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Background Television and Infants' Allocation of Their Attention During Toy Play

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The effect of background television on 6- and 12-month-olds' attention during 20 min of toy play was examined. During the first or second half of the session, a clip from a variety of commonly available television programs was presented. The duration and frequency of infants' looks to the toys and to the television indicated that regardless of age or program content, background television frequently got, but did not hold the infants' attention. An order effect indicated that infants looked longer at the television when it was available in the second half of the session. Examination of infants' focused attention to the toys showed a reduction in the mean length of focused episodes when the television was on. A follow-up of the infants at 24 months indicated greater resistance to distraction by the television during play. Data from the three ages showed that individual differences in the amount of viewing were moderately stable across age and across home and lab contexts.

The ubiquitous presence of television and video material in infants' and toddlers' environment has been amply documented. The consensus of a series of reports from the Kaiser Family Foundation (Rideout, 2007; Rideout & Hamel, 2006; Rideout, Vandewater, & Wartella, 2003; Valkenburg et al., 2007) indicates that from as early as 3 months of age most infants have been exposed to some television or video and by age 2 years about 90% are regular viewers and spend about 1–2 hr a day watching. This estimate is

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consistent with several other national and international reports on very young children's viewing patterns (see Barr, Danziger, Hilliard, Andolina, & Ruskis, 2010; Mendelsohn et al., 2008; Murray & Murray, 2008; Pierroutsakos, Hanna, Self, Lewis, & Brewer, 2004; Schmidt, Rich, Rifas-Shiman, Oken, & Taveras, 2009; Wright et al., 2001; Zimmerman, Christakis, & Meltzoff, 2007). Although parents report that most of the media viewing is of child-appropriate material, babies of this age are also exposed to additional "background" television that is not directed at them specifically but that is typically being viewed by older children and adults. This exposure is probably extensive as about 50% of parents report having the television on most or all of the time in the home, whether or not anyone is watching it (Masur & Flynn, 2008; Rideout et al., 2003).

The distinction between exposure to television that is "background" and that which is "foreground" is an important one that was first made by Anderson and Evans (2001) who defined *foreground* television as programming to which young children show sustained attention. Typically, the content has been designed for young children and is presumably comprehensible to them at some level (e.g., *Sesame Street*; *Dora the Explorer*). Background television refers to programming to which young children pay little attention generally because the content is directed at older children or adults and is presumably less comprehensible to the younger viewers (e.g., news, sports, dramas). As Anderson and Evans noted, most of the early survey research on very young children's attention to television has not made this distinction, making the data on viewing time confounded and its potential effects difficult to interpret. Keeping in mind that background and foreground categories are not mutually exclusive, the two can be expected to have different effects on attention and learning. Although background television is not intended for young infants and children, certain of its salient visual and auditory formal features (e.g., cuts, zooms, sound effects) will elicit orienting and in so doing may distract from ongoing toy play and social interactions. In contrast, foreground television might engage the young child's attention for fairly extended periods of time (e.g., Howard & Roberts, 2002; Lemish, 1987; Richards & Anderson, 2004) and might potentially provide instruction in addition to entertainment. This might be especially likely during co-viewing when parents engage with their infants and direct their attention to the television material (Barr, Zack, Garcia, & Muentener, 2008; Fender, Richert, Robb, & Wartella, 2010; Fidler, Zack, & Barr, 2010).

Until recently there has been little research on the impact of commercially available television programs on infants and toddlers. Although recent reports from an increasing number of active research labs have begun to fill this void (e.g., see special issues of the *British Journal of Developmental*

Psychology, Durkin & Blades, 2009; *Developmental Review*, Courage & Howe, 2010; *Infant and Child Development*, Barr & Linebarger, 2010) regarding foreground television, there is less empirical research on the impact of background television on very young children. The American Academy of Pediatrics (1999) expressed concern that the presence of television "displaces involvement in creative, active, or social pursuits" (p. 341). However, several reported observations of children's behavior while in the presence of television indicated that in fact they continue to engage in cognitive and social activities necessary for healthy development. For example, Schmitt, Woolf, and Anderson (2003) reported from data collected in the 1980s that 2-year-olds present in a room where mixed content television programming was available spent 41% of their time looking at the screen, 39% socializing, 34% in physically activity, and 32% playing with toys. In a more recent survey, about half of the respondents reported that the television was typically on in the background during much of children's solitary play with toys as well as during mother–infant joint play with toys (Masur & Flynn, 2008). Moreover, Barr et al. (2008) found that about 35% of 12- to 18-month-old infants engaged in some toy play in the presence of an infant-directed video that was provided to them as foreground television.

Despite the finding that young children continue to engage in concurrent activities, the presence of television may impact the quality, if not the quantity, of play and social interactions (e.g., Anderson & Evans, 2001; Courage, Murphy, Goulding, & Setliff, 2010). Indeed, Kirkorian, Pempek, Murphy, Schmidt, and Anderson (2009) found that the presence of adult-content background television had a negative impact (albeit indirect) on parent–child interactions. They reported that the parents of 12-, 24- and 36-month-olds interacted less with their infants and they responded less quickly and less enthusiastically to the child's bids for attention when the television was on compared to when it was off. In addition, a negative correlation has been found between exposure to background television and time spent reading or being read to in children 3–6 years of age (Vandewater et al., 2005). Consistent with this, Barr, Lauricella, Zack, and Calvert (2010) reported that infants' and toddlers' exposure to adult television material during the second year of life was associated with poorer executive functioning at preschool age, an association that was not significant when exposure to television consisted of infant- or child-directed content.

The potential of background television to act as a distractor may be especially detrimental to infants and toddlers during periods of focused attention. Focused (or sustained) attention is a state of engagement that involves narrowed selectivity and increased commitment of energy and resources on the targeted activity (e.g., examination of a toy or toys) and that primarily enhances information processing in that system. Visual

attention that lacks this intensity of engagement is referred to as casual attention (Richards, 2004; Ruff, Capozzoli, & Saltarelli, 1996). The amount of focused attention during infants' play has consistently been associated with a variety of positive cognitive outcomes in later childhood (see Lawson & Ruff, 2001). Schmidt, Pempek, Kirkorian, Lund, and Anderson (2008) examined groups of 12-, 24-, and 36-month-olds as they played with toys with and without the presence of adult-content background television. They found that, when the television was on, the length of play episodes decreased as did their focused attention during toy play.

