A LONGITUDINAL ANALYSIS OF CHILDREN’S MEDIA USE AND TIME CHOICES

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Introduction

Media use is often implicated in debates about how young people should use their time for optimal benefit. In the child development literature and in more popular discourses, media use — and particularly television viewing — has long been associated with a number of serious social problems, including the inability to read well and/or concentrate on learning tasks, and the lack of active play or exercise, which is seen as a contributing factor in obesity. This attribution arises because it is widely believed that TV (or perhaps we should now say ‘lean back media’) interferes with activities that are seen as more developmentally appropriate, such as reading or being read to, interacting with parents (especially for very young children), engaging in active or creative play, or homework (Vandewater et al., 2006).

In addition, today’s young children are popularly conceived to have been born into an era saturated with, and reshaped in its core social practices by the advent of, digital media. In media industry and policy contexts it is often taken as a given that TV viewing is on the decline across all age ranges, being displaced by new media. Alongside these cultural shifts on the population level, researchers have identified developmental stages in how children use their time on media and other activities. (Bianchi & Robinson, 1997; Timmer et al., 1985; Huston et al., 1999). So the question arises now, in the early 21st century: how does the introduction of digital media impact on these previously observed patterns for the current generation of young children?

Research questions

This paper addresses the following research questions:

1. How do ‘lean back’ (TV/DVD) media and ‘lean forward’ interactive media (computer/games) relate to other free-time activities undertaken by children that have been associated with beneficial outcomes? Are there observable changes to patterns of mean time use as children grow from infancy to middle childhood?

2. How does use of these media map onto children’s daily routines as they age? Are there different times of day at different media more frequently are more frequently used?

3. Given that it is often posited that ‘legacy’ electronic media (TV) has been gradually displacing older, print media (reading) as a free-time activity, and projected that, in its turn, new digital media is now displacing television, this paper tests the hypotheses that as children age from infancy to middle childhood:
   - H1: TV/DVD viewing is associated with less reading.
   - H2: TV/DVD viewing is associated with less use of computer/games
Finally, since childhood obesity has recently figured so prominently in the (2007–09) Review of the Children’s Television Standards (CTS), we also test the hypothesis that:

- \( H_3 \): TV/DVD use is associated with less exercise as children age from infancy to middle childhood.

My presentation today attempts to provide just one kind of picture of the way young Australian children use their time on media and other activities, but one that we hope will complement the kind of picture gleaned from industry ratings data, and rich — but small-scale — qualitative research undertaken with (usually older) children.

Methods

Data: Sample

This paper uses time-use diary data from the first three waves of the Growing Up in Australia: The Longitudinal Study of Australian Children (Soloff et al., 2005). The LSAC is a large and complex developmental study that follows two Australian cohorts born in 1999 and 2003 at two-year intervals starting in 2004.

Table 1: LSAC Cohorts and waves of data collection

<table>
<thead>
<tr>
<th>Year</th>
<th>2003 Cohort (B)</th>
<th>1999 Cohort (K)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Child’s Age</td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>0/1 2/3 3/4 4/5</td>
<td>4/5 6/7 7/8 8/9</td>
</tr>
<tr>
<td>2006</td>
<td>Wave 1</td>
<td>Wave 1</td>
</tr>
<tr>
<td>2007</td>
<td>Wave 2</td>
<td>Wave 2</td>
</tr>
<tr>
<td>2008</td>
<td>Wave 3</td>
<td>Wave 3</td>
</tr>
<tr>
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</tbody>
</table>

LSAC collects data on Households (e.g. income, etc), Family and Parent Characteristics, Child Characteristics, and has a range of measures to assess children’s outcomes (i.e. their physical, learning and academic, and socio-emotional functioning) (Misson et al., 2011). Sample representativeness at Wave 1 was established by comparison with the Australian population using 2001 Census data. Correspondence across a wide range of demographic measures was high but the sample slightly over-represented highly educated mothers (around 10% more with post-secondary education) while single parents, non-English speaking families, and families living in rental properties were all slightly under-represented (Soloff et al., 2006). Analyses of sample losses from Wave 1 to Wave 3 showed socio-economic attrition biases with lower retention for children with less educated parents, children living in rental properties and those from non-English speaking backgrounds (Sipthorp & Misson, 2009).

