differences between our low-income population and the population in Dennison's study (children 12 to 59 months of age, participants in the New York State Supplemental Nutrition Program for Women, Infants, and Children) (Dennison et al. 2002) make it difficult to draw direct comparisons. Future research should further examine the relationship of parental education and child screen viewing. It is possible that some of the more educated mothers in our study were currently enrolled in college classes and used screen time to engage their children while they were occupied with meeting degree requirements. Other previously reported risk factors for high screen time were not evident in our population of low-income children (Mendoza et al. 2007; Sisson et al. 2009). For example, we did not find that children with a BMI-for-age 85th percentile (overweight) were more likely to have high screen time. Whether this reflects parents' differential reporting relative to children's BMI-for-age, decisions by parents of overweight children to limit their child's screen time, or something else, cannot be determined from our study.

Limitations

Our sample was limited to low-income preschool-aged children attending Head Start in spring 2007. The questions used in FACES to assess screen time are similar to those that have been used in other population studies (Anderson and Whitaker 2010; Mendoza et al. 2007), but may be subject to measurement error (Bryant et al. 2007). The accuracy with which parents can report their young child's screen time is variable and the ability of parents to monitor and thus know the extent of children's screen time may be lower for children who have a TV in their bedroom (Robinson et al. 2006). Our measures of screen time were limited to TV, videos/DVDs, computer use, and video games. Increasingly children are using smart phones and tablet computers (Common Sense Media 2011). These screen modalities were not widely available in 2007 and were not assessed in this study, but future studies of children's screen time and media use will need to consider these and other newly developed technologies. We also do not know if different types of screens were viewed individually or in combination, with other people or alone, nor the content of, nor how much attention children paid to, what they viewed. Whether children had a TV in their bedroom was defined based on response to a single question about where the child sleeps and the question did not allow us to distinguish between a bedroom (the child's own or shared with others), a living or family room, or another location in the home. Although more than half of children had access to a computer at home, the location of these computers was not assessed, and it is not known if the computers were located in the child's bedroom. Our study was conducted in 2007, before portable devices with the capability to stream video were common. We do not know whether our findings would be different in this population today, or the extent to which the introduction of smart phones and tablet computers influences children's screen time. Our analysis is cross-sectional and we report associations; our study does not show that placing a TV in a child's bedroom results in their having higher screen times, nor can we conclude that removing it from their bedroom will reduce their viewing. Experimental studies are needed to draw such conclusions.

CONCLUSIONS

The AAP recommends that pediatricians ask parents about how much time per day their child spends with screen media and whether there is a TV in the child's bedroom (Mulligan et al. 2011). We provide evidence from a representative sample of low-income children attending Head Start that having a TV in the bedroom is associated with 2.5 times the odds of a child having high home screen time. Common reasons parents have reported for placing a TV in their child's bedroom include keeping the child occupied, helping the child sleep, and making it possible for family members to watch other programming (Taveras et al. 2009; Vandewater et al. 2007). At least in terms of sleep quality, placing a TV in a child's bedroom is unlikely to serve parents' intended goals (Sisson et al. 2011). Parents may also see having a TV in a child's bedroom as a way to encourage learning (Rideout and Hamel 2006). Although educational programs can have positive effects on children's cognitive and language development (Anderson et al. 2001; Linebarger and Walker 2005; Rice et al. 1990), these may be overshadowed by adverse effects on attention (Christakis et al. 2004b), aggressive behavior (Christakis and Zimmerman 2007; Mistry et al. 2007; Robinson et al. 2001), and obesity (Jordan and Robinson 2008; Mendoza et al. 2007). At least 1 out of 8

low-income preschool children attending Head Start in spring 2007 had daily screen times more than double the AAP guidelines, and these children were more likely than children with lower home screen times to have a TV in their bedroom. Non-Hispanic black children were more likely to both have a TV in the bedroom and have high home screen times. Head Start programs might consider counseling parents to avoid placing a TV in their child's bedroom. It will also be important to better understand how children and their parents interact with portable viewing devices, such as iPads, which are increasingly used for viewing programs that would previously have been viewed on a television.

