Viewing the Viewers: Ten Video Cases of Children’s Television Viewing Behaviors

Dina L.G. Borzekowski and Thomas N. Robinson

This paper examines measures of children’s television viewing. We performed ten video case studies to replicate and extend work addressing “in what ways do parent and child estimates and descriptions of television viewing resemble those observed using in-home videotape observations?” Mothers’ general estimates were more accurate than children’s estimates. In contrast, children’s perceptions of behaviors while viewing were more accurate than their mothers. Lastly, we found that in-home videotape observation has substantial limitations.

Besides articles and reports for the lay public, thousands of research studies describe how television generates mostly negative, but also some positive influences on youth. Some link the recent surge in violence on our streets to watching televised violence (Centerwall, 1992; Palermo, 1995; Rosenberg, O’Carroll, & Powell, 1992; Huesmann, 1982). Others believe that unhealthy eating habits and accelerating rates of obesity result from sedentary television viewing and observing commercials promoting high fat, high calorie foods (DuRant, Baranowski, Johnson, & Thompson, 1994; Goldberg, Gorn, & Gibson, 1978; Gortmaker, Must, Sobel, Peterson, Colditz, & Dietz, 1996; Taras, Sallis, Patterson, Nader, & Nelson, 1989). Television viewing has been associated with teenagers’ involvement in risky behaviors (Grube & Wallack, 1994; Klein, Brown, Walsh-Childrens, Oliveri, Porter, & Dykers, 1993). Others indict television as the cause of poor academic achievement among youth in

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the United States (Beentjes & Van der Voort, 1988; Chall et al., 1982; Fetler, 1984; Neuman, 1988). Less often, researchers discuss some of the benefits of watching TV, such as the educational value of well-produced television programs about history, art, and science (Dorr & Rabin, 1995; Lesser, 1974; Liebert & Sprafkin, 1988; Valkenburg, Krcmar, & de Roos, 1998).

The reports describing these television effects often present remarkable statistics. They remind us that practically all (98%) American households have a TV set and over two-thirds have a VCR (Bernard-Bonnin, Gilbert, Rousseau, Masson, & Maheux, 1991; Stanger, 1997). Ninety-four percent of U.S. households have a remote control (Nielsen Media Research, 1997). Another often mentioned statistic is that, on average, children spend more time watching television than in any activity other than sleep (Huston, Wright, Rice, Kerkman, & St. Peters, 1990; Liebert & Sprafkin, 1988; Stanger, 1997; Tangney & Fesbach, 1988). Researchers frequently report that the average child is exposed by television to approximately 12,000 violent acts and around 20,000 commercials in a given year (Goldberg et al., 1978; Huston et al., 1992; Kunkel & Roberts, 1991; Sege & Dietz, 1994).

One study on attitudes about commercials found that children watch from 5 to 69 hours of television per week, with a mean of 34.2 hours (Ferguson, 1975). Another study on parent's perceptions of television reported that children watched an average 14 hours a week, with a range between 1 to 56 hours (Bernard-Bonnin et al., 1991). Elementary school children are said to watch two to three hours of television per day. However, there are considerable differences among children from study to study (Anderson, Field, Collins, Lorch, & Nathan, 1985; Stanger, 1997; Tangney & Fesbach, 1988).

Besides variation in amount, there are great differences in how children spend time in front of the television set. Attention given to television, often called "eyes on screen," varies within the range of viewing experiences (Krugman, Cameron, & White, 1995; Anderson et al., 1985). Research on viewing in naturalistic settings is scant; the few studies that exist estimate that viewers have their eyes on the screen less than two-thirds of the time while watching programming and around one-third of the time while watching commercials (Anderson et al., 1985; Allen, 1965; Krugman, Cameron, & White, 1995).

In many homes, the TV set is on from the time the first family member wakes to the time the last family member goes to bed—and in some households, even after that last person "goes to bed" (especially if he or she has fallen asleep in front of the TV set). Children do their homework, play board games, and eat their meals with television programs and commercials in the background in these constant television homes (Medrich, 1979). In other families, television viewing is a more structured activity. Prior to viewing, parents and children determine what will be watched and when the scheduled program is being broadcast; then viewing is the exclusive activity (Bryce, 1987). Parents may directly and indirectly mediate children's viewing, altering television's effects in either of these scenarios (Jason, & Lonak, 1988; Krcmar, 1998; St. Peters, Fitch, Huston, Wright, & Eakins, 1991; Sarlo, Fry & McCain, 1980; Weaver
& Barbour, 1992). Reports often cite how much television children watch: They less frequently discuss different degrees of attention, other concurrent activities and social contexts of viewing behaviors.

Given the enormous potential effects television may have on our society, it is important to critically consider the research and methodology giving rise to statistics on television consumption. How credible are the figures about television? How do researchers come to know these things about children and television, and is the manner in which these scientists collect data reasonably sound? Should alternative methods be developed, given changes in media access and technologies? Answers to such questions affect not only academic researchers, but also commercial and cable programmers. Several broadcast professionals have complained that Nielsen Media Research, the industry standard, does a poor job collecting data on children’s television viewing (Carter, 1997; Moshavi, 1992).

Both quantity and quality of viewing are important in the case of children. When and how do children watch? Is television viewing an exclusive activity, or is it background to eating, doing homework, or game playing? Does co-viewing occur at the rates reported by children or by their parents? Exploring the methodologies employed to gather such information is a first step in providing useful data to those concerned with reducing the negative impact and increase the potential benefits of watching television.

Several researchers have previously critiqued current data collection methods and measures (Anderson et al., 1985; Fletcher & Chen, 1975). The review and study presented in this paper serves as a replication and extension of work done over a decade ago. It is a replication in that it uses methods and answers questions raised specifically by Anderson, Field and colleagues, 1985. It is an extension in that both the technology and social context environment of viewing has changed tremendously in the past few years. Homes now have more televisions, VCRs, and computers (Stanger, 1997). Using remote controls, children can now access many more channels, including several that directly target youth. Children also use television to watch videotapes and play videogames. Viewing behaviors may have changed and considering this, we have examined behaviors in front of the television set that others have not reported including watching with parents or peers, eating, playing, or reading while viewing and/or playing video games.