Infants' ability to direct and sustain their attention selectively to some stimuli (e.g., toys) while resisting distraction from others that compete for their attention (e.g., television) is critical for early learning. In general, research has shown that distractibility decreases across infancy and early childhood, although a number of endogenous (e.g., focused versus casual attention) and exogenous (e.g., target versus distractor salience) factors interact with the changes as a function of age (Kannass, Oakes, & Shaddy, 2006; Oakes, Kannass, & Shaddy, 2002; Ruff & Capozzoli, 2003). For example, Oakes et al. (2002) assessed distraction latencies for 6.5- and 10-month-olds during toy play. They found that the older but not the younger infants showed longer latencies when playing with novel toys compared to familiar toys. Presumably, the emergence of the endogenous control of attention across this age range accounted for the findings. Given that infants and toddlers are susceptible to distraction, it is clear that background television is potentially a significant source of interruption to them during play as its formal features are salient, often novel, and come to signal interesting content as infants gain experience with the medium.

The primary goal of this study was to examine the impact of background television on infants' allocation of their attention during a free play session with novel toys when they were 6 months old and again when they were 12 months old. These ages were selected because it is in this time frame that several endogenous or internally directed attentional functions and their underlying neural structures (e.g., anterior cingulate, frontal eye fields, dorsolateral prefrontal cortex) gradually begin to come online. These functions include the volitional direction of attention depending on the task at hand and the inhibition of attention that enables infants to sustain attention on a task and to resist distraction (see Colombo, 2001; Courage, Reynolds, & Richards, 2006; Oakes et al., 2002; Ruff & Rothbart, 1996). For example, Courage et al. (2006) showed groups of 3- to 12-month-olds a series of simple and complex stimuli and found that their peak look durations to simple stimuli decreased linearly across age. For complex stimuli, infants younger than 6 months again showed decreased look durations with age whereas older infants showed an increase in look duration. The selected ages also

overlap but extend downward those examined by Schmidt et al. (2008) to include 6-month-olds. Moreover, although Schmidt et al. found that the presence of an adult-directed program diminished infants' play and focused attention, the generality of the finding to a wide variety of programs that differed in target audience and that might commonly provide background television at home was not established. As such, the present study utilized a variety of television shows that included both adult and child programming.

Within the general goal of assessing the impact of background television on infants' attention, two experimental questions were of interest. The first question was whether infants would resist the distraction of background television during play and allocate their attention to the toys. The second question was whether the television material would engage infants' attention once it had been attracted, in effect making it functionally more like foreground television. These two questions address the attention-getting and attention-holding (Cohen, 1972) potential of television, respectively, and have important implications for several broader questions about the impact of television viewing on early development (see Courage & Setliff, 2010). In general, it was expected that the presence of background television would increase infants' attention to the television and diminish their attention to the toys. Although this distractibility would typically be expected to decrease across the age range tested, infants' increasing understanding of the medium of television and their emerging language at the end of their first year might lead them to be more distracted and perhaps more engaged by the television programs.

The second goal of this study was to examine the impact of background television on the quality of infants' attention to toys. In addition to its potential impact on quantitative measures (e.g., frequency of looks, duration of looking) of infants' attention, evidence suggests that background television might also affect the quality (e.g., focused attention) of their attention to toys (Schmidt et al., 2008). Although the extant literature indicates that the amount of focused attention to the toys would typically increase with age (e.g., see Ruff & Rothbart, 1996), it was expected that the presence of background television in the study would lead to lower rates of focused attention to the toys at both ages. If background television did indeed compel infants' attention more so at 12 months than at 6 months, the older infants would also be expected to show a relatively greater attenuation of focused attention than the younger infants.

The third goal of the study was to examine stability in infants' television viewing patterns over time. To date, little attention has been paid to the individual differences that likely exist among these young viewers in the extent to which television can get and hold their attention during play. Informal parent reports suggest that individual differences do exist, with

some infants appearing to be highly attentive to television regardless of the content and others inattentive and seemingly disinterested. Moreover, descriptive statistics on the amount of television viewed by young children often show high variability, suggesting substantial individual differences within the samples (Barr, Danziger, 2010; Mendelsohn et al., 2008; Richards & Cronise, 2000; Schmidt et al., 2008). Such individual differences might be important as research with older preschoolers and children indicates that viewing patterns established early tend to be stable over time (Huston, Wright, Rice, Kerkman, & St. Peters, 1990). This is a matter of concern as high amounts of television viewing (i.e., over 7 hr a day) may place children at risk for problems in attention (see Foster & Watkins, 2010) and for a sedentary lifestyle and the health risks that can accompany it (Dennison, Erb, & Jenkins, 2002; Landhuis, Poultin, Welch, & Hancox, 2008). To examine stability, a subset of the primary sample of infants who participated in the study as 6- and 12-month-olds and who were available a year later participated in a similar experimental procedure when they were 24 months old. Given the known stability in preschoolers' television viewing and the research showing that individual differences in look duration to a variety of stimuli on paired-comparison and habituation tasks are stable across infancy and the preschool years (see Colombo, 1993; Rose, 2004), stability in television viewing pattern was expected to be evident across the age range tested here.

METHOD

Participants

Eighty-eight infants participated at 6 months of age. Data from 28 infants were eliminated due to crying or fussiness ($n = 20$), parent interference ($n = 3$), sleepiness ($n = 1$), and equipment failure ($n = 4$). The final sample comprised 60 infants (30 boys, 30 girls). The mean age at time of testing was 26.3 weeks ($SD = 1.08$). The infants were full term and healthy at birth (38- to 42-week gestation and at least 2,500 g), and were without known developmental anomalies. The participants were Caucasian, predominantly middle class, and were recruited from an existing database of parents who had provided contact information at the time of their child's birth. A week before the study, parents were sent a letter describing the current project. This was followed by a phone call to schedule an appointment for those who were interested in having their infants participate.

Fifty-two of the 60 infants returned at 12 months of age to participate in a follow-up session. Five infants were eliminated due to crying or fussiness ($n = 3$), sleepiness ($n = 1$), and experimenter error ($n = 1$). The final sam-

ple consisted of 47 infants (25 boys, 22 girls). The mean age at testing was 51.5 weeks ($SD = 1.21$). Preliminary analyses revealed no differences in key measures of attention to the toys or to the television between those 13 infants who participated only at 6 months of age and those who participated in both 6- and 12-month sessions (all $ps > .05$). One year later when the infants were 24 months old, 37 of them were available for a follow-up of the procedure. Data from three of those were not included in the final sample because of procedural errors. The remaining 34 infants (15 females, 19 males) were tested at a mean age of 100.49 weeks ($SD = 3.98$). Preliminary analyses of key attention measures did not reveal any significant differences between those 13 infants who participated only at 6 and 12 months old and the 34 infants who participated at all three ages (all $ps > .05$). However, because the sample size had been reduced by almost half over the three test ages, the analyses of the 24-month-olds' data were limited to the question of stability in television-viewing habits over time.