Data: Time Use Diary (TUD)

To date the LSAC has included children’s time use diaries for both cohorts of children. The Time Use Diary (TUD) collects details of the activities of the study children over two 24-hour periods, one a specified weekday and one a specified weekend day. The diaries divided the 24-hour day into 96 15-minute intervals, or bubbles, with pre-coded activities (e.g. sleep, eating, bathing) and information about context (e.g. where they were and who they were with).²

Classification of activities used in descriptive statistics

For the purposes of this analysis, the 20+ diary categories were grouped into broader categories, to foreground (1) media activities, and (2) activities that have either been associated with children’s developmental outcomes (e.g. exercise and bodily well-being; play/educational play with academic
A longitudinal analysis of children’s media use and time choices

development); or (3) activities that are said to be harmed by excessive media use (such as sleeping).\(^3\)

Table 2: Activities classifications used in the descriptions of means over time

<table>
<thead>
<tr>
<th>Activity type</th>
<th>Coded activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Media</td>
<td>E.g. Television/DVD; listening to music media; computer/games; read; read to</td>
</tr>
<tr>
<td>Sleep</td>
<td>E.g. Sleeping, napping</td>
</tr>
<tr>
<td>Emotional</td>
<td>E.g. crying, upset/arguing/fighting; destroying things; being held/cuddled</td>
</tr>
<tr>
<td>Exercise</td>
<td>E.g. crawl/ climb/ swing arms or legs; active free play; organised sport</td>
</tr>
<tr>
<td>Other education/play</td>
<td>E.g. Draw, colour, look at a book; educational game; quiet free play</td>
</tr>
<tr>
<td>School /childcare</td>
<td>E.g. Childcare; kindergarten, etc</td>
</tr>
<tr>
<td>Other</td>
<td>E.g. Quiet activities (bored, restless); bathing and eating; going to social events; or taken places with adults; being taught to do chores</td>
</tr>
</tbody>
</table>

Results

1. Descriptive statistics: mean times spent by children on media and other activities over time

B cohort, weekday

Not surprisingly, very young children spend more of their time sleeping than in any other single activity. They also spend more time in emotional activities, such as crying, upset, being held. School and childcare on a weekday increases at the child ages while other education/play decreases slightly.

Looking at the weekday media variables, being read to is the largest activity category for the infants (0/1), at 1.3 hours per day; this reduces to 0.6 hours at age 2/3, then rises slightly to 0.8 hours at age 4/5. Weekday television/DVD begins at 0.5 hours for the infants, increasing to 1.6 hours by age 2/3. Using a computer or game was not tested in Wave 1, when the B (birth) cohort children were <1 year-old. At age 2/3 they were spending 0.1 hours (about 6 minutes) per weekday on computer/games, doubling to about 12 minutes by age 4/5.

B cohort, weekend day

There is little change in activities for the infants <1 year-old between weekdays and weekend days, with the exception of the category of childcare, which drops to 0 for all age groups. There is less change than might be expected on the media variables for young children. Being read to remains the same for infants, but decreases by 6 minutes for 2/3 year-olds to half an hour.\(^4\) Computer/games go up by 6 minutes for the oldest children (4/5) only. Mean weekend time with Television/DVD, actually decreases for infants, remains the same for 2/3 year olds, but rises by 18 minutes for the 4/5 year olds, to 1.9 hours per day.

K cohort, weekday

My charts for the K Cohort means over time are grouped to display media activities more strongly. Data is now shown on independent reading as well as being read to. And predictably, these children now spend increasing amounts of time in school or childcare. (And a reminder: the LSAC TUD data is completed by a parent or caregiver, and thus can give no indication of activities undertaken while the child is in these out-of-home care settings).
Looking at the **media** variables, we find the mean weekday time with **television/DVD** is fairly moderate. At Wave 2 (child age 6/7) children are watching for around 1.3 hours, rising slightly to 1.5 at age 8/9. After holding steady for the first two waves, computer/game usage increases to around 24 minutes per day at age 8/9, still well under that of TV/DVD, at nearly an hour and a half. Being read to on a weekday decreases from an hour at age 4/5, to around 12 minutes at age 8/9, while independent reading is first tested at age 6/7 and holds steady at 24 minutes per weekday through to Wave 3 when the children are 8/9 years.

**K cohort, weekend day**

On weekend days Australian kindergarten- and early school-age children spend a little less time sleeping, more time exercising, and more time enjoying both ‘lean back’ and interactive media. There is not a great deal of difference in the time spent being read to (down 6 minutes for 8/9 year olds only) or reading (down 6 minutes for 6/7 year olds only) between weekdays and weekend days. However, 4/5 year olds on an average spend an extra 12 minutes watching TV/DVDs on weekends, 6/7 year olds spend an extra 48 minutes, and 8/9 year olds spend almost an extra hour. Interactive media use (computer/game) grows to 18 minutes at 4/5 years old, and 40 minutes at age 8/9.