Screen viewing within Head Start classrooms was limited and predominately associated with using a computer. Although computer use is less “passive” than TV/video/DVD viewing, and many computer programs for preschool-aged children are designed to be educational (Li et al. 2006), there is limited evidence to determine the extent to which classroom technology improves young children's cognitive, social, and emotional development (Bavelier et al. 2010). Efficacy of technologically advanced teaching methods and the points at which children benefit from their introduction should be further investigated. Concern about reducing disparities in computer experience (i.e. the “digital divide”) may motivate classroom computer-use in some Head Start programs; in the current environment, in which technology is increasingly omnipresent (Common Sense Media 2011), it is important to reevaluate the benefit of computers in the preschool classroom.

Acknowledgments

The source of the original collection and analysis of the FACES data bears no responsibility for their further analysis or interpretation.

Funding Source: This work was supported in part by grant R01DK088913 from the National Institutes of Health.

References

- American Academy of Pediatrics Council on Communications and Media. Media use by children younger than 2 years. *Pediatrics*. 2011; 128(5):1040–1045. [PubMed: 22007002]
- Anderson DR, Huston AC, Schmitt KL, Linebarger DL, Wright JC. Early childhood television viewing and adolescent behavior: the recontact study. *Monographs of the Society for Research in Child Development*. 2001; 66(1):I–VIII. 1–147. [PubMed: 11326591]
- Anderson SE, Whitaker RC. Household routines and obesity in US preschool-aged children. *Pediatrics*. 2010; 125(3):420–428. [PubMed: 20142280]
- Bavelier D, Green CS, Dye MW. Children, wired: for better and for worse. *Neuron*. 2010; 67(5):692–701. [PubMed: 20826302]
- Bryant MJ, Lucove JC, Evenson KR, Marshall S. Measurement of television viewing in children and adolescents: a systematic review. *Obesity Reviews*. 2007; 8(3):197–209. [PubMed: 17444962]
- Certain LK, Kahn RS. Prevalence, correlates, and trajectory of television viewing among infants and toddlers. *Pediatrics*. 2002; 109(4):634–642. [PubMed: 11927708]
- Chase-Lansdale, PL.; Gordon, RA.; Brooks-Gunn, J.; Klebanov, PK. Neighborhood and family influences on the intellectual and behavioral competence of preschool and early school-age children. In: Brooks-Gunn, J.; Duncan, GJ.; Aber, JL., editors. *Neighborhood Poverty: Context and consequences for children*. Vol. 1. New York: The Russell Sage Foundation; 1997.
- Christakis DA, Ebel BE, Rivara FP, Zimmerman FJ. Television, video, and computer game usage in children under 11 years of age. *Journal of Pediatrics*. 2004a; 145(5):652–656. [PubMed: 15520768]
- Christakis DA, Gilkerson J, Richards JA, Zimmerman FJ, Garrison MM, Xu D, et al. Audible television and decreased adult words, infant vocalizations, and conversational turns: a population-