Materials

Cameras and computer

Two analog cameras were connected to a Macintosh G5 computer (Apple, Inc., Cupertino, CA) located in a room adjacent to the testing room. One camera was mounted on top of the television and recorded the entire room and the second was mounted in front of the infant and in the same plane as his or her face. The input from the cameras was converted to digital files using the Canopus Advanced Digital Video Converter (ADVC110; Grass Valley, CA) and saved as one file using Security Spyware software (BenSoftware, London, UK), which enabled temporally synchronized playback of the two videos.

Television programs

A 20-in. flat screen color television was used to present the television program clips. To simulate a typical home viewing context, the television was positioned 6.5 in. away and at a 33° angle to the infant's right side (see Nathan, Anderson, Field, & Collins, 1985). The program clips were selected from three categories that were intended to reflect what might be commonly viewed on a typical day by older siblings and caretakers. These categories were children's educational programming (e.g., *Sesame Street*; *Barney*), children's noneducational/action programming (e.g., *Pokemon*; *Rocket Power*), and soap operas (e.g., *The Young and the Restless*; *Days of Our Lives*). Ten programs per category were selected so that the results

could be generalized widely across programs within each category. A 10-min segment from each program was randomly selected for presentation to the infants.

Toys

The 6-month-olds were presented with seven brightly colored, commercially available, age-appropriate toys with movable parts (e.g., Fisher-Price® "Brilliant Basics" activity magnet and activity block; Mega-Bloks® "Block Buddies" fire truck with driver). The 12-month-olds were presented with seven age-appropriate toys (e.g., Baby Einstein® "Splash & Stack" color cups; Playskool® "Rumblin Roller" truck) including two toys that were used for the 6-month testing that were deemed to have sufficient complexity for a 12-month-old. At 24 months, a new array of age-appropriate toys (e.g., Pop-up Pets from Mattell®; Mega-Bloks® Kitchen Set) was provided. Although the decision to use a different array of toys at each age (there was overlap of two toys in the 6- and 12-month-olds' arrays) introduced a potential confound in the attention data, the need to maintain participants' interest in the toys required that age appropriateness be the primary consideration. However, each child also saw a novel television program (though from the same program category) at each age.

Parent questionnaire

A 12-item questionnaire was developed for this study to acquire information about the amount and type of television viewing the infant experienced at home. It also solicited demographic and background information on the parents and siblings and information on whether or not the infant had any of the experimental toys at home.

Procedure

A list of 30 television clips with a corresponding order (TV-first, TV-second) was randomly generated with the restriction that only one boy and one girl see each program clip and that each program clip be presented in a TV-first and TV-second condition. At 6 months of age, the infants were assigned to a condition based on the order in which they arrived at the laboratory. Thus, at the 6-month visit each infant was presented with 10 min of a television program and one third of the infants viewed a program belonging to one of the three program categories. At 12 and 24 months of age, the participants were randomly assigned to a different program clip within the same program category and in the same order (TV-first or TV-second) as that viewed at

6 months of age. As participant attrition over the three test sessions was not uniform across variables, the balance across conditions could not be fully maintained.

Upon arrival at the lab, the parent was given a verbal and written review of the procedure, their questions were answered and informed consent was obtained. The infant was then secured in a hook-on chair attached to a table in the testing room for 20 min of free play with the toys. For 10 min of this session, the television was on and for the other 10 min the television was off. The parent remained in the room and was seated slightly behind and to the right of the infant. The parent was instructed to pick up any toy that the infant dropped or pushed out of reach but to keep interactions at a minimum. The parent was also asked to complete a brief questionnaire on the infants' experience with television at home.

For infants assigned to the TV-first condition, the 10-min television program began playing as soon as the experimenter left the room. For those in the TV-second condition, the 10-min program began 10 min after the experimenter left the room. The entire experimental session was video recorded. The same procedure was followed for the infants at 12 and 24 months except that at the latter age, they were seated at a child-sized table with the toys and were also free to move around the room.

Dependent measures

Direction of gaze

The digital files of each session were coded for the direction and duration of the infant's looks. Two independent observers judged if the infant was fixating on the toys, the parent, the television, or elsewhere. A look to the toys was coded every time the infants looked at one of more toys regardless of the length of the look or the co-occurrence of other behaviors. A look to the television was coded every time the infants shifted their gaze to the TV screen, regardless of the length of look or the co-occurrence of other behaviors. The observers viewed the digital files at real-time speed while pressing buttons on a keyboard that recorded the corresponding duration with an accuracy of one tenth of a second. From these temporal onsets and offsets, the frequency and duration of the looks were calculated. Interrater reliability was assessed by having a second rater code 12 each of the 6-, 12-, and 24-month-olds' files. An analysis using the Kappa statistic was performed to determine consistency between raters. At 6, 12, and 24 months, Cohen's Kappas were .73, .69, and .70 and the percentage agreements were 88.7, 86.5, and 87.4, respectively.

Focused attention

The videotapes were reviewed by two observers who were trained in the coding of behavioral aspects of attention using Ruff's (1986) criteria. All looks to a toy(s) ≥ 2 sec were examined for the following behavioral indices of a focused state of attention: (a) gaze is directed to a toy; (b) facial expression is serious—brows may be knit and mouth may be pursed or slightly open; (c) head and shoulders are oriented forward, and often down, toward the toy; (d) general body motion is stilled; (e) minimal or no vocalization; and (f) fingering or manipulation of the toy (Ruff, Saltarelli, Capozzoli, & Dubinger, 1992; Ruff et al., 1996). The observers independently coded all of the infants at 6 and 12 months of age, the coding was reviewed and any disagreements were resolved through consensus.

RESULTS

Questionnaire data: Exposure to television at home

Forty-two percent of the parents reported having at least two television sets at home. They also reported that, at 6 months of age, their infants watched an average of 40.8 min ($SD = 40.7$) of television a day and at 12 months of age, they watched an average of 62.7 min ($SD = 49.6$) a day. This represents a significant increase in viewing time: $t(41) = -2.59$, $p < .05$. There was a wide range in the amount of television exposure in the home. At 6 months of age, exposure ranged from none to 3.5 hr a day, and at 12 months of age, viewing ranged from none to 4 hr a day. Regarding background television, 70% of parents of 6-month-olds and 59% of parents of 12-month-olds reported that the television was "often" or "always" on even when no one was watching it. The number of infants who had a television in their bedrooms ($M = 2.0$, $SD = 0.18$) was low.

Overview of the visual attention data analyses

Dependent measures

Several measures of visual attention were calculated to reflect infants' attention to the toys and to the television when the television was on and when it was off: (a) total duration of looking, (b) total number of looks, (c) the percentage of the session spent looking at the toys or the television, and (d) mean length of the looks. These measures tap into the attention-getting (number of looks) and attention-holding (duration of looking, percentage of session, and mean look length) components of visual attention (Cohen,

1972). The descriptive statistics for the measures of attention to the television and to the toys are provided in Tables 1 and 2. A preliminary examination of these means revealed that, regardless of the presence of television, the toys occupied the majority of the infants' attention; however, the infants directed frequent looks to the television during play. The range of total television time viewing at both ages was large, from as little as 4 sec to as much as 552 sec out of a possible 600 sec. Similarly, the range in number of looks to the television was large, from as few as two looks to as many as 61 in the 10-min TV-on session.

