

Active versus passive screen time for young children

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IN THIS PAPER WE REPORT SOME initial findings from our investigations into the Australian Government's Longitudinal Study of Australian Children dataset. It is revealed that the majority of Australian children are exceeding the government's Screen Time recommendations and that most of their screen time is spent as TV viewing, as opposed to video game play or computer use. In light of this finding, we review the body of research surrounding children's engagement in Screen Time activities and the associated positive and negative effects. Based on existing evidence, we define two categories of Screen Time—Active Screen Time and Passive Screen Time. It is proposed that this distinction provides a more accurate classification of Screen Time and a more informative lens through which to consider the associated benefits and detrimental effects for young children.

Introduction

The Australian Government provides recommendations for the amount of Screen Time that children should be exposed to, in the *Get Up and Grow* publication released by the Department of Health and Ageing (DoHA, 2011). This publication recommends that children aged up to two years engage in no Screen Time and that children aged two to five years engage in less than one hour of Screen Time per day. These recommendations are similar to (and were in part based on) those of the American Academy of Pediatrics (AAP, 2001).

Screen Time is defined as the viewing or use of anything with a screen, including TV, DVDs, video games and computers. The Australian Government's recommendations stipulate that 'For toddlers and pre-schoolers, long periods of screen-time mean less opportunity for active, outdoor and creative play, and fewer of the associated benefits. It also leads to less healthy eating habits, and slower development of language, memory and thinking skills' (DoHA, 2011). These recommendations suggest that all Screen Time activities are physically and cognitively sedentary. However, there is an increasing body of research that illustrates how certain types of Screen Time can increase children's physical and cognitive activity and that there can be associated benefits for children's health and development.

In this paper, we present some early findings on the Screen Time usage of young children in Australia, drawn from the Longitudinal Study of Australian Children dataset, collected by the Australian Government. We compare these findings to the Government's Screen Time recommendations and raise some key questions that will direct future work in the area. We also define two categories of Screen Time—Active and Passive. We believe this distinction provides a more accurate classification of Screen Time and a more informative means of viewing the associated positive and negative effects for young children.

Longitudinal Study of Australian Children

In 2004, the Australian Institute of Family Studies began the first wave of data collection for the Longitudinal Study of Australian Children (LSAC). The LSAC has collected four waves of data over seven years (2004 to 2010) for children aged zero–one years (B Cohort, $n = 5107$) and children aged four–five years (K Cohort, $n = 4983$) in 2004. Participants in the study include the child's parents, childcare providers, teachers and the child. The sample of Australian children was selected randomly from the Australian Medicare database.

Data for both cohorts has been collected using a combination of interviews, mail-back questionnaires, time-use diaries, and interviewer observations. Interviews are conducted both face-to-face and over the telephone. Families are visited once every two years and questionnaire responses and direct observations are recorded. Observations include the child's height, weight, blood pressure, and a cognitive assessment. Families can also be contacted in between interviewing years and asked to complete short mail-out questionnaires.

Screen Time habits of Australian children

Early investigations of the LSAC dataset revealed that the majority of children between ages two and five are exceeding the Government's recommendations of less than one hour Screen Time per day (see Table 1). Moreover, it was found that most of the children's Screen Time was spent as TV/DVD viewing, as opposed to video game play or computer use (see Table 2).

Table 1. Percentage of children aged two to five years that exceeded Australian recommendations for Screen Time and mean daily Screen Time.

Cohort	Age	Year	Weekday		Weekend	
			≥1hr	Mean	≥1hr	Mean
B2	2–3	2006	85%	1:58	77%	1:42
B3	3–4	2007	74%	1:59	84%	2:17
B4	4–5	2008	89%	3:34	90%	2:45
K4	4–5	2004	83%	–	79%	–

Active versus passive Screen Time

Current Screen Time recommendations are based on the sum of all screen-related activities. However, there is emerging evidence that suggests computer use and video game play should not be classed as the same type of activity as TV viewing.

Children's metabolic and physiologic responses to video game play have been found to be different from time spent watching TV (Wang & Perry, 2006). It was shown that the energy expended during video game play was significantly higher than that expended during TV watching (where the video game used did not require any gross physical activity beyond holding a controller while sitting). It has also been shown that TV viewing, but not computer use, is positively associated with both systolic and diastolic blood pressure (Martinez-Gomez, Tucker, Heelan, Welk & Eisenmann, 2009). Additionally, some video games actively promote increased physical activity (Graves, Ridgers & Stratton, 2008).