- based study. *Archives of Pediatrics & Adolescent Medicine*. 2009; 163(6):554–558. [PubMed: 19487612]
- Christakis DA, Zimmerman FJ. Violent television viewing during preschool is associated with antisocial behavior during school age. *Pediatrics*. 2007; 120(5):993–999. [PubMed: 17974736]
- Christakis DA, Zimmerman FJ, DiGiuseppe DL, McCarty CA. Early television exposure and subsequent attentional problems in children. *Pediatrics*. 2004b; 113(4):708–713. [PubMed: 15060216]
- Common Sense Media. Zero to eight: children's media use in America. A Common Sense Media Research Study. 2011. Available at: <http://www.commonsensemedia.org/sites/default/files/research/zerotoeightfinal2011.pdf>
- Dennison BA, Erb TA, Jenkins PL. Television viewing and television in bedroom associated with overweight risk among low-income preschool children. *Pediatrics*. 2002; 109(6):1028–1035. [PubMed: 12042539]
- Duncan GJ, Yeung WJ, Brooks-Gunn J, Smith JR. How much does childhood poverty affect the life chances of children? *American Sociological Review*. 1998; 63(3):406–423.
- Froehlich TE, Lanphear BP, Epstein JN, Barbaresi WJ, Katusic SK, Kahn RS. Prevalence, recognition, and treatment of attention-deficit/hyperactivity disorder in a national sample of US children. *Archives of Pediatrics & Adolescent Medicine*. 2007; 161(9):857–864. [PubMed: 17768285]
- Garrison MM, Liekweg K, Christakis DA. Media use and child sleep: the impact of content, timing, and environment. *Pediatrics*. 2011; 128(1):29–35. [PubMed: 21708803]
- Jordan AB, Robinson TN. Children, television viewing, and weight status: summary and recommendations from an expert panel meeting. *Annals of the American Academy of Political and Social Science*. 2008; 615:119–132.
- Kuczmarski RJ, Ogden CL, Guo SS, Grummer-Strawn LM, Flegal KM, Mei Z, et al. 2000 CDC Growth Charts for the United States: methods and development. *Vital and Health Statistics Series*. 2002; 11(246):1–190.
- Li XM, Atkins MS, Stanton B. Effects of home and school computer use on school readiness and cognitive development among head start children: A randomized controlled pilot trial. *Merrill-Palmer Quarterly-Journal of Developmental Psychology*. 2006; 52(2):239–263.
- Linebarger DL, Walker D. Infants' and toddlers' television viewing and language outcomes. *American Behavioral Scientist*. 2005; 48(5):624–645.
- Mendoza JA, Zimmerman FJ, Christakis DA. Television viewing, computer use, obesity, and adiposity in US preschool children. *International Journal of Behavioral Nutrition and Physical Activity*. 2007; 4:44. [PubMed: 17894878]
- Mistry KB, Minkovitz CS, Strobino DM, Borzekowski DLG. Children's television exposure and behavioral and social outcomes at 5.5 years: does timing of exposure matter? *Pediatrics*. 2007; 120(4):762–769. [PubMed: 17908763]
- Mulligan DA, Altmann TR, Brown A, Christakis DA, Clarke-Pearson K, Falik HL, et al. Children, adolescents, obesity, and the media. *Pediatrics*. 2011; 128(1):201–208. [PubMed: 21708800]
- Owens J. Classification and epidemiology of childhood sleep disorders. *Primary Care: Clinics in Office Practice*. 2008; 35(3):533–546.
- Owens J, Maxim R, McGuinn M, Nobile C, Msall M, Alario A. Television-viewing habits and sleep disturbance in school children. *Pediatrics*. 1999; 104(3):e27. [PubMed: 10469810]
- Rice ML, Huston AC, Truglio R, Wright J. Words from Sesame Street: learning vocabulary while viewing. *Developmental Psychology*. 1990; 26(3):421–428.
- Rideout, VJ.; Hamel, E. The media family: electronic media in the lives of infants, toddlers, preschoolers, and their parents. Menlo Park, CA: Kaiser Family Foundation; 2006.
- Robinson JL, Winiewicz DD, Fuerch JH, Roemmich JN, Epstein LH. Relationship between parental estimate and an objective measure of child television watching. *International Journal of Behavioral Nutrition and Physical Activity*. 2006; 3:43. [PubMed: 17129381]
- Robinson TN, Wilde ML, Navracruz LC, Haydel KF, Varady A. Effects of reducing children's television and video game use on aggressive behavior: a randomized controlled trial. *Archives of Pediatrics & Adolescent Medicine*. 2001; 155(1):17–23. [PubMed: 11177057]