This study occurred during a time when families seem to be in flux. Many more children live in households where both parents work or the child is being raised by a single parent (Coontz, 1997). We consider the most frequently used methodologies in children and television research. We review the major methods researchers use to study children’s television viewing, the findings from case studies of ten families, including how much and in what ways children watch television. The study is based on interviewer-administered parent and child surveys as well as video observations in the children’s homes. The research question here is: “In what ways do parent and child estimates and descriptions of television viewing resemble those observed using in-home videotape observations?”
Measuring Children’s Television Viewing: Methodologies

The majority of studies have employed one or more of the following methods to collect data on children’s viewing habits: written questionnaires, interviews with parents and/or children, television logs and diaries, electronic monitors, and video or direct visual observations. A number of television-related studies occur in laboratory settings—we will not examine these methods, because such studies usually do not address television viewing at home (Goldberg, Gorn & Gibson, 1978; Reeves, Thorson, Rothchild, McDonald, Hirsch & Goldstein, 1985). This consideration is timely, because we now face even more obstacles in determining how much and in what ways children watch given the current multi-channel, ever-present remote control, television environment (Krugman, Cameron, & White 1995; Lull, 1988).

Questionnaires and Interviews

Many studies on children’s television viewing use questionnaires, presenting questions to parents and children in written or interviewer-administered forms (Bryant & Gerner, 1981; Gortmaker et al., 1996; Plomin, Corley, DeFries, Fulker, 1990; Robinson & Killen, 1995; Sarlo et al., 1988; Taras et al., 1989; Tangney, 1988). Subjects respond to questions like, “How often is your television set on?”, “How much time did you spend watching television yesterday?”, and “How many hours of television does your child view on a typical weekday/weekend day?”

In person or over the telephone, investigators interview subjects asking about how much and in what ways children use television (Fry & McCain, 1980; Grube & Wallack, 1994; Medrich, 1979). This method differs from the written survey in that a researcher can often provide additional information to clarify standard questions or assist a subject in providing an accurate answer, allowing for more detailed and descriptive responses (Flagg, 1990).

Television Logs and Diaries

Television logs and diaries are also used by television researchers (Anderson et al., 1985; Bernard-Bonnin et al., 1991; Brosius, Wober, & Weimann, 1992; Hawkins, Reynolds, & Pingree, 1991; Huston et al., 1990; Pinon, Huston, Wright 1989; St. Peters et al., 1991; van der Voort & Vooijs, 1990; Tangney & Feshbach, 1988). Some investigators provide subjects with program grids that contain show names, broadcast channel, and time information. Parents and/or children are asked to mark shows which they recall watching (Bernard-Bonnin et al., 1991; Tangney & Feshbach, 1988). Other television diaries require subjects to write in program names on empty grids (St. Peters et al., 1991; Huston et al., 1990; Anderson et al., 1985; van der Voort & Vooijs, 1990). For example, one study had children keep a seven-day diary in
which they reported all their leisure activities in 15 minute blocks (van der Voort & Vooijs, 1990).

A technologically-aided diary system is the Electronic Sampling Method (ESM) used by Kubey and Csikszentmihalyi (1990). In their studies, subjects answered questions when randomly signaled with an electronic pager. ESM has been used with samples of adults and children as young as ten years. It has provided findings regarding the amount of television people watch and the manner and mood in which they watch (Kubey & Larson, 1990; Larson, Kubey, & Colletti, 1990).

Nielsen Media Research

While the A.C. Nielsen Media Research Company employs telephone interviews and television viewing diaries, it relies primarily on the Nielsen People Meter to measure national television viewing as well as viewing in many local TV areas (Nielsen Media Research, 1995). Drawing a sample of 5,000 households (Aust, 1996; Nielsen, 1995), Nielsen enters homes and installs metering equipment. When an individual begins watching television, she presses an assigned button either on the box or on a remote, changing a light above her people meter button from red to green (Danaher & Beed, 1993; Friedman, 1989; Nielsen, 1995). When she finishes watching, she presses a button again, returning his/her meter light to red. Each people meter has buttons and lights for household members and guests. Children as young as two years of age are instructed and expected to enter viewing information into the people meter. Button pressing identifies who is watching. This is integrated with the information collected and transferred through the installed computers and modems, allowing Nielsen to derive their ratings of television programs (Aust, 1996; Nielsen, 1995).

Observations

Photographed or direct observations have been considered the “gold-standard” of measures. In several studies, researchers entered the viewing areas and watched television viewing (Bryce, 1987; DuRant, Baranowski, Johnson, & Thompson, 1994; Krugman, Cameron, & White, 1995; Lemish, 1987; Palmer, 1986). In the Krugman, Cameron and White (1995) study of college student viewing, observers concealed what they were doing. Since the collectors were also college students, they were able to act as though they were completing homework while covertly measured subjects' eyes on screen time. Upon the program's completion, the data collectors revealed what they were doing and asked the subject questions about programming just viewed. Ethnographic methods also allow for observations of television viewing. In studies by Lemish (1987) and Bryce (1987), observers entered subjects' homes to follow a variety of family activities, but especially television viewing. Because they spent a great deal of time in these households, the observers’ presence reportedly
became unobtrusive and family members' viewing behaviors were described as "natural."

A handful of researchers have installed cameras in subjects' homes (Allen, 1965; Anderson et al., 1985; Bechtel, Achelpohl, & Akers, 1972; Collett, 1986; Fletcher & Chen, 1975; Svennevig 1986). In some cases, the cameras recorded only when the TV set was turned on (Anderson et al., 1985; Collett, 1986; Svennevig 1986); in others, recording was continuous (Bechtel, Achelpohl, & Akers, 1972; Fletcher & Chen, 1975). Such film and videotape observations have led researchers to conclude that people do not give their undivided attention to program viewing (Collett, 1986) and heavy viewers, those who spend more time in front of a turned on set, do not necessarily spend more time looking at the TV set (Anderson et al., 1985).