TABLE 1
Means and Standard Deviations for the Measures of Attention to Television When It Was On by Age and Order of Presentation

Measures of attention	*6 months M (SD)*	*12 months M (SD)*
TV-first 10 min		
Total duration of looking (sec)	97.37 (85.4)	87.86 (82.5)
Number of looks	22.50 (10.5)	25.75 (14.1)
% of session looking at TV	16.23 (14.2)	14.64 (13.8)
Mean look length (sec)	4.33 (1.9)	3.41 (1.5)
TV-second 10 min		
Total duration of looking (sec)	216.74 (146.2)	182.34 (126.3)
Number of looks	28.51 (11.5)	28.07 (10.3)
% of session looking at TV	36.12 (24.4)	30.39 (21.0)
Mean look length (sec)	7.60 (6.2)	6.50 (6.1)

TABLE 2
Means and Standard Deviations for the Measures of Attention to Toys by Age, Order of TV Presentation, and Treatment (TV on and off)

	6 months		*12 months*	
Measures of attention	*TV on M (SD)*	*TV off M (SD)*	*TV on M (SD)*	*TV off M (SD)*
TV-first 10 min				
Total duration (sec)	455.06 (92.3)	469.44 (74.3)	466.55 (74.8)	468.96 (91.9)
Number of looks	31.70 (9.7)	26.70 (9.6)	35.40 (12.6)	26.40 (11.4)
% of time looking at toys	75.84 (15.4)	78.24 (12.4)	77.76 (12.5)	78.16 (15.1)
Mean look length (sec)	14.36 (6.4)	17.58 (9.1)	13.18 (5.9)	17.76 (12.4)
TV-second 10 min				
Total duration (sec)	300.56 (143.5)	520.90 (53.1)	327.86 (112.3)	505.29 (68.9)
Number of looks	32.77 (12.4)	21.59 (10.9)	33.03 (9.8)	24.85 (8.2)
% of time looking at toys	50.09 (23.9)	86.82 (8.9)	54.64 (18.7)	84.21 (11.5)
Mean look length (sec)	9.17 (8.4)	24.13 (12.1)	9.9 (2.6)	20.33 (9.7)

Infants' attention at 6 and 12 months of age

The primary measures of interest for the analyses were the frequency and duration of looking at the toys and at the television when the television was on and when it was off.[1] The analyses of the mean look length and the percentage of time spent looking at the toys and at the television were consistent with the primary measures. For simplicity, we report only the analyses of the frequency and duration of looking. Preliminary analyses did not indicate any significant main effects or interactions of gender or program category and these two variables were not analyzed further.

Duration of looking

The results of a 2(age: 6, 12 months) × 2(where: toys, TV) × 2(treatment: TV on, TV off) × 2(order: TV-first 10 min, TV-second 10 min) analysis of variance (ANOVA) indicated a significant main effect of where the infants looked: $F(1, 45) = 656.87$, $p < .001$, partial $\eta^2 = .94$. This reflected the fact that infants directed significantly more attention to the toys than to the television. This main effect was qualified by significant Where × Treatment: $F(1, 45) = 76.46$, $p < .001$, partial $\eta^2 = .63$, Where × Order: $F(1, 45) = 12.86$, $p < .001$, partial $\eta^2 = .22$, and Where × Treatment × Order: $F(1, 45) = 30.77$, $p < .001$, partial $\eta^2 = .41$ interactions. The three-way interaction is illustrated in Figure 1. Follow-up ANOVAs of this interaction indicated that regardless of age or order of viewing, infants spent more time looking at the toys than at the television when it was available for viewing, $F(1, 45) = 82.90$, $p < .001$, partial $\eta^2 = .65$, although this pattern was stronger among infants in the TV-first group than the TV-second group, $F(1, 45) = 22.98$, $p < .001$, partial $\eta^2 = .34$. Consistent with this, when the television was on infants in the TV-first group looked significantly longer at the toys than did those in the TV-second group, $F(1, 45) = 29.75$, $p < .001$, partial $\eta^2 = .40$. However, the opposite pattern was observed for the duration of looking at the television when it was on. The infants in the TV-second condition looked longer at the TV than did those in the TV-first group, $F(1, 45) = 14.24$, $p < .001$, partial $\eta^2 = .24$. Thus, at both 6 and 12 months of age infants spent more time looking at the toys than at the television but this preference for toys was larger among infants who viewed television in the first 10 min of the session.

[1]The inclusion of looks to the television when the television was off provided a baseline for infants' attention to the television itself. The amount of looking in that condition was low, though not at floor. Any inflation in the results that might be attributable to this condition was offset by the highly significant *p*-values noted throughout the analyses.

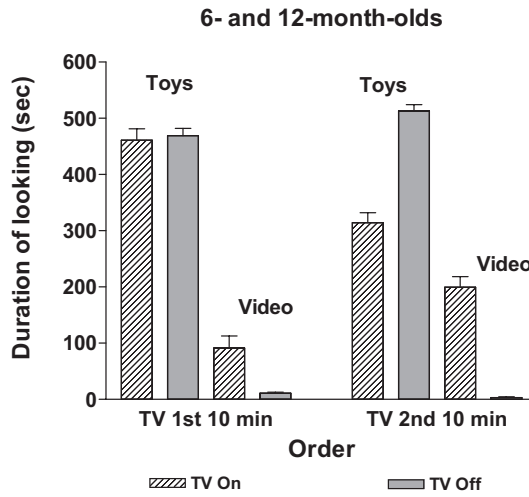

Figure 1 Duration of looking at the toys and the television as a function of treatment and the order of viewing.