**Media activities: K cohort combined**

While this might seem like a simple displacement trajectory — mean time with TV going down as mean time with computer/games go up as the children age — the combined means (both weekday and weekend days together) tell a more interesting story, and one that will be firmed up in the regression analysis to come. Combined mean domestic TV/DVD viewing drops dramatically between Wave 1 and Wave 2, from 2 hours to an hour and a half, presumably as the children enter schooling (Huston et al., 1999). However children’s mean combined TV use rises again from age 6/7 onwards, in parallel with a rise in the use of computer/games.

2. **Descriptive statistics: child TV/DVD and computer/games by time of day**

At what times of day do most children watch ‘lean back’ and ‘lean forward’ media over their infancy–middle childhood? (The presentation showed four tempograms plotting children’s patterns for TV/DVD and for interactive media, for weekdays, and weekend days.)

**Weekday TV/DVD**

As we saw from our means data, TV/DVD viewing by infants is very low. It peaks in the morning at around 8.30–9.00 am, when just over 10% of the population are watching. By age 2/3 use of ‘lean back’ media has more than doubled, still peaking at around 8.30 am, but building a little earlier. At age 4/5, an extra 6% of the population participate in the morning, peaking around 8 am, with much stronger viewing numbers in the early afternoon, peaking at 4.30, but extending strongly up to 7.30 pm. By age 6–7, although there are still obvious morning and evening peaks, the evening one is now the most dominant. This trend continues and becomes more pronounced at age 8/9, reversing the pattern of the youngest children. 36% now view at 7.30 at night, and the morning peak now occurring at 7.30 am (perhaps indicating a staggered family routine of preparedness for school and work).

**Weekend TV/DVD**

The patterns by age are broadly similar for weekend days, the greatest changes being for the oldest children (8/9). There is more extended TV viewing in the mornings, peaking later. And there is a huge spike of viewing in the evenings, with 42% of 8/9 year-olds watching at 7.30 pm. When we turn to ‘lean forward’ or interactive media such as computers and electronic games, daily domestic routines seem to be a little different.
Weekday computer/game

‘Lean forward’ media use is an afternoon weekday activity across all age ranges. Providing a corrective to the most millennial projections of extremely precocious ‘digital natives’, the youngest children, age 2/3 years devote a miniscule amount of their daily time budgets to computer/gaming. Less than 1% of the population engage in these practices for all but one time period of the day (5 pm). By age 4/5 the participation rate has almost quadrupled, to 3.9% of the population, peaking at 4.30 in the afternoon, and this doubles again by age 8/9, with a dominant peak at 4.30 pm.

This reverses the pattern seen for TV/DVD, suggesting that up to middle childhood, evenings are still TV time in most families. (Note: LSAC Wave 4 data is now available and Wave 5 data collection will go into the field in 2012; thus researchers will soon be able to track the shifts in developmental patterns of media use as these children move into adolescence.)

Weekend computing/games

Weekend day computer/game use is a little higher and spread more throughout the day, especially for the oldest children. Usage still peaks in the late afternoon, with 8–9% of 8/9 year olds participating between 4.30 and 5.30 pm.6

3. Regression analyses: associations of TV viewing and other activities

The model presented today tests the associations between TV/DVD viewing and other activities thought to have developmental significance, in the domains of learning, health, socio-emotional functioning and social participation. (Reading, being read to, exercise, sleep, chores, homework). It also includes two other categories of media use, computing/games and listening to music.

Controls

For the regression analyses, the following controls were applied: mother’s age, mother’s education, age of child, sex of child, household income, number of other children in the family, amount of time spent in school/care, and whether it was a weekday/weekend day.

As you will recall, we hypothesised that more:

1. TV/DVD would be associated with less reading
2. TV/DVD viewing would be associated with less use of computer/games
3. TV/DVD would be associated with less exercise.

As you will see, hypotheses 1 and 2 are not supported, and evidence for hypothesis 3 is very inconsistent. However, it does appear that there are negative associations of various degrees between sleep, being read to etc, and homework. Let us unpack this a little more. (Note: because of the amount of information being presented, the slide did not show the actual effect sizes. A plus sign, or a minus sign, indicated statistically significant positive or negative associations.)