A major finding of video observation research is that discrepancies exist between people's viewing estimates and videotapes or films of their viewing. Fletcher and Chen (1975) assumed that families who knew they were being filmed would keep viewing diaries more accurately. They reported that diary keepers were accurate only in reporting their own but not another's viewing. In a study of 334 Massachusetts families, parent-maintained viewing diaries indicated that children had watched an average of 16.6 hours per week while videotapes revealed 13.4 hours per week (Anderson et al., 1985). While different in absolute value, estimates had a strong positive correlation ($r = .86$, $p < .001$). In contrast, Collett (1986) found diary estimates to be unreliable representations of what was observed on the research videotapes. He noted no obvious pattern to the inaccuracies.

There is general dissatisfaction with estimates of television viewing, especially regarding children's television use (Friedman, 1989; Kubey & Csikszentmihalyi, 1990; St. Peters et al., 1991). Anderson found that direct estimates of hours had a moderately high correlation with the viewing diaries ($r = .60$, $p < .001$); however, average direct estimates (22.0 hrs per week) were considerably higher in absolute value than the diary estimates (16.7 hrs per week) (Anderson et al., 1985). Van der Voort and Vooijs (1990) found significant, but slightly weaker correlations between diaries and weekdays/weekend estimates ($r = .52$, $p < .001$) and times of the day estimates ($r = .45$, $p < .001$). Here too, average direct estimates were much higher (by 26%) than the diary estimates (Van der Voort & Vooijs, 1990).

A final indication that a problem exists with measuring children's television viewing can be noted in the variations in viewing amounts from study to study. Consider the following number of hours per week children reportedly spent watching television: 40 (Klein et al., 1993), 21.4 (Taras et al., 1989), 34 (Gortmaker, , 1996); 13.4 (Anderson et al., 1985), 41.8 (Robinson & Killen, 1995); 14 (Bernard-Bonnin et al., 1991); 31.2 (Tangney & Feshbach, 1988) and 24.2 (Nielsen, 1997). Although the samples differed in composition, these large differences in weekly average viewing estimates suggest the need to re-examine how we measure children's television viewing.
Video Cases of Ten Families

We made video recordings in the homes of ten families in order to develop, assess, and improve self-report measures of children’s television viewing. The current study was designed to examine the validity of self-report measures of a number of television viewing related behaviors. We focused on total viewing time estimates, including use of video games, eyes on screen, co-viewing with parents, peers, and siblings, eating, reading or doing homework and playing while watching.

Method

Participants

Recruitment letters describing the general research goal of studying children’s television viewing were sent to parents of approximately 150 third and fourth grade students from two suburban public schools. In addition, a brief recruitment announcement appeared twice in a weekly newspaper (circulation 17,000) reaching university faculty, staff, and the local community. The study protocols were approved by the Panel for the Protection of Human Subjects in Research of Stanford University. Participating parents and children consented to participation in writing.

A total of 30 families indicated preliminary interest and 11 families from the San Jose metropolitan region agreed to participate. Reasons for not participating included aversion to the videotaping procedures and scheduling difficulties. The first family selected was used to pretest various versions of the research instruments, interview formats, and equipment installation. As a result, their data are not included. Of the remaining ten families, nine were Caucasian, and one was Hispanic American. Two mothers had completed high school, four reported some college education, two had college degrees, one had some graduate education, and one had a graduate degree. Each family had at least one child in the third or fourth grade, whom we label as the focus child. Genders of focus children were evenly divided, and the average age was nine years nine months. One family was a single parent family, where the mother was the head of the household. One focus child was an only child, five had one sibling, two had two siblings, and two had three siblings. In all families, the mother was the participating parent for the surveys.

Families had an average of 2.5 TV sets, from one set in two of the households to five sets in one of the households. Of the TV sets, 64% were connected to cable or to a satellite dish. Seventy-two percent of the TV sets were connected to a VCR. Four households had TV sets in the focus child’s bedroom; none had a TV set in the kitchen. All the families had home computers which the focus child was allowed to use.
Procedure

When a family agreed to participate, the research team entered the family home to install recording units and cameras. The equipment recorded activity for a total of ten days. Time-lapse video recording units (Mitsubishi Model No. HS-5168U) were installed in locked 30"x19"x15" wood-paneled boxes, beside each working TV set in the household. Unless the room shape allowed a single camera to capture the entire room, two infrared wide-angle cameras (Ultrak ObserVision, Model #K04050TRS and Sanyo B/W CCD Camera, VDC-9212) were set on tripods or shelves to record both the TV set and any possible viewing areas. Exposed cables were kept to a minimum and cameras were positioned as discretely as possible and out of traffic paths.

Time lapse video recording and extended play videotapes (Maxell HGX-Gold T-120) allowed us to collect all ten days of observation data onto two tape cassettes per TV set, minimizing intrusion by our research team. A researcher from our team switched the tapes (and re-tested the equipment) three days into the ten-day recording period. She returned at the end of the ten days to collect the final seven-day tapes and remove the recording equipment.

Two cameras per room alternated recording images every four seconds 24 hours a day for ten days. Thus, our database contained sequences of images in which every other image was from a different angle of the room. As a result, the only events not captured were events of less than four seconds duration visible by only one camera. All images had superimposed date and time stamps.

In addition to installing equipment at the first visit, researchers conducted two interviews, one with the mother and another with the focus child. Interviews with mothers and focus children were conducted separately. The same interviews were repeated ten days later, when observation equipment was removed from the home.

Before beginning the interview with the focus child, the researcher reviewed with the child how different activities take different amounts of time (i.e., brushing one's teeth takes less than five minutes, playing at recess lasts around 30 minutes, watching a movie in the movie theater takes more than one hour, etc.) This was done to trigger the focus child's concept of time durations before asking him or her how long he or she spent in various activities. Researchers read aloud the questions, and the parent and focus child responded.