Frequency of looking

Infants directed an average of 128.02 looks to the toys, the television, the parent, and elsewhere across the session when they were 6 months of age, a shift of gaze every 9.38 sec. At 12 months of age, they directed an average of 143.09 looks during the session, a gaze shift every 8.39 sec. The results of a 2(where: toys, TV) × 2(age: 6, 12 months) × 2(treatment: TV on, TV off) × 2(order: TV-first 10 min, TV-second 10 min) ANOVA of the frequency of looks indicated a significant main effect of where the infants looked: $F(1, 45) = 261.48$, $p < .001$, partial $\eta^2 = .85$, indicating that infants at both ages looked significantly more frequently at the toys than at the television. This main effect was qualified by a significant Where × Treatment interaction, $F(1, 45) = 161.62$, $p < .001$, partial $\eta^2 = .78$. The primary finding from follow-up tests was that regardless of the order of viewing, when the television was on infants at both ages directed more looks to the toys as well as to the television than they did when the television was off: $F(1, 45) = 165.43$, $p < .001$, partial $\eta^2 = .78$, and that of those looks, more were to the toys than to the television: $F(1, 45) = 48.32$, $p < .001$, partial $\eta^2 = .51$. The Where × Treatment × Order: $F(1, 45) = 2.77$, $p < .10$, partial $\eta^2 = .06$ interaction, approached significance and is illustrated in Figure 2. In summary, when the television was on the frequency of looks to the toys increased regardless of viewing order and the duration of looking at the toys decreased, though only for those infants in the TV-second group.

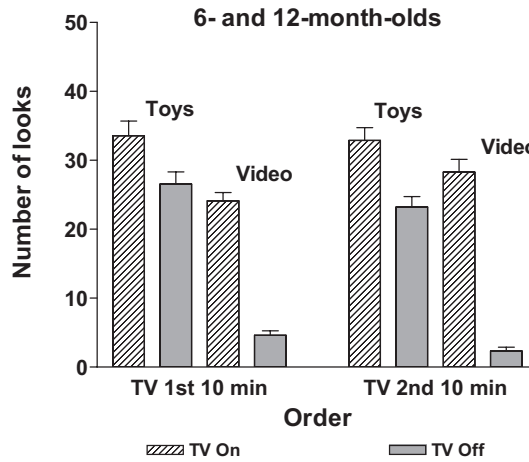

Figure 2 Frequency of looks at the toys and the television as a function of treatment and the order of viewing.

Because a high number of looks to the toys represents higher rates of the infants' shifting their gaze away from and back to the toys, together, these results suggest that the television distracted infants during play and especially so after 10 min of familiarization with the toys.

Habituation to background television

The infants' allocation of attention across the 10 min during which the television was turned on was examined to determine whether or not they habituated to it over the period. The 10-min session was divided into four 2.5-min time periods and the total duration of looking (attention-holding) and total number of looks (attention-getting) were calculated for each period.

The total duration of looking at the television was entered into a 2(age: 6, 12 months) × 2(order: TV-first, TV-second) × 4(time periods: 2.5 min 1 through 4) mixed ANOVA that revealed only a significant main effect of time period, $F(2.23, 105) = 13.65$, $p < .001$. There was a significant difference in duration of looking at the television between the first and second quarters of the session, $t(46) = 5.41$, $p < .001$, but no change across the subsequent quarters (see Figure 3a). A parallel ANOVA on the frequency of looks also indicated a significant main effect of time period, $F(3, 105) = 19.57$, $p < .001$ (see Figure 3b), such that the number of looks to the television decreased across the first 2.5 min, $t(46) = 5.44$, $p < .001$, but not thereafter. Together, these results indicate that infants directed most of

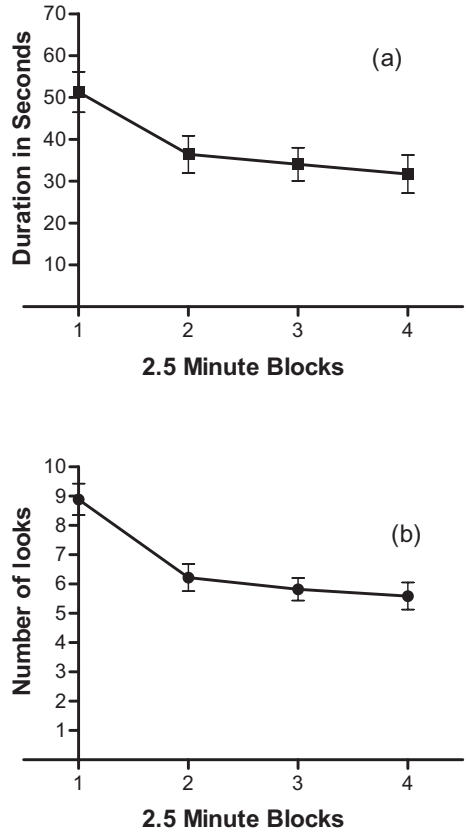

Figure 3 Habituation in the duration (a) and frequency (b) of looking at the television over the four 2.5-min blocks of the viewing period.

their attention to the television during the first quarter of the viewing session and that, although there was some habituation in the duration and frequency of looking at the television after that interval, the television continued to compel their attention to some extent for the remainder of the session.

Focused attention to toys at 6 and 12 months of age

The second goal of the study was to assess the impact of background television on the quality of infants' attention during play as indicated by their focused attention to the toys (Ruff, 1986). Several measures were calculated: (a) the percentage of play spent in focused attention, (b) the total number of

focused attention episodes, (c) the mean length of focused attention episodes, and (d) the peak or longest period of focused attention. As the presence of television reduced overall play with toys, the percentage of focused attention measure was calculated independent of the length of play. These four measures were analyzed in a series of 2(age: 6, 12 months) × 2(order: TV-first, TV-second) × 2(treatment: TV on, TV off) mixed ANOVAs with age and treatment as within-subject variables and order as a between-subjects variable. Preliminary analyses failed to reveal significant effects of program category or gender and these variables were not included. The means and standard deviations for the focused attention measures are shown in Table 3.

The results of the analysis of the percentage of play that infants spent in focused attention to the toys indicated only a significant main effect of age, $F(1, 35) = 8.17$, $p < .01$, such that the infants at 12 months of age spent more of their play in focused attention (11.7%) than they did at 6 months of age (7.2%). The analysis of the frequency of focused attention episodes indicated a significant Treatment × Order interaction, $F(1, 35) = 10.60$, $p < 001$. Follow-up tests revealed that infants in the TV-second group engaged in significantly more focused attention episodes when the TV was off ($M = 4.52$) than when it was on ($M = 2.93$), $t(26) = -3.95$, $p < .01$. Infants in the TV-first group engaged in more episodes of focused attention when the television was on ($M = 5.33$) than did infants in the TV-second group ($M = 2.93$), $t(45) = 3.13$, $p < .01$. Analysis of the mean length of focused attention episodes revealed a main effect of age, $F(1, 35) = 16.05$, $p < .001$, such that infants at 12 months engaged in longer episodes of

TABLE 3
Means and Standard Deviations for Focused Attention (FA) Measures by Order of Television Presentation, Age, and Treatment (TV on and off)