- Sisson SB, Broyles ST, Newton RL Jr, Baker BL, Chernausk SD. TVs in the bedrooms of children: does it impact health and behavior? *Preventive Medicine*. 2011; 52(2):104–108. [PubMed: 21130109]
- Sisson SB, Church TS, Martin CK, Tudor-Locke C, Smith SR, Bouchard C, et al. Profiles of sedentary behavior in children and adolescents: the US National Health and Nutrition Examination Survey, 2001–2006. *International Journal of Pediatric Obesity*. 2009; 4(4):353–359. [PubMed: 19922052]
- Spencer N. Social, economic, and political determinants of child health. *Pediatrics*. 2003; 112(3 Part 2):704–706. [PubMed: 12949325]
- Tandon PS, Zhou CA, Lozano P, Christakis DA. Preschoolers' total daily screen time at home and by type of child care. *Journal of Pediatrics*. 2011; 158(2):297–300. [PubMed: 20980020]
- Taveras EM, Hohman KH, Price S, Gortmaker SL, Sonnevile K. Televisions in the bedrooms of racial/ethnic minority children: how did they get there and how do we get them out? *Clinical Pediatrics*. 2009; 48(7):715–719. [PubMed: 19420181]
- Thompson DA, Christakis DA. The association between television viewing and irregular sleep schedules among children less than 3 years of age. *Pediatrics*. 2005; 116(4):851–856. [PubMed: 16199693]
- Tremblay RE, Nagin DS, Séguin JR, Zoccolillo M, Zelazo PD, Boivin M, et al. Physical aggression during early childhood: trajectories and predictors. *Pediatrics*. 2004; 114(1):e43–e50. [PubMed: 15231972]
- U.S. Department of Health and Human Services: Administration for Children & Families. [Accessed June 7 2012.] About Head Start Services. 2012. <http://transition.acf.hhs.gov/programs/ohs/about>
- U.S. Department of Health and Human Services: Administration for Children & Families. [Accessed June 7 2012.] Program Information Report (PIR). 2011. <http://eclkc.ohs.acf.hhs.gov/hslc/mr/pir>
- Vandewater EA, Bickham DS, Lee JH, Cummings HM, Wartella EA, Rideout VJ. When the television is always on: heavy television exposure and young children's development. *American Behavioral Scientist*. 2005; 48(5):562–577.
- Vandewater EA, Rideout VJ, Wartella EA, Huang X, Lee JH, Shim MS. Digital childhood: electronic media and technology use among infants, toddlers, and preschoolers. *Pediatrics*. 2007; 119(5):e1006–1015. [PubMed: 17473074]
- Verlinden M, Tiemeier H, Hudziak JJ, Jaddoe VW, Raat H, Guxens M, et al. Television viewing and externalizing problems in preschool children: the Generation R Study. *Archives of Pediatrics & Adolescent Medicine*. 2012; 166(10):919–925. [PubMed: 22869354]
- West, J.; Aikens, N.; Carlson, BL.; Meagher, C.; Malone, L.; Bloomenthal, A., et al. User's manual. Washington, DC: 2010. Head Start Family and Child Experiences Survey: 2006.
- Whitaker RC, Gooze RA, Hughes CC, Finkelstein DM. A national survey of obesity prevention practices in Head Start. *Archives of Pediatrics & Adolescent Medicine*. 2009; 163(12):1144–1150. [PubMed: 19996052]
- Zimmerman FJ, Christakis DA. Children's television viewing and cognitive outcomes: a longitudinal analysis of national data. *Archives of Pediatrics & Adolescent Medicine*. 2005; 159(7):619–625. [PubMed: 15996993]