Measures

To assess total viewing by the focus child, questions were asked in two recall formats. The same question formats were used with mothers and focus children. The first, the Global Weekly Estimate, assessed viewing for an entire week. This measure
was the sum of responses to the following questions:

"In the past 7 days, how much time did (child's name) spend...

... (1) Watching regular (broadcast or cable) television - not including TV programs previously videotaped on the VCR?

... (2) Watching TV programs that had been previously videotaped on the VCR?

... (3) Watching videotapes on the VCR, like movies or educational video, but NOT including previously taped TV programs?"

Mothers and focus children answered each question for the three time periods: before school (before noon for weekend days), after school but before dinner (noon to dinner for weekends), and after dinner. Separate estimates for each period were given for in-home and out-of-home viewing. To derive the Summed Weekly Estimate, we collected seven day-by-day recalls, starting with "yesterday." We asked the same questions across the aforementioned time periods for each day and then added the responses to create the Summed Weekly Estimate. While probing the parent and child about television viewing, we asked separately about the child's video game playing.

Besides media use estimates, the mother and the child indicated how often the following occurred while the focus child watched television: had his or her eyes on the screen, watched with a parent, sibling or a peer, ate or drank, did homework or read, or played. For these activities, the parents estimated percentages of time and the child responded on a five point scale from "none of the time" to "all of the time."  

Coding Videotaped Observations

Prior to and during coding, a team of eight researchers met to discuss how to interpret recorded activities. They observed random segments of tapes and developed coding rules as a group. For example, it was decided that even if a coder was unable to tell whether a television program or a videotape was on the TV screen, an individual using a joy-stick or similar device while watching was coded as "playing a video game." The group did not attempt to code whether an individual was watching a videotape versus an on-air program. Because of the use of remote controls, distinguishing this accurately would be nearly impossible.

Coders recorded video data directly into a computer database custom designed for this study. For each tape, the following information was entered once: tape number, family number, starting/ending tape date, starting/ending tape time, room, coder number, and coding date. Then, for every five minute Instantaneous Point of Time (IPT) that the TV set was on, coders input the time and who was in the room. For each person in the room at the IPT, coders indicated whether the person was looking at the TV set, participating in another activity besides watching television (i.e., reading, doing homework, playing a game, etc.), and eating or drinking. Besides answering yes or no, coders were allowed to input "don't know" if unable to tell clearly what was going on at an IPT.
Results

Inter-Rater Reliabilities

A random selection of approximately one-third of the research tapes were coded by two coders, representing duplicate coding of 1,937 hours (23,249 IPTs). The Kappa coefficient (Hartmann, 1977), a statistic indicating the proportion of agreement that corrects for chance agreement, was calculated for times the TV set was on and is presented in Table 1.

Completeness of Coding

 Coders were permitted to code “don’t know” when they were uncertain about behaviors while viewing. Coders were uncertain in deciding whether the child’s eyes were on the screen for an average of 15% of the IPTs when the child was in a room with the television turned on. The average uncertainty rate was 7.4% for the focus child’s eating or drinking and 8.3% for activities other than watching. There were variations among families. For child’s eyes on screen, uncertainty rates were more than 10% of the IPTs for five families (Family Eight - 15.1%, Family Six - 15.6%, Family Three - 18.3%, Family One - 28.5%, Family Nine - 47.1%). Some families also had high uncertainty rates for the child’s eating and drinking (Family One - 20.9% and Family Six - 11.0%) and participating in other activities (Family One - 24.0%, Family Six - 15.6%, and Family Nine - 11.5%). “Don’t Know” codes were treated as

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Inter-Rater Reliabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
<td>Percent Agreement</td>
</tr>
<tr>
<td>TV Set On</td>
<td>98.3</td>
</tr>
<tr>
<td>Focus Child in the Room with the TV Set On</td>
<td>93.3</td>
</tr>
<tr>
<td>Focus Child’s Eyes on Screen with the TV Set On</td>
<td>96.9</td>
</tr>
<tr>
<td>Focus Child CoViewing with a Parent</td>
<td>93.4</td>
</tr>
<tr>
<td>Focus Child CoViewing with a Sibling or a Peer</td>
<td>97.8</td>
</tr>
<tr>
<td>Focus Child Eating with the TV Set On</td>
<td>99.2</td>
</tr>
<tr>
<td>Focus Child Reading/Doing Homework with the TV Set On</td>
<td>98.8</td>
</tr>
<tr>
<td>Focus Child Playing with the TV Set On</td>
<td>96.3</td>
</tr>
</tbody>
</table>
missing data. Percentage estimates are reported for all times in which coders were able to code a behavior.

There were also several periods where observations were missing from single cameras due to disturbed or malfunctioning equipment. After reviewing the focus child's simultaneous activities in other rooms of the house or studying behaviors at the same time periods on other days, it was decided that no imputations were to be entered.

**Does Videotaping Alter Viewing Behaviors?**

We found no systematic changes in parent or child self-report estimates of viewing behaviors between the initial visit and the visit ten days later. Similarly, we found both increases and decreases in viewing behaviors when comparing the first three days and the subsequent days of videotaped observation. There were no systematic differences in behaviors between the first three and the last seven days or between the first three days and corresponding measures on the same day of the week one week later. We observed only three instances of household members heeding the presence of the cameras. In one household, the children occasionally made silly faces at the camera and this behavior happened throughout the videotaping period. In another, a younger sibling of a focus child often danced naked in the living room. At one point, a teenage sister appears to stop her and specifically points in the camera's direction. In a third household, a teenage brother indicated that he found it uncomfortable to have a camera in his bedroom, but agreed to permit the installation. Six hours into the first day’s taping, this youngster managed to interrupt electrical current to the equipment.

Since the study was designed to compare mother and child reports of viewing behaviors for only the final seven days, the first three days of videotaping served as a transition period where families became accustomed to having the equipment in their homes.