	6 months		*12 months*	
Measure of attention	*TV on M (SD)*	*TV off M (SD)*	*TV on M (SD)*	*TV off M (SD)*
TV-first 10 min				
Percentage of play in FA	9.7 (12.6)	9.1 (12.8)	13.1 (10.5)	17.1 (12.6)
Frequency of FA periods	5.8 (5.4)	3.7 (2.9)	4.9 (3.2)	4.9 (3.1)
Mean length FA periods (sec)	5.3 (3.8)	9.2 (11.1)	12.7 (6.7)	17.0 (10.7)
Duration longest FA period (sec)	12.2 (14.2)	17.3 (23.2)	24.9 (15.4)	35.4 (22.5)
TV-second 10 min				
Percentage of play in FA	4.1 (4.8)	6.9 (6.0)	9.5 (7.9)	9.1 (7.2)
Frequency of FA periods	2.4 (2.8)	5.0 (3.5)	3.4 (3.2)	4.1 (2.6)
Mean length of FA periods (sec)	4.4 (4.5)	6.5 (3.2)	8.7 (8.1)	11.4 (11.8)
Duration longest FA period (sec)	6.6 (8.2)	12.0 (9.2)	14.3 (11.8)	21.5 (15.7)

focused attention than they did at 6 months (*M*s = 12.18 versus 7.30 sec, respectively). A significant main effect of treatment, $F(1, 35) = 11.29$, $p < .01$, indicated that the infants engaged in longer episodes of focused attention when the television was off ($M = 12.93$ sec) than when it was on ($M = 8.89$ sec). The results for infants' longest episode of focused attention paralleled those of their mean length of episodes. A significant main effect of age, $F(1, 35) = 18.87$, $p < .001$, indicated that at 12 months, the length of infants' peak episode was twice as long as their peak episode at 6 months of age (*M*s = 23.14 versus 11.62 sec, respectively). A main effect of treatment, $F(1, 35) = 20.20$, $p < .001$, indicated that the peak episodes were longer when the television was off ($M = 20.85$ sec) than when it was on ($M = 13.91$ sec). In summary, the primary findings were that infants engaged in more focused attention and in longer periods of focused attention at 12 months of age than they did at 6 months. In addition, although the presence of background television did not influence the percentage of play infants spent engaged in focused attention, it did reduce both the mean length and the peak length of their focused attention episodes.

Stability in infants' attention to television at 6, 12, and 24 months of age

The third goal of this study was to examine the stability of infants' television viewing behavior across age. As noted, the duration and frequency data from infants at their 6- and 12-month test sessions indicated marked individual differences in both measures of attention. These individual differences raised questions about the development of television viewing habits in the early years of life and suggested that for certain infants "background" television can readily become "foreground" television, even when the content is adult-directed. To examine these questions and to extend the inquiry further into the toddler years, 34 of the infants who had participated at 6 and 12 months of age were reassessed in a similar procedure when they were 24 months old. At that time, individual differences were still apparent with the frequency of looks to the television ranging from 1 to 39 in the 10-min period and the duration of looking from 2 to 364 sec out of a possible 600 sec. As well, parents reported that the amount of television their toddlers viewed at home was 101.40 min per day, a significant increase from the viewing of those infants when they were 6 and 12 months old, $F(2, 56) = 15.29$, $p < .001$, partial $\eta^2 = .35$. Pearson correlations between the amounts of television viewing at home for successive ages are shown in Table 4. These were significant only for 12 and 24 months and indicate that those infants who viewed larger amounts of television at home at 12 months also viewed larger amounts at 24 months. Amount of viewing at 6 months was unrelated to later viewing at home.

TABLE 4
Correlations Between the Amounts of Television Viewed at Home Across the Ages of 6, 12, and 24 Months

	6 months	*12 months*	*24 months*
6 months	1.00	.077	.190
12 months	—	1.00	.656**
24 months	—	—	1.00

**Correlation is significant at the .01 level (one-tailed).

Concerning television viewing in the experimental context, the duration and frequency of looking at the television when it was on were examined for the 34 infants who participated at all three ages. A 3(age: 6, 12, 24 months) × 2(order: TV-first, TV-second) mixed ANOVA was conducted on the duration of looking at the television when it was on. The results yielded significant main effects of age: $F(2, 64) = 7.04$, $p < .003$, partial $\eta^2 = .18$, and of order: $F(1, 32) = 2.77$, $p < .001$, partial $\eta^2 = .33$. These indicate that, although there was no difference in duration of looking at the television at 6 and 12 months of age, there was a significant decrease in duration of looking at the television at 24 months ($M = 109.98$ sec, $SE = 15.60$) and that at this age this tendency was still more pronounced among infants who viewed the television in the first 10 min of the session. A parallel ANOVA on the frequency of looking data yielded only a main effect of age: $F(2, 64) = 21.44$, $p < .001$, partial $\eta^2 = .40$, reflecting the approximately 50% drop in the frequency of looks to the television between the 12- and 24-month-old test sessions ($M = 25.34$, $SE = 1.90$; $M = 12.89$, $SE = 1.53$, respectively). These results were consistent with and extend the primary analyses but should be interpreted with caution as they are based on a subset of the original sample following participant attrition over time.

To evaluate the stability in looking at the television in the lab context across the age range examined here, a series of Pearson correlations were calculated on the duration and frequency of looking data. These are shown in Table 5. There were significant correlations between the duration of looking at the television at 6, 12, and 24 months for those infants who had participated at all three ages. There were also significant correlations between the frequencies of looks to the television between 6 and 12 months and between 12 and 24 months, but not between 6 and 24 months of age. These results provide evidence for the stability of attention-getting and attention-holding aspects of television across age, such that infants who engaged in long or frequent looks to the television in the experimental setting at 6 months also exhibited long looks in that setting at 12 and 24 months of age.

TABLE 5
Correlations Between the (a) Durations of Time Spent Viewing and (b) Frequency of Looks to Television in the Experimental Context Across Ages 6, 12, and 24 Months

	6 months	*12 months*	*24 months*
(a) Duration of looking			
6 months	1.00	.373*	.346*
12 months	—	1.00	.400**
24 months	—	—	1.00
(b) Frequency of looks			
6 months	1.00	.297*	.144
12 months	—	1.00	.603**
24 months	—	—	1.00

*Correlation is significant at the .05 level (one-tailed). **Correlation is significant at the .01 level (one-tailed).

To compare the relationship between the amounts of television viewing infants did in the experimental context and at home, a series of correlations were calculated on the duration of looking at all three age points in the two different contexts. These are shown in Table 6. The results indicated that television viewing at home at 6 months did not predict later viewing at home or in the experimental context. By 12 months, however, television viewing at home was significantly correlated with television viewing in the lab at 12 months and with television viewing at home at 24 months. At 24 months, television viewing at home was also correlated with television viewing in the lab. These results suggest an emergent pattern of stability in television viewing behavior at home and in the lab over time. However, these correlations do not indicate the extent to which the noted pattern of stability was consistent across the full sample or whether it was due to the performance of a smaller subgroup within the sample.