Reading/ being read to

There is no association at all between TV/DVD and children’s independent reading. There is, however, a negative association between being read to/told a story, appearing at around 6 years of age.

Exercise

Overall TV time is strongly associated with childhood obesity in almost all international studies, and displacement of exercise has been posited as one possible mechanism explaining this. Using this regression model, however, we do not find a consistent negative association.
Sleep
More television is associated with less sleep from ages 4/5. While sleep researchers have long been concerned with the effects of media on sleep, particularly for adolescents, who are the most sleep deprived population, it should be noted that this association does not ‘prove’ that TV displaces sleep time. (Children who have trouble sleeping may watch more TV in order to kill time).

Chores/ being taught to do chores
There is no consistent pattern of association between TV/DVD and chores or being taught to do chores.

Homework
Homework only began to be measured from Wave 2 of the K(inder)garten cohort, and data to date show that, from age 7+ children who watch more TV/DVD do less homework. This is consistent with findings from the US (Vandewater et al., 2006).

Music
There is no association between listening to music media and TV/DVD. However …

Computing/games
Contrary to received opinion, growing time with digital interactive media does not seem to displace viewing of TV/DVD for young and pre-adolescent children. Rather, there is a consistent positive association between these two types of media use.

Conclusions
To sum up then, analysis of longitudinal data from the LSAC, shows that there is merit in examining children’s activity patterns in smaller segments that the more usual preschool, school age and adolescent ‘super categories’. There are striking differences between babies and older toddlers, that while some patterns of media use hold similar shapes, in their episodic structure and placement within the day, there are also subtle shifts in the placement of activities as the child ages.

There is thus value in looking at family time investments, not just numbers of children watching particular programs. Analysing population level samples, we can see that media use is only one of many investments of time made by children and families. While TV/DVD use falls increasingly into two time bands within the day, computer/games use is primarily an afternoon activity. Even without detailed content data, we can see very different routines in place for ‘lean forward’ and ‘lean back’ media in domestic settings.

As previously noted, various media at various times have been blamed for a range of ills, including growing levels of obesity, and, perhaps, the death of reading as an activity. While other mechanisms contributing to obesity (such as the effects of advertising) cannot be tested in this study, the model presented today indicates that time spent with TV/DVD, at least, is not associated with lack of exercise. Furthermore, while being read to, or told a story by parents does down by age as TV goes up, there is no association between reading and time spent with TV. Homework and sleep look to be a different matter and worthy of further study. Perhaps the most striking finding of this model is that, rather than interactive media taking the place of ‘lean back’ media, at least up until the early phase of middle childhood, their use goes hand in hand.

We hope to have convinced you that the LSAC dataset can be a useful complement to other resources available to those interested in researching children and media.
REFERENCES


Acknowledgements

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The concept of displacement (or time trade-off) depends on the following assumption: that the relationship between two different activities is zero-sum, for example time taken for computer or TV use means less time available for another activity. Proving it depends on accurate time-use measurement, and the mutual exclusivity of coded activities. Studies that allow respondents to double-code single units of time (i.e. allow the reporting of multi-tasking) cannot claim to map displacement as rigorously as those that do not. In addition, the analyses presented in this paper do not include all activities undertaken by children, or the social context (who with) of these activities. They cannot, therefore, untangle the full web of causal influences.

Unlike some adult time use surveys, the TUD did not differentiate between the main activity being undertaken (primary activity) and any activities being undertaken concurrently (secondary activities). Children could be specified as engaging in a number of activities concurrently (multi-tasking), which means that the sum of time spent in different activities might be greater than 24 hours. For a discussion of the data quality issues associated with the TUD see Baxter (2007) and Australian Institute of Family Studies (n.d.)

Other classification systems for children’s time use can be found in Baxter (2007); Baxter & Hayes (2007); Yeung et al., 2001. These cover a larger range of activities, and tend to place media use under play, achievement or leisure, along with a large number of other activities.

Australian children appear to be watching less TV and reading more than their US counterparts (Vandewater, Bickham and Lee (2006)).

Interestingly, however, it is only at this latter age that Australian children approach the 2 hours per day maximum recommended by the American Academy of Pediatrics (2011), although total screen time exceeds that suggested limit.

Unfortunately the LSAC is not designed to collect content data, or track a broad range of media practices so we can only speculate as to the proportion of game play versus social media usage on weekend days.