**Total Time On**

The twenty-five videotaped television sets were on for a total of 560 hours and 5 minutes. The amount of time a TV set was on varied greatly by family (see Table 2). Family Two had a TV set on for the least amount of time, 24 hours 20 minutes over a ten-day period. At the other extreme was Family Eight where television was on for 111 hours 25 minutes during the observation period. We also observed large differences by day, within as well as between families.

What percentage of time was no one in the room while the TV sets were turned on? In three families, over 95% of the time the TV set was on, someone was watching. In contrast, in the Family Eight household, the TV set played to an empty room over half the time it was turned on.
Table 2
Number of Hours Per Day Television Was On, Based on the Videotape

<table>
<thead>
<tr>
<th>Family</th>
<th>Mean (Hrs:Mins)</th>
<th>Minimum (Hrs:Mins)</th>
<th>Maximum (Hrs:Mins)</th>
<th>Time TV Set Was On With No One in the Room (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7:23</td>
<td>2:15</td>
<td>14:55</td>
<td>13.1</td>
</tr>
<tr>
<td>2</td>
<td>2:42</td>
<td>0:00</td>
<td>10:15</td>
<td>26.0</td>
</tr>
<tr>
<td>3</td>
<td>3:06</td>
<td>0:00</td>
<td>7:10</td>
<td>4.6</td>
</tr>
<tr>
<td>4</td>
<td>4:07</td>
<td>0:00</td>
<td>7:50</td>
<td>22.7</td>
</tr>
<tr>
<td>5</td>
<td>4:27</td>
<td>1:10</td>
<td>11:10</td>
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<td>5:23</td>
<td>1:35</td>
<td>8:35</td>
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<td>9</td>
<td>6:42</td>
<td>3:15</td>
<td>12:15</td>
<td>20.7</td>
</tr>
<tr>
<td>10</td>
<td>5:49</td>
<td>0:00</td>
<td>12:00</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Validity of Mother and Child Estimates

Table 3 compares videotaped and self-report data from the ten families. In several families, the mothers' estimates closely corresponded to the videotape. Four of ten mothers were quite precise, such that both the global and the summed weekly estimates were within two hours of the observed videotape data. In four families, the mother's global estimates were more accurate than the summed estimates. In five families, the summed estimate was better. For the remaining mother, global and summed estimates were the same. Considering the children's estimates, five out of the ten summed estimates were more accurate than the global estimates. For three children, the global estimate was more accurate. In two cases, children's global and summed estimates were the same.

Several mothers and children indicated that some television viewing occurred outside of the home. Five mothers and six children reported that no television viewing occurred outside of the home. Since our video observations captured images only in the focus child's homes, we were unable to validate these estimates.