Table 1

Characteristics of low-income Head Start children, spring 2007

	n^a	% (95% CI)^b
Total	2221	100.0%
Child's age cohort		
3-year-old	1359	59.9 (54.4, 65.5)
4-year-old	862	40.1 (34.5, 45.6)
Head Start program type		
Full-day	1077	47.3 (36.3, 58.4)
Half-day ^c	1138	52.7 (41.6, 63.7)
Gender		
Female	1090	49.4 (46.8, 52.0)
Male	1126	50.6 (48.0, 53.2)
Racial/ethnic group		
Non-Hispanic white	418	20.7 (16.2, 25.2)
Non-Hispanic black	721	33.3 (25.0, 41.6)
Hispanic	899	37.9 (28.3, 47.6)
Other	175	8.1 (5.6, 10.5)
Mother's education		
Less than high school	817	39.1 (35.5, 42.7)
High school diploma or GED ^d	692	33.2 (30.4, 36.0)
Some college or more ^e	599	27.7 (25.0, 30.3)
Household income-to-poverty ratio		
<0.5	564	26.2 (23.7, 28.7)
0.5 – 1.0	946	42.5 (40.4, 44.6)
>1.0 – 1.85	711	31.3 (28.5, 34.0)
Mother's employment		
Working full-time	704	33.0 (30.1, 35.9)
Working part-time	449	21.7 (19.4, 24.0)
Not employed	957	45.3 (42.0, 48.7)
Single parent		
Yes	981	45.1 (40.9, 49.4)
No	1240	54.9 (50.6, 59.1)
Household size		
2 – 3 people	435	20.9 (17.9, 23.8)
4 people	613	28.0 (25.7, 30.2)
5 people	533	23.4 (20.7, 26.2)
6 or more people	640	27.7 (24.4, 31.0)
Primary household language		
English	1506	70.3 (63.3, 77.2)
Other than English	710	29.7 (22.8, 36.7)

	n^a	% (95% CI)^b
BMI-for-age percentile^f		
85 th (overweight)	797	36.2 (33.7, 38.6)
<85 th (not overweight)	1360	63.8 (61.4, 66.3)
Television in the child's bedroom		
Yes	1235	55.7 (52.4, 59.0)
No	984	44.3 (40.9, 47.6)

^a Unweighted sample sizes. Some sample sizes do not sum to 2221 due to missing data: Head Start program type (n = 6), gender (n = 5), racial/ethnic group (n = 8), mother's education (n = 113), mother's employment (n=111), household language (n=5), BMI-for-age (n = 64), and TV in the bedroom (n = 2).

^b Percentages are weighted and 95% CI account for complex sample design.

^c Includes 35 children who were in a home-based Head Start program.

^d GED = General Equivalency Diploma.

^e Includes children whose mother completed some college/vocational/technical degree (n = 478), or Bachelors degree or higher (n = 121).

^f From the Centers for Disease Control and Prevention sex-specific BMI-for-age growth charts; BMI = body mass index.

Table 2

Reported duration of low-income Head Start children's weekday screen use by screen category at home and school

Location	Screen Category ^a				
	Television	Videos/DVD	Video Games	Computer, games	Computer, other ^b
Home					
Zero hours	7.7 (6.1, 9.2)	56.1 (53.8, 58.5)	70.6 (68.4, 72.8)	67.1 (64.2, 70.1)	82.8 (81.0, 84.5)
<1 hour/weekday	22.9 (20.6, 25.1)	11.4 (9.6, 13.3)	18.3 (16.6, 20.1)	21.8 (19.8, 23.7)	12.7 (11.3, 14.1)
1–2 hours/weekday	50.4 (48.1, 52.6)	27.2 (25.2, 29.2)	9.0 (7.5, 10.5)	9.7 (8.0, 11.4)	3.9 (2.8, 5.1)
>2 hours/weekday	19.1 (16.6, 21.7)	5.2 (3.8, 6.6)	2.0 (1.4, 2.7)	1.4 (0.7, 2.0)	0.6 (0.3, 0.9)
School					
<1 hours/week	96.5 (93.5, 99.6)	94.5 (91.3, 97.6)	99.4 (99.3, 99.6)	52.0 (42.7, 61.3)	91.7 (87.1, 96.2)
1–2 hours/week	2.4 (0.4, 4.4)	4.5 (2.2, 6.8)	0.2 (0.1, 0.3)	20.0 (12.1, 27.9)	5.5 (1.4, 9.6)
3–4 hours/week	1.1 (0.0, 2.5)	1.0 (0.0, 2.4)	---	13.8 (9.1, 18.6)	1.3 (0.2, 2.4)
5–9 hours/week	---	---	0.4 (0.3, 0.4)	9.6 (5.0, 14.1)	1.0 (0.2, 1.9)
10 hours/week	---	---	---	4.6 (1.8, 7.4)	0.5 (0.0, 1.3)

Percentages are weighted and 95% CI account for complex sample design.

^a Percentages (95% confidence interval) represent the percentage of children with a given duration of screen use within a given category of screen use and location. Percentages in columns within each location may not add to 100% due to rounding.