This research suggests that video game play and computer use can be considered a different type of activity from TV watching in terms of physiological effects. As a result, in this paper we define two different types of Screen Time—Active Screen Time and Passive Screen Time.

Active Screen Time

Active Screen Time involves cognitively or physically engaging in screen-based activities, such as playing video games or completing homework on a computer.

Physically Active Screen Time

Physically active video games have become increasingly popular and prevalent in recent years. With the advent of the *Nintendo Wii*[™], *Sony PlayStation Move*[™], and the *XBOX Kinect*[™], active video games have become readily available and mainstream.

Physically active games are comparable to physical exercise. Some are specifically designed to improve fitness (e.g. *Wii Fit*) but most are primarily designed to be entertaining, with exercise being a side-effect of play (e.g. *Dance Central*) (Lieberman et al., 2011). Playing active games has been shown to be similar

Table 2. Mean TV, computer (Com.) and video game play (VG) time per weekday and weekend day

Cohort	Age	Year	Weekday			Weekend		
			TV	VG	Com.	TV	VG	Com.
B2	2–3	2006	1:58	–	–	1:42	–	–
B3	3–4	2007	1:50	0:06	0:17	2:03	0:05	0:09
B4	4–5	2008	3:08	0:09	0:17	2:10	0:16	0:19
B5	5–6	2009	1:31	0:15	0:15	3:19	0:47	0:37
B6	6–7	2010	1:33	0:15	0:20	2:37	0:50	0:38
K6	6–7	2006	1:37	0:10	0:20	2:25	0:29	0:36
K8	8–9	2008	1:41	0:17	0:26	2:37	0:53	0:47
K9	9–10	2009	1:39	0:19	0:28	2:38	1:02	1:03
K10	10–11	2010	1:49	0:20	0:41	2:57	1:02	1:10

in intensity to light to moderate walking, skipping and jogging (Maddison, Mhurchu, Jull, Prapavessis & Rodgers, 2007).

Emerging research has also shown that active video games can improve academic performance and reduce classroom absenteeism, tardiness and negative classroom behaviours (Lieberman et al., 2011). Active video games can also be used to motivate young children to exercise and be more active outside of the game setting (Borja, 2006) and can improve group socialisation, bonds, mutual support and self-esteem (Lieberman et al., 2011). There is also evidence that children enjoy playing active video games more than traditional games in school physical education classes (Yeh-Lane, Moosbrugger, Liu & Arnold, 2011).

Moreover, active video games are increasingly being used in the treatment of children with developmental disorders, such as Autism Spectrum Disorder (Durkin, 2010). Video games have also been shown to help children undergoing chemotherapy or psychotherapy, children with emotional and behavioural problems (e.g. attention deficit disorder), and children with medical and health problems (e.g. muscular dystrophy) (Griffiths, 2003).

Cognitively Active Screen Time

There is a substantial body of research that illustrates the benefits of Active Screen Time in terms of cognitive skills and development. Computer use during the preschool years is associated with improvements in school readiness and cognitive development (Li & Atkins, 2004) and higher levels of attention and motivation (McCarrick & Li, 2007), while the instant feedback scaffolds children's interactions (Shute & Miksad, 1997). Computers facilitate social interaction and provide an environment for young children to use large amounts of language (McCarrick & Li, 2007) and improve word knowledge and verbal fluency (Shute & Miksad, 1997).

Playing video games has been shown to enhance the capacity for visual attention and dynamic spatial skills (e.g. Boot, Kramer, Simons, Fabiani & Gratton, 2008) and improve problem-solving and inductive reasoning (Pillay, 2003). Playing video games can also lead to changes across sensory, perceptual and attentional abilities, resulting in improvements in contrast sensitivity, spatial resolution, attentional visual field, enumeration, multiple object tracking, and visuomotor coordination and speed (Spence & Feng, 2010).

Passive Screen Time

Passive Screen Time involves sedentary screen-based activities and/or passively receiving screen-based information, such as watching TV or a DVD. There is some evidence that particular types of TV shows and

DVDs (e.g. Sesame Street) are beneficial for pre-school-age children (e.g. Linebarger & Walker, 2005). However, children learn less from TV than from equivalent real-life experiences (Anderson & Pempek, 2005).