Coviewing

Compared to video data, mothers were less accurate about parental coviewing than about peer coviewing. Three mothers were within ±10% for parental coviewing, five were within ±10% for peer coviewing. Although they used a different scale, children's perceptions of the proportion of viewing with parents, siblings, or peers appear accurate. Seven of ten children provided parental coviewing estimates similar to those observed on the videotapes, and seven of ten had accurate perceptions of peer coviewing.
<table>
<thead>
<tr>
<th>Family One</th>
<th>Videotape Information</th>
<th>21:50</th>
<th>N.A.**</th>
<th>69.1%</th>
<th>51.3%</th>
<th>2.7%</th>
<th>18.3%</th>
<th>5.0%</th>
<th>15.0%</th>
<th>Playing While Watching TV</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mother's Information</td>
<td>14:00</td>
<td>Not Collected</td>
<td>90.0%</td>
<td>20.0%</td>
<td>0.0%</td>
<td>15.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>Playing While Watching TV</td>
</tr>
<tr>
<td></td>
<td>Child's Estimate</td>
<td>9:00</td>
<td>Not Collected</td>
<td>About half of the time</td>
<td>About half of the time</td>
<td>None of the time</td>
<td>A little of the time</td>
<td>None of the time</td>
<td>About half of the time</td>
<td>Playing While Watching TV</td>
</tr>
<tr>
<td>Family Two</td>
<td>Videotape Information</td>
<td>11:05</td>
<td>N.A.</td>
<td>87.3%</td>
<td>33.1%</td>
<td>65.4%</td>
<td>25.4%</td>
<td>0.8%</td>
<td>4.0%</td>
<td>Playing While Watching TV</td>
</tr>
<tr>
<td></td>
<td>Mother's Estimate</td>
<td>11:00</td>
<td>11:30</td>
<td>2:00</td>
<td>70.0%</td>
<td>10.0%</td>
<td>80.0%</td>
<td>60.0%</td>
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<tr>
<td></td>
<td>Child's Estimate</td>
<td>2:00</td>
<td>2:00</td>
<td>4:05</td>
<td>About half of the time</td>
<td>About half of the time</td>
<td>About half of the time</td>
<td>About half of the time</td>
<td>None of the time</td>
<td>None of the time</td>
</tr>
<tr>
<td>Family Three</td>
<td>Videotape Information</td>
<td>9:45</td>
<td>N.A.</td>
<td>76.6%</td>
<td>21.7%</td>
<td>6.1%</td>
<td>10.2%</td>
<td>2.9%</td>
<td>27.9%</td>
<td>Playing While Watching TV</td>
</tr>
<tr>
<td></td>
<td>Mother's Estimate</td>
<td>9:45</td>
<td>17:40</td>
<td>3:00</td>
<td>25.0%</td>
<td>50.0%</td>
<td>25.0%</td>
<td>50.0%</td>
<td>25.0%</td>
<td>50.0%</td>
</tr>
<tr>
<td></td>
<td>Child's Estimate</td>
<td>7:00</td>
<td>12:00</td>
<td>0:00</td>
<td>A little of the time</td>
<td>A little of the time</td>
<td>None of the time</td>
<td>A little of the time</td>
<td>A little of the time</td>
<td>Playing While Watching TV</td>
</tr>
<tr>
<td>Family Four</td>
<td>Videotape Estimate</td>
<td>9:10</td>
<td>N.A.</td>
<td>70.9%</td>
<td>33.6%</td>
<td>83.6%</td>
<td>9.6%</td>
<td>1.0%</td>
<td>46.6%</td>
<td>Playing While Watching TV</td>
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<td></td>
<td>Mother's Estimate</td>
<td>7:30</td>
<td>10:00</td>
<td>0:00</td>
<td>50.0%</td>
<td>30.0%</td>
<td>80.0%</td>
<td>10.0%</td>
<td>0.0%</td>
<td>10.0%</td>
</tr>
<tr>
<td></td>
<td>Child's Estimate</td>
<td>16:00</td>
<td>39:30</td>
<td>0:00</td>
<td>A lot of the time</td>
<td>A little of the time</td>
<td>A lot of the time</td>
<td>A little of the time</td>
<td>None of the time</td>
<td>A little of the time</td>
</tr>
<tr>
<td>Family Five</td>
<td>Videotape Estimate</td>
<td>14:25</td>
<td>N.A.</td>
<td>87.0%</td>
<td>18.7%</td>
<td>99.4%</td>
<td>2.4%</td>
<td>1.3%</td>
<td>12.0%</td>
<td>Playing While Watching TV</td>
</tr>
<tr>
<td></td>
<td>Mother's Estimate</td>
<td>20:00</td>
<td>13:30</td>
<td>8:30</td>
<td>95.0%</td>
<td>5.0%</td>
<td>95.0%</td>
<td>60.0%</td>
<td>0.0%</td>
<td>15.0%</td>
</tr>
<tr>
<td></td>
<td>Child's Estimate</td>
<td>20:30</td>
<td>20:30</td>
<td>6:00</td>
<td>A lot of the time</td>
<td>A little of the time</td>
<td>All of the time</td>
<td>A little of the time</td>
<td>All of the time</td>
<td>A lot of the time</td>
</tr>
<tr>
<td>Family 6</td>
<td>Videotape Estimate</td>
<td>9:05</td>
<td>N.A.</td>
<td>75.0%</td>
<td>28.4%</td>
<td>66.1%</td>
<td>0.0%</td>
<td>8.7%</td>
<td>13.0%</td>
<td></td>
</tr>
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<td></td>
</tr>
<tr>
<td></td>
<td>Mother's Estimate</td>
<td>14:00</td>
<td>20:00</td>
<td>0:00</td>
<td>60.0%</td>
<td>10.0%</td>
<td>13.0%</td>
<td>NA</td>
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<td>15.0%</td>
</tr>
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<td></td>
<td>Child's Estimate</td>
<td>9:30</td>
<td>21:20</td>
<td>0:10</td>
<td>A lot of the time</td>
<td>A little of the time</td>
<td>A little of the time</td>
<td>None of the time</td>
<td>A little of the time</td>
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<th>Family 7</th>
<th>Videotape Estimate</th>
<th>13:35</th>
<th>N.A.</th>
<th>93.4%</th>
<th>38.5%</th>
<th>32.1%</th>
<th>35.0%</th>
<th>10.8%</th>
<th>3.2%</th>
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<td></td>
<td>Mother's Estimate</td>
<td>17:00</td>
<td>16:00</td>
<td>0:00</td>
<td>95.0%</td>
<td>20.0%</td>
<td>60.0%</td>
<td>30.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td></td>
<td>Child's Estimate</td>
<td>21:00</td>
<td>19:15</td>
<td>0:00</td>
<td>All of the time</td>
<td>A lot of the time</td>
<td>A lot of the time</td>
<td>None of the time</td>
<td>None of the time</td>
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<th>Family 8</th>
<th>Videotape Estimate</th>
<th>4:25</th>
<th>N.A.</th>
<th>95.6%</th>
<th>18.9%</th>
<th>100.0%</th>
<th>25.0%</th>
<th>1.9%</th>
<th>5.8%</th>
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<tbody>
<tr>
<td></td>
<td>Mother's Estimate</td>
<td>10:00</td>
<td>10:00</td>
<td>0:00</td>
<td>90.0%</td>
<td>50.0%</td>
<td>95.0%</td>
<td>50.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td></td>
<td>Child's Estimate</td>
<td>1:00</td>
<td>6:15</td>
<td>0:00</td>
<td>All of the time</td>
<td>All of the time</td>
<td>All of the time</td>
<td>A lot of the time</td>
<td>A little of the time</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>Family 9</th>
<th>Videotape Estimate</th>
<th>7:25</th>
<th>N.A.</th>
<th>76.1%</th>
<th>17.2%</th>
<th>67.8%</th>
<th>6.3%</th>
<th>0.0%</th>
<th>11.7%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mother's Estimate</td>
<td>27:00</td>
<td>28:00</td>
<td>0:30</td>
<td>70.0%</td>
<td>15.0%</td>
<td>75.0%</td>
<td>10.0%</td>
<td>25.0%</td>
</tr>
<tr>
<td></td>
<td>Child's Estimate</td>
<td>7:00</td>
<td>13:50</td>
<td>0:00</td>
<td>A lot of the time</td>
<td>A little of the time</td>
<td>A little of the time</td>
<td>None of the time</td>
<td>A little of the time</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Family 10</th>
<th>Videotape Estimate</th>
<th>15:20</th>
<th>N.A.</th>
<th>90.2%</th>
<th>10.3%</th>
<th>61.4%</th>
<th>8.8%</th>
<th>1.1%</th>
<th>20.2%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mother's Estimate</td>
<td>17:00</td>
<td>14:50</td>
<td>0:00</td>
<td>95.0%</td>
<td>15.0%</td>
<td>90.0%</td>
<td>5.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td></td>
<td>Child's Estimate</td>
<td>6:00</td>
<td>6:45</td>
<td>0:00</td>
<td>A lot of the time</td>
<td>A lot of the time</td>
<td>A lot of the time</td>
<td>A little of the time</td>
<td>A little of the time</td>
</tr>
</tbody>
</table>

*This television viewing estimate refers to the focus child's viewing in the home.