To address this question, an alternative but complementary analysis on the consistency of television viewing patterns across age and context was

TABLE 6
Correlations Between the Amounts of Television Viewed at Home (H) and Amounts Viewed in the Experimental Context (E) at Ages 6, 12, and 24 Months

	6 months (H)	*12 months (H)*	*24 months (H)*
6 months (E)	.138	.147	.140
12 months (E)	.222	.507**	.411**
24 months (E)	−.095	.218	.356*

*Correlation is significant at the .05 level (one-tailed). **Correlation is significant at the .01 level (one-tailed).

conducted. Infants were designated as "high television viewers" or "low television viewers" according to a median split of duration of looking times to the television in the experimental context at each age. The results showed that 44% of the infants were consistent in their looking patterns across the three ages (26% low; 18% high) and that 59% were consistent in their looking pattern at both 12 and 24 months (29% low; 29% high). Moreover, infants who were designated as high television viewers at all three ages watched more than twice the amount of television at home (M = 125 min, SE = 12.85; M = 58.33 min, SE = 32.21, respectively) when they were 24 months old than did those who were consistent low viewers at all three ages: $t(13) = 4.56$, $p < .002$. What these findings suggest is that beginning after 6 months of age, infants in this study who had long look durations to television in the lab also watched more television at home and that this pattern became stronger across the age range examined. Again, these findings are tentative as they are based on the subset of 34 infants who participated at all three ages.

DISCUSSION

The general objective of this research was to examine the impact of background television on infants' attention during a period of free play with an array of novel toys. As toy play provides young infants with an important opportunity for exploration and learning, concerns about the effects of background television on the deployment of their attention processes and on the quality of that attention during play have been raised. A related concern is the possibility that early patterns of attention to television may become stable over time placing "heavy viewers" at greater risk for the consequences of interrupted play and for cognitive and social disadvantage later in childhood.

The attention-getting and attention-holding potential of television

The first goal was to examine the impact of background television on the way that infants deployed their attention during play. The two questions of particular interest were whether background television would attract infants' attention and if so, whether any of the television programs would be able to engage or hold their attention, in effect making it functionally more like foreground television. The results indicated that in general, infants at both 6 and 12 months of age showed a preference for looking at and playing with the toys over looking at the television during the 10 min when both were available, regardless of the type of program shown. The lack of an effect of

program type may have been due to the fact that even the children's programs were beyond the comprehension of even the oldest infants. Moreover, the formal features embedded in the selected programs were not quantified and may have differed across the three categories.

Although the television did not appear to engage infants' attention during play, it did interrupt that activity. When the television was on, the mean length of infants' looks to the toys was significantly shorter than when it was off (11.66 versus 19.95 sec). Moreover, infants directed an average of 26.21 looks to the television during play and most of those were quite brief with almost half of them (46%) $<$ 2 sec in duration. These data indicate that the television programs selected were successful in getting infants' attention but were not successful in holding it. For most infants, background television did not become foreground television. This should allay the concerns of those who contend that the typical fast pace of current television programs compels visual fixation in young infants who find themselves unable to look away, regardless of comprehension (e.g., Christakis & Zimmerman, 2005). However, the failure of the television material to engage infants' attention is perhaps not surprising given other evidence that the amount of time that infants look at television depends on several factors, such as its comprehensibility (infant- or adult-directed), the viewing context (home or laboratory), and whether a parent co-views with the infant (e.g., Anderson & Levin, 1976; Barr et al., 2008; Schmidt et al., 2008), none of which was examined here.

It is important to note that infants' preference for the toys was strongly affected by the order in which the television program was presented. Those infants who were shown the television program in the second half of the play session engaged in more overall looking at the television (33%) and a greater number of looks to the television (28.5 looks) than those infants who were presented with the television in the first half of the session (15% and 24.5 looks, respectively). In addition, the mean length of a look to the television in the TV-second group was more than twice that of the TV-first group (7.6 versus 3.4 sec). This order effect probably reflected a change in the relative familiarity of the toys and the television over time (see also Courage et al., 2010). The importance of target familiarity on infants' distractibility has been documented in other contexts such that an increase in the familiarity of a focal object (e.g., novel or familiar toys) results in a decrease in the latency to turn to a distractor object (e.g., Kannass et al., 2006; Oakes, Tellinghuisen, & Tjebkes, 2000; Tellinghuisen, Oakes, & Tjebkes,1999). These findings have implications for the generality of the results from television viewing in the laboratory to viewing at home, where the array of available toys is typically familiar to the infant. For example, parents concerned about their infants' exposure to television might

consider optimizing the novelty of toys at home by rotating their availability to the infant.

An unexpected outcome of the current study was the failure to find age differences in infants' attention (duration, frequency of looking) to television between the 6- and 12-month assessments. Most of the research on television viewing in young children has shown increased attention to television with age from infancy to the preschool years (e.g., Anderson & Levin, 1976; Barr et al., 2008; Schmitt, Anderson, & Collins, 1999; Valkenburg & Vroone, 2004), although much of that research involved foreground television and age-appropriate content. It may have been that even the child-directed programs selected in the present study were beyond infants' level of comprehension at both ages and functioned more as a distractor than a focal activity when they were engaged in play. Given that this was the case, research shows that distractibility tends to decrease with age as the infant's attention becomes less driven by exogenous features in the environment and more so by endogenous control of their resources, a shift that typically begins to occur between 9 and 12 months of age (Colombo, 2001; Kannass et al., 2006; Oakes & Tellinghuisen, 1994; Oakes et al., 2002; Ruff & Capozzoli, 2003; Ruff & Lawson, 1990; Ruff & Rothbart, 1996). Yet, no age differences in distractibility (i.e., frequency of looks) were evident in the study reported here. However, most of the reports of decreased distractibility with age have employed intermittent distractors. The continuous and varied audiovisual distraction provided by background television in the present study may have made the demand for attentional focus too great for infants in this transitional age range to cope with (see Kannass & Colombo, 2007). Indeed, the analysis of a subgroup of the same infants who were reassessed at 24 months of age showed that they engaged in significantly less looking (frequency and duration) at the television than they had at 6 and 12 months. This finding is also consistent with Schmidt et al. (2008) who also failed to find age differences in attention to background television until the infants they tested were between 24 and 36 months old.