TV viewing has been associated with childhood obesity, with mean hours of TV watched being directly proportional to weight (Hancox & Poulton, 2006). Additionally, children have been found to have higher caloric intake while engaging in sedentary Screen Time (Epstein et al., 2008). In contrast, there is a lack of evidence linking obesity to video game play or computer use (Wake, Hesketh & Waters, 2003).

TV viewing has been shown to be particularly detrimental to infants and toddlers less than two years of age. Early TV exposure is associated with attentional problems at age seven (Christakis, Zimmerman, DiGiuseppe & McCarty, 2004) and adversely affects cognitive development, reading recognition and comprehension, mathematical proficiency, and short-term memory (Zimmerman & Christakis, 2005), as well as language development and vocabulary (e.g. Linebarger & Walker, 2005). Furthermore, no commercial TV shows or DVDs have demonstrated a benefit for children less than two years of age (Garrison & Christakis, 2005).

Screen Time and physical activity

The recommendations for limited Screen Time for children aged two to five is partially based on the assumption that engaging in Screen Time means less time for active outdoor and creative play. However, there is increasing evidence that physical inactivity and Screen Time are not directly linked.

Research has shown that Screen Time is largely uncorrelated with physical activity (Biddle, Gorely, Marshall, Murdey & Cameron, 2004), and exceeding two hours of Screen Time daily is not consistently associated with lower levels of physical activity (Melkevik, Torsheim, Iannotti & Wold, 2010). As well, the TV viewing by preschool children has been found to be consistently unrelated to outdoors playtime (Hinkley, Salmon, Okely & Trost, 2010). Moreover, the amount of TV watched per head has not changed for 40 years (Biddle et al., 2004), despite being more readily available. This research suggests that decreasing the amount of Screen Time might not be effective in increasing the amount of physical activity in children.

Implications of types of Screen Time

The recommendations made by the Australian Government are based on a definition of Screen Time that does not distinguish between different types of screen-based activities. The research reviewed in this paper suggests that not all Screen Time should be treated as equivalent. Moreover, it is not appropriate to assume that all screen-related activities are negative or harmful.

We propose that a hierarchy of Screen Time is a more accurate and useful construct by which to measure and assess children's time expenditure on screen-based activities. Although it is too early to formalise such a hierarchy, it is clear that it is possible to engage with screen-based media in ways that are more or less active and with a variety of positive and negative effects. Strictly speaking, the extent to which a child actively engages with media is a function of the child, rather than the specific form of media. For example, two children might engage with the same TV show with varying degrees of cognitive activity, or with the same video game with differing degrees of physical exertion.

Irrespective of individual variation across children, the research reviewed in this paper suggests that different media tend to engender differing degrees of activity. Specifically, we hypothesise that, on average, TV viewing engenders lower levels of physical and cognitive activity than do computer use and video game play. Further research is needed to formalise the proposed hierarchy and to answer questions regarding the conditions under which the positive effects associated with specific types of Screen Time are likely to result.

We do not mean to suggest that all kinds of media are appropriate for children and that no limits should be placed on children's Screen Time. Clearly, certain forms of media (e.g. violent video games) are not appropriate for children, and moderation is essential for any positive effects of media to be seen.

Conclusion

In this paper, we reported some early investigations into the Australian's Government's LSAC dataset. First, it was found that the majority of children are not meeting the Government's recommendations of a maximum of one hour of Screen Time per day for children aged two to five. Second, we have identified that most of children's Screen Time is spent viewing TV and DVDs.

In light of this evidence, we have reviewed the body of research surrounding children's engagement in Screen Time activities and identified some associated positive and negative effects of specific activities. Based on existing evidence, we have proposed that Screen Time as a sum of all screen-related activities might not be the most accurate and useful measure. Instead, we have defined two distinct Screen Time categories, Active and Passive Screen Time.

Further research is needed to explore questions around the conditions under which children are more or less active in their media engagement, as well as the circumstances in which they are likely

to experience positive or negative effects related to Screen Time. Consideration needs to be given to whether government recommendations should take account of these issues. Should parents be encouraging one kind of media engagement over another? Our ongoing research is aimed at exploring these questions, as well as further investigating the effects associated with Active versus Passive Screen Time.

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