**Since video equipment only recorded inside the home of the focus child, we cannot offer videotape estimates on viewing done outside of the home.
Behaviors While Viewing

Mothers' estimates of the focus child's viewing behaviors are similar to those observed on the videotapes. Many estimates were within 10% for child eyes on screen and reading or doing homework while watching. Although they used a different scale, focus children offered perceptions of behaviors while viewing that closely resembled those observed on the videotapes. With few exceptions, children accurately described how often they watched with others, had their eyes on the screen, ate or drank, read or did homework, or played while watching television.

Video Game Playing

Four mothers and one child estimated that a few hours of video game playing occurred during the observed week. The observed playing was less than any of the estimates provided. Mothers and children indicated that little video game playing occurred outside of the home.

Day By Day Information

Earlier we presented the comparison of mothers' and children's summed weekly estimates to video information. Given our continuous observations, we considered each family's television viewing by day, examining the day-by-day accuracy of mother and child recalls. We found that most mothers' and children's daily estimates fall within two hours of observed viewing. No obvious pattern existed; subjects did not consistently over- or under-estimate the focus child's viewing, even when taking into account day of the week. Finally, no trends appeared. One might expect that over time (e.g., seven as opposed to two days ago) an estimate would become more inaccurate. These data indicate that neither mothers nor children distort the data more (or less) as time passes.

Discussion

Variation

We observed great variation in television viewing among the ten families. Considering videotape data, focus children of some households watched infrequently while others watched often. In the studied week, the focus child of Family One watched close to 22 hours of television while the focus child of Family Eight watched around four hours. Some children had their eyes on the screen all the time, such as the focus children of Families Seven and Eight. Other children had their eyes on the screen less than three-fourths of the viewing time (the focus children of Families One and Four).

Viewing varied across days; a child who watched no hours on some days watched
many hours on subsequent days. The child from Family Ten watched zero hours on the previous Sunday, between zero and two hours on the previous Tuesday, Wednesday, Friday, and Saturday, three and a half hours on the previous Thursday, and close to 10 hours on the previous Monday. We observed no children who watched the same amount of television every day. We saw children's viewing vary widely across days. It may be beneficial for researchers to assess viewing on multiple days rather than only asking about "viewing yesterday."

This study also shows variation across measures. For example, in Family Four the measures ranged from seven hours for the mother's global weekly estimate to 39 hours for the child's summed weekly estimate. No apparent relationship appears between number of hours watched and the amount of variation between measures (i.e., we did not see a pattern where children who watched less television had less variation in the estimates). In fact, for the focus child who actually watched the least according to the videotapes (Family Eight), there was a nine hour difference between the child's global and the mother's summed weekly estimate.

For some activities while viewing, mother and child estimates were quite similar to observed values; for others, estimates were disparate. In general, we found parental estimates of global viewing to be more accurate than the child's estimates. However, children provided better reports of behaviors and actions while viewing. Quite often on the videotapes, we saw a parent's figure in an adjacent room. It is possible that parents receive auditory cues that their children are in a room with a TV set operating, but do not have the visual cues to know what their children are doing while watching.

**Measurement Error**

This study indicates that self-reports of television viewing contain substantial measurement error. It is important to consider the likely sources of error in designing future measures of media use. With video observations as the "gold standard," we observed no apparent systematic bias in the mothers' and children's estimates. We noted a slight trend for mothers to overestimate viewing when providing global and summed estimates, but it is not systematic enough to assert that an outside variable is likely causing bias. Examining the data across demographics (i.e., focus child's grade or gender, mother's education level) or household attributes (i.e., number of TV sets, number of siblings) did not reveal error patterns.

It has been believed in the research and practice community that recall of the recent television viewing will be more accurate than of past viewing. This belief makes common sense and has led to an emphasis on collecting self reports of "yesterday." This practice is also common in measuring other behaviors such as dietary intake and physical activity (as in 24-hour recall questions). Our results question this assumption. The data suggest that researchers should not assume that recall of the most recent behavior is more accurate than recall of distal behaviors. We recommend that researchers not limit their measures to only the most recent days.

A simple explanation of the inability to provide more accurate estimates of
television viewing may have to do with the multiple facets of everyday life. For discrepancies between parent and the videotape estimates, it is understandable that a mother who is preparing supper in the kitchen or paying bills at the living room table may not know that her ten-year-old daughter was watching cartoons in the bedroom. Our videotapes document a small amount of time when the mother was watching television in one room while the focus child watched in another. We also observed several situations when viewing occurred in the very early morning hours (between 5:00 am and 7:00 am). In one family, on every day observed on the videotapes, the focus child’s five-year-old sister entered the living room, turned on the TV set, and curled up in a blanket by 5:15 am. Given that a parent did not enter the room (and turn off the TV set) until 7:30 am, it is possible that this parent was unaware of more than 17 hours of this child’s television viewing.

In Family Eight, the three brothers of the focus child (who were five, seven, and ten years-old) were all very heavy viewers and video game players. These boys also had a tendency to leave the TV set on when they left the room. One could suppose that the mother in this family may have had difficulty offering an accurate estimate for the focus child’s viewing since the TV set was on so frequently in this home playing to a sibling or to an empty room. We found that families with more parent co-viewing generally provided more accurate parent estimates of child viewing.

Among these families, child estimates also showed substantial measurement error but no obvious bias. In fact, half of the participating children underestimated (the other half overestimated) when giving the global estimate. As with parental estimates, one potential explanation is a lack of actual awareness of time spent watching. Here, though, the children’s inaccuracies may have more to do with cognitive difficulties with the concept of time than with the stresses of modern life. Our research design involved a check of subjects’ understanding of time, but it may be that children this age have difficulties with such abstractions (Friedman & Laycock, 1989).