The evidence that the presence of a continuous and varied distractor can be more difficult for young infants to resist is consistent with the finding that infants in the current study did not habituate to background television over the interval. Although there was a decrease in the duration and frequency of looking over the first 2.5 min of the television presentation, there was no further decline thereafter as infants continued to direct brief looks to the television. Interestingly, a study by Malcuit, Bastien, and Pomerleau (1996) indicated that the functional significance of a stimulus affects its ability to maintain infants' attention over time. They showed that 4-month-olds habituated to a simple, briefly presented visual stimulus. When the same stimulus was followed by an animated cartoon that remained on for as long as the

infant looked at it, not only did the infants fail to habituate to the brief stimulus, there was an increase in visual orientations over successive presentations. An implication of this is that if an orienting response to a formal feature in a television program is reinforced by the continuing presence of interesting features or content, infants may fail to habituate and television may continue to distract them during play. Hawkins, Pingree, Bruce, and Tapper (1997) referred to such short looks in preschool children as "monitoring" looks that, rather than being random, represent purposeful turns toward the television that enable them to continue watching or not depending on the content (see also Lorch, Anderson, & Levin, 1979).

Infants' focused attention to toys

The second goal of this study was to examine the impact of background television on infants' focused attention to the toys, a qualitative measure of their attention. As expected, the infants at 12 months of age engaged in more focused attention, had longer mean episodes and longer peak episodes of focused attention than they did at 6 months of age. The results also showed that the presence of background television disrupted the infants' focused attention to the toys, regardless of the order of presentation, but did not do so differentially by age. Although the percentage of play spent in focused attention was not impacted by the presence of television, the mean length of the focused attention episodes decreased from 12.9 sec to 8.9 sec when the television was on. Likewise, infants' peak looks in focused attention decreased from an average of 20.9 sec while the television was off to 13.9 sec while it was on. A significant negative correlation between both duration and frequency of looking at the television and the mean length of focused attention episodes (rs = −.30 and −.33, respectively, both ps < .05) supports a conclusion that the infants' attention to the television and frequent orienting to it, while not impacting the overall amount of focused attention, interrupted these episodes, in effect, cutting them short. In contrast to these results, Ruff and colleagues (Ruff & Capozzoli, 2003; Ruff et al., 1996) found a preservation of focused attention in an intermittent distractor condition and suggested that young infants may use lower level processes, such as peripheral narrowing or increased effort to resist distraction and maintain focused attention on a central target or activity. Infants in the current study may have failed to preserve focused attention because background television provided a level of interference that was too great for the infants to tune out.

The attenuation in infants' ability to maintain focused episodes during play has potentially important implications for their cognitive development. Focused attention represents a state in which the processing of information

is facilitated or enhanced, and it is important for learning and memory (Lawson & Ruff, 2004). Ruff et al. (1996) found that 10-month-olds' focused attention tended to occur during long play episodes whereas casual attention was associated with short play episodes (see also Oakes, Ross-Sheehy, & Kannass, 2004). In addition, long looks have been associated with deeper attentional engagement and greater information processing (Richards & Anderson, 2004). Thus, the overall amount of time spent on an object or task can influence both the likelihood that focused attention will occur and the depth or quality of focused attention episodes. Several investigators have found that the amount of time spent in focused attention during infancy is positively predictive of intellectual outcome (e.g., IQ, representational play) in normally developing and high-risk infants later in childhood (for a review, see Ruff & Rothbart, 1996). Moreover, there is some evidence from preschool children that once interrupted from play, they return to the activity at a more superficial level of engagement than they showed before they were distracted (DiLalla & Watson, 1988), although this has not been examined in infants and toddlers.

Individual differences in television viewing across age

The third goal of the current research was to examine the stability of infants' pattern of attention to television across the first and second years of life. Although most infants preferred to play with toys than to watch television, the range of interest in the background television during play was large; some infants engaged in as little as a few seconds of looking at the television while others spent almost the entire 10-min session watching it. They also showed a wide range in the number of looks they directed to the television. A series of positive correlations suggested that these individual differences were maintained from 6 to 12 months of age and were still evident for many infants at 24 months of age. That is, infants who engaged in long looks to the television at 6 months of age continued to do so at 12 and 24 months. It could be said that some infants were "television watchers" while others were not. Moreover, infants who were high television viewers during the play session also tended to watch more television at home as reported by parents, a pattern that became increasingly evident after 6 months of age.

Such individual differences in viewing probably reflect the influence of the family viewing environment in which adults and older siblings have established a pattern of heavy, moderate, or light viewing to which the infants and toddlers are also exposed (Huston et al., 1990). However, a study by Plomin, Corley, DeFries, and Fulker (1990) indicated that there might also be a biogenic influence on individual differences in children's television viewing. They compared the television-viewing habits of adopted

preschoolers with their adoptive and biological parents who participated in the Colorado Adoption Project and found evidence that individual differences in viewing are significantly affected by genetic factors (32%) as well as by shared environment (20%). Although the mechanisms that might mediate a genetic influence on television viewing are unknown, several traditional measures of development, such as IQ and temperament, were ruled out. The authors note that finding a genetic influence on television habits does not imply that they cannot be changed, just that individual differences may be explained in part by an inherent tendency in some children to watch television at length.

Finally, it should be noted that the infants tested in the present study also showed stability in the duration of their attention to the toys both when the television was on and when it was off (see Setliff et al., 2009). Therefore it may be that the stability in infants' attention to television reported here is part of a more general tendency for patterns of attention to various types of stimuli to become increasingly stable across the first 3 years of life (e.g., Bornstein & Benasich, 1986; Kannass et al., 2006; Ruff, Lawson, Parrinello, & Weissberg, 1990). For example, Kannass et al. (2006) found that in a multiple toy free play situation there was moderate stability in mean look length and number of looks to the toys across the ages of 7 and 9 months and also between 9 and 31 months, though no stability between 7 and 31 months. They suggest that the ages studied may tap into transitional ages in which infants' attention is changing from control by exogenous factors to internal or endogenous control.

In conclusion, given the ubiquitous presence of television in infants' daily lives, its potential to compel attention and to interrupt other ongoing activities is significant. Although there is evidence that in some circumstances infants and toddlers continue to engage in concurrent activities while exposed to background distractions (Ruff & Rothbart, 1996; Schmitt et al., 2003), the particular stimulus characteristics of television may make it unique in its ability to elicit attention, diminish focused attention, and to be resistant to habituation. In addition to these special characteristics, it may be that the presence of background television in and of itself (i.e., as a source of noise) could interfere with cognitive processing as has been reported for preschoolers and older children (e.g., Lercher, Evans, & Meis, 2003; Maxwell & Evans, 2000). Of particular concern is the distraction from toy play that frequent looks to the television elicited. Play is a key component of early cognitive and social development during which infants explore the properties of objects, learn about cause and effect, and practice motor skills (see Power, 2000; Ruff & Rothbart, 1996; Singer, Golinkoff, & Hirsh-Pasek, 2006). Finally, if patterns of television viewing established in infancy and toddlerhood are indeed stable over time, recent evidence that parents are

increasingly concerned about their children's exposure to television and other media is timely (Rideout, Foehr, & Roberts, 2010; Rideout & Hamel, 2006).

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