^b 19 children were missing information for use of computers for purposes other than for computer games at school.

Table 3

Prevalence of high home screen time (>4 hours per weekday) and TV in the bedroom by children's sociodemographic characteristics among low-income children attending Head Start in spring 2007

	Home Screen time >4 hours/weekday % (95% CI) ^a	P Value ^b	TV in the child's bedroom % (95% CI) ^a	P Value ^b
TV in the child's bedroom				
Yes	16.9 (14.1, 19.6)	<0.001	NA	
No	7.0 (5.1, 8.8)		NA	
Child's age cohort				
3-year-old	12.8 (10.7, 14.8)	0.66	56.1 (52.5, 59.7)	0.74
4-year-old	12.1 (9.2, 14.9)		55.2 (49.8, 60.5)	
Head Start program type				
Full-day	15.7 (13.1, 18.3)	<0.001	61.6 (57.5 – 65.7)	<0.001
Half-day	9.5 (7.1, 11.9)		50.5 (45.7 – 55.2)	
Gender				
Female	10.6 (8.4, 12.7)	0.001	54.4 (49.0 – 59.9)	0.41
Male	14.4 (12.3, 16.6)		57.0 (53.5 – 60.5)	
Racial/ethnic group				
Non-Hispanic white	8.6 (4.3, 12.9)		48.7 (42.7 – 54.7)	
Non-Hispanic black	20.2 (17.7, 22.8)	<0.001	64.9 (59.0 – 70.8)	<0.001
Hispanic	7.5 (5.0, 10.0)		54.8 (50.1 – 59.5)	
Other	34.4 (28.2, 40.6)		40.9 (32.9 – 48.9)	
Mother's education				
Less than high school	8.6 (6.0, 11.2)		57.5 (51.3 – 63.6)	
High school diploma or GED ^c	13.6 (10.0, 17.2)	0.002	57.1 (51.4 – 62.8)	0.18
Some college or more	16.4 (12.8, 20.1)		50.8 (46.0 – 55.5)	
Single parent				
Yes	13.5 (11.0, 16.1)	0.25	58.2 (54.5, 62.0)	0.02
No	11.6 (9.3, 13.9)		53.7 (49.7, 57.6)	
Household income-to-poverty ratio				
<0.5	14.2 (10.4, 18.1)		57.6 (51.4, 63.9)	
0.5 – 1.0	12.1 (8.8, 15.5)	0.54	56.0 (52.4, 59.5)	0.50

	Home Screen time >4 hours/weekday % (95% CI) ^a	P Value ^b	TV in the child's bedroom % (95% CI) ^a	P Value ^b
>1.0 – 1.85	11.5 (8.7, 14.2)		53.8 (48.7, 58.8)	
Mother's employment				
Working full-time	15.2 (11.7, 18.8)	0.09	56.8 (52.2, 61.6)	0.80
Working part-time	11.3 (7.8, 14.8)		54.1 (47.9, 60.4)	
Not employed	10.7 (7.6, 13.9)		55.0 (48.9, 61.2)	
Household size				
2 – 3 people	14.4 (9.9, 18.8)	0.70	58.7 (51.1, 66.3)	0.41
4 people	12.2 (8.8, 15.6)		56.2 (50.4, 62.0)	
5 people	12.3 (8.6, 15.9)		51.8 (47.1, 56.5)	
6 or more people	11.5 (8.8, 14.2)		56.3 (51.1, 61.5)	
Primary household language				
English	14.7 (12.6, 16.7)	0.008	57.3 (53.5, 61.2)	0.11
Other than English	7.5 (3.7, 11.2)		51.9 (45.9, 57.9)	
BMI-for-age percentile^d				
85 th (overweight)	10.3 (7.6, 13.0)	0.06	56.7 (51.7, 61.7)	0.47
<85 th (not overweight)	13.7 (11.4, 16.1)		55.1 (51.7, 58.4)	

^aPercentages are weighted and 95% CI account for complex sample design.

^bP value from Rao-Scott design-corrected likelihood-ratio χ^2 .