Difficulties in having child viewers provide valid information may be a function of the child’s age and developmental stage. Previous research indicates that children’s estimates become more consistent with diary reports of viewing as they get older (Alexander, Wartella, & Brown, 1981; van der Voort & Vooijs, 1990), but this has not been validated with observation measures. Because we limited our sample of focus children to a narrow age range, we could not address age variations directly. Future research might include samples of children of different ages, perhaps even questioning multiple siblings within one family, to explore the effects of age on the accuracy of estimates of viewing. Such a study might also obtain data on whether parents are more accurate in describing viewing patterns of different aged children (i.e., “Are parents more aware of media use patterns among their preschool children versus their teenagers?”).

Another source of error may derive from parent and children’s perceptions of “watching time.” In households where television provides background noise to daily activities, family members may not be counting all the time that the TV set is on.
Especially in covingiewing situations, children may think others are watching though they are in the TV room engaged in other activities. Such situations may lead to underestimations by the focus child. If the parent or child considers all the time the TV set is turned on as watching time (even if the focus child is not consistently in the room), then one is likely to inflate viewing estimates.

Finally, on the issue of measurement error, it is possible that both parents and focus children attempt to underestimate television viewing amounts. One might expect subjects to give smaller than actual amounts when excessive television viewing is commonly perceived as a negative behavior. In our data, however, we did not discern such a social desirability reporting bias.

Throughout this discussion, we have implied that the videotape data represent actual viewing. In fact, videotape observations are not without problems. While our inter-rater reliabilities were high, we are aware of potential errors with the videotapes. The most discernible events were whether an individual was in the room with the TV set turned on, but our coders found questionable situations. In one family, an individual placed a cloth over a video camera directed at one of the TV sets. Because the room’s other camera was not disturbed, we have videotape of the focus child’s siblings staring for extended time periods in the direction of the TV set. However, we had no videotape confirmation that the TV was turned on. In another family, a housekeeper, while dusting around the camera, shifted it enough that part of the room was no longer in view.

Coding the presence of various individuals also proved to be difficult. Some children were harder than others to code given their preferences for location in the room and activity while viewing. In one case, the focus child comes into view in the morning from what we know to be a bedroom closet. Repeated reviews of the tape did not reveal this child entering this closet. Since we know the TV set was on, it is possible that this child could have watched (or slept through) television all night long while sitting in the closet, out of our camera’s view. The two year-old sibling of another focus child also posed a challenge to our coders. Often, this toddler ducked behind couches, sat behind curtains, and crouched underneath the coffee table. At times, this younger sibling may have gone unnoticed, introducing error into the co-viewer estimates. Previous validation studies from the 1970s and 1980s, in which cameras were attached to the single television in the home, did not report many of these challenges. We believe that videotaping has its problems and videotape measures may underestimate actual viewing in many circumstances.

Limitations

First, our sample size was small. Because we examined just ten families, we lacked the power to perform statistical comparisons. Therefore, we make no generalizations to other families with third or fourth graders. We consider these ten families as qualitative case studies, describing in detail the collected information. With sufficient resources, a future validation analysis would gather a large random sample from the
population. Thus, one could not only consider the validity of various methodologies, but also examine possible variations between demographic groups.

The second major limitation was that neither the subjects nor the data collectors were blind to the study's purpose. Because all were aware that we were gathering information on children's television viewing, family members may have altered their self-report answers or behaviors. Our equipment was not hidden, although it was placed inconspicuously. An awareness of the monitoring was not reflected in any evident reporting bias. It is possible, though, that subjects misrepresented when and how they watched television for the entire observation period.

A third limitation is that we investigated a limited number of measures and methods. In a larger sample, it would be desirable to examine more methods, such as completing television viewing diaries or logs.

Implications and Recommendations

The variation, measurement error, and limitations of this study seem likely to be representative of the variation, measurement error, and limitations encountered by other research on children's television viewing. Surprisingly, many studies do not acknowledge the issues illustrated by our findings. We believe the absence of such discussions is not indicative of the absence of such issues.

In view of measurement issues presented throughout this paper, this work's primary implication is that one should consider the general rather than precise findings of television research based on reported estimates of viewing behaviors. Until methodologies are improved, less emphasis should be given to particular effect size estimates derived from research employing number of hours watched as a predictive independent variable.

We need to question the alarming statistics presented in television research. Certainly children are viewing too many violent acts and too many commercials for junk food, but previous exposure estimates might prove to be great exaggerations, especially given the variation of children's attention to the screen and frequency with which we witnessed the TV set playing to an empty room. Given the people meter methodology, Nielsen reports of children's watching an average of 24 hours a week of television, may also prove to be an overestimation of actual viewing. This is not good news to Nielsen's critics, who usually accuse them of underestimating viewing (Carter, 1997; Moshavi, 1992).

This is not to say that several decades worth of research findings are erroneous. Actually, it may be that many previously presented studies underestimated the effects of television viewing. For example, a number of observational studies show obesity to be only weakly, if at all, associated with amounts of television viewing (Robinson, 1998). Given the extent of measurement error in estimating television viewing, and assuming no bias, only a very strong relationship would be apparent. Better measures of children's television viewing might reveal even stronger relationships with obesity, aggression and violence, academic achievement and other problems or benefits.
The primary purpose of this study was to explore measures used in assessing children's media use. We recommend that researchers better align their methods with the research questions they are tackling. Some television researchers investigate the influence of specific television content, others examine the role of television as a sedentary behavior. Their methods and measures should directly reflect these aims.

References


Notes

1 Comprehensive summaries of the children and television literature can be found in the following sources: Liebert and Sprafkin's 1988 book The Early Window: Effects of Television on Children and Youth; Pearl, Bouthilet; and Lazar's 1982 book Television and Behavior: Ten Years of Scientific Progress and Implications for the Eighties; and Comstock, Chaffee, Katzman, McCombs, and Roberts' 1978 book Television and Human Behavior.

2 For example, the parent question about reading or doing homework was "When your 3rd/4th grader is in the room with the TV turned on, what percentage of time is s/he reading or doing homework?" An example of a child question is "When you are in a room with the TV turned on, how often are you playing (including playing a game, doing arts and crafts, or playing with a brother, sister, or friend)"