^cGED = General Equivalency Diploma.

^dFrom the Centers for Disease Control and Prevention sex-specific BMI-for-age growth charts; BMI = body mass index.

Table 4

Factors associated with high home screen time (>4 hours per weekday) among low-income children attending Head Start, spring 2007

	Odds ratio (95% CI) ^a		
	Unadjusted	Fully adjusted ^b	Adjusted for variables significant in fully adjusted model ^c
TV in the child's bedroom			
Yes	2.71 (1.92, 3.82)	2.52 (1.71, 3.72)	2.57 (1.80, 3.68)
No	1 (referent)	1 (referent)	1 (referent)
Child's age cohort			
3-year-old	1.07 (0.80, 1.43)	0.72 (0.55, 0.95)	0.81 (0.61, 1.06)
4-year-old	1 (referent)	1 (referent)	1 (referent)
Head Start program type			
Full-day	1.78 (1.25, 2.54)	1.50 (0.99, 2.28)	----
Half-day	1 (referent)	1 (referent)	----
Gender			
Male	1.43 (1.15, 1.78)	1.22 (0.98, 1.52)	----
Female	1 (referent)	1 (referent)	----
Racial/ethnic group			
Non-Hispanic white	1.16 (0.61, 2.20)	1.04 (0.40, 2.74)	1.17 (0.62, 2.19)
Non-Hispanic black	3.13 (2.08, 4.71)	2.63 (1.32, 5.22)	3.15 (1.93, 5.13)
Hispanic	1 (referent)	1 (referent)	1 (referent)
Other	2.04 (1.13, 3.68)	2.08 (0.96, 4.53)	2.05 (1.05, 4.02)
Mother's education			
Less than high school	1 (referent)	1 (referent)	1 (referent)
High school diploma or GED ^d	1.67 (1.07, 2.62)	1.33 (0.80, 2.21)	1.39 (0.85, 2.28)
Some college or more	2.09 (1.33, 3.29)	1.93 (1.18, 3.17)	2.00 (1.27, 3.16)
Household income-to-poverty ratio			
<0.5	1.28 (0.88, 1.86)	1.52 (1.06, 2.17)	1.38 (0.94, 2.03)
0.5 – 1.0	1.07 (0.70, 1.62)	1.29 (0.83, 1.98)	1.14 (0.73, 1.79)
>1.0 – 1.85	1 (referent)	1 (referent)	1 (referent)
Mother's employment			
Working full-time	1.50 (0.96, 2.34)	1.16 (0.74, 1.82)	----
Working part-time	1.06 (0.68, 1.65)	0.88 (0.60, 1.29)	----
Not employed	1 (referent)	1 (referent)	----
Single parent			
Yes	1.19 (0.88, 1.59)	0.67 (0.48, 0.94)	0.75 (0.54, 1.03)
No	1 (referent)	1 (referent)	1 (referent)
Household size			
2 – 3 people	1.29 (0.79, 2.11)	1.15 (0.69, 1.90)	----
4 people	1.07 (0.73, 1.59)	1.12 (0.78, 1.61)	----
5 people	1.08 (0.72, 1.62)	1.23 (0.84, 1.80)	----
6 or more people	1 (referent)	1 (referent)	----

	Odds ratio (95% CI) ^a		
	Unadjusted	Fully adjusted ^b	Adjusted for variables significant in fully adjusted model ^c
Primary household language			
English	2.13 (1.19, 3.80)	1.27 (0.53, 3.04)	-----
Other than English	1 (referent)	1 (referent)	-----
BMI-for-age percentile^e			
85 th (overweight)	0.72 (0.51, 1.01)	0.66 (0.43, 1.03)	-----
<85 th (not overweight)	1 (referent)	1 (referent)	-----

^a Bolding indicates odds ratios that are statistically significant at an alpha level of 0.05.

^b includes 2020 children who were not missing information on covariates

^c includes 2103 children who were not missing information on covariates

^d GED = General Equivalency Diploma

^e From the Centers for Disease Control and Prevention sex-specific BMI-for-age growth charts; BMI = body mass index.