

Young children and screen time: Creating a mindful approach to digital technology

Author

Neumann, MM

Published

2015

Journal Title

Australian Educational Computing

Version

Version of Record (VoR)

Rights statement

© The Author(s) 2015. This is an Open Access article distributed under the terms of the Creative Commons Attribution 3.0 Unported (CC BY 3.0) License (<https://creativecommons.org/licenses/by/3.0/>) which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Downloaded from

<http://hdl.handle.net/10072/141477>

Link to published version

<http://journal.acce.edu.au/index.php/AEC/article/view/67>

Griffith Research Online

<https://research-repository.griffith.edu.au>

Young children and screen time: Creating a mindful approach to digital technology

Dr Michelle M. Neumann
Griffith University, Australia

To effectively address early childhood screen time concerns raised by parents and policy makers it is important to examine the current home digital environments of young children. The present study draws upon research that examined the home digital environment of Australian parents and their children (aged 2 to 4; N = 69). Parents completed a questionnaire that asked how many digital devices families had at home, how much time children spend on them, and how easily children could operate them. The extent of parental engagement in digital activities and parent views on touch screen tablets were also measured. TVs and touch screen tablets were the most popular digital device among pre-schoolers being used on average for 80 mins and 20 mins per day respectively. Parents rated touch screen tablets as the easiest device for young children to operate. It is suggested that a differentiated screen time policy approach for TVs and tablets is needed to better address screen time concerns. Practical ways to help parents create a mindful approach to digital technology to foster positive screen time interactions is also discussed.

Key words: Home digital environment, digital devices, touch screen tablets, screen-time policy, young children, parents

Introduction

Young children are exposed to a range of digital devices (e.g., computers, mobile phones, TV) from birth and their use of digital media is rapidly increasing (UK: Marsh et al., 2015; Ofcom, 2014; Livingstone, 2014; USA: Rideout, 2011). The constant evolution of digital technology impacts upon the types of digital experiences pre-schoolers engage in at home which in turn shapes early development in potentially positive and negative ways (Blackwell, Lauricella, & Wartella, 2014; Connell, Lauricella, & Wartella, 2015; Ernest, Causey, Newton, Shakins, Summerlin, & Albaiz, 2014; Karuppiah, 2015; Lee, 2015;). This has led to increased concerns about screen time which are reflected in Australian Government policy screen time guidelines for pre-schooler use of screen-based digital devices (Australian Government, 2014). Sweetser, Johnson, Ozdowska, and Wyeth (2012) define screen time as “the viewing or use of anything with a screen, including TV, DVDs, video games and computers” (p. 94). Government policy restricts children under two to no screen time and 2 to 5 year olds less than an hour per day (Australian Government, 2014).

In contrast to previous generations, young children in the 21st century not only watch TV at home but engage with digital media through desktop computers, gaming devices, touch screen tablets and mobile phones for a range of purposes such as entertainment, listening to stories, creating, searching the internet, and playing games (Connell et al., 2015; Ofcom, 2014; Rideout, 2011). Watching quality educational television programs such as *Sesame Street* may have positive effects on academic outcomes (Anderson, Hutson, Schmitt, Linebarger, & Wright, 2001; Linebarger & Walker, 2005; Penuel et al., 2012) and computer experiences can benefit pre-school children's learning (Downes, 2002; Marsh, 2005; O'Mara & Laidlaw, 2011; Tahnk, 2011). For example, Korat (2001) describes how through interactions with his family members, 6 year old Daniel used his home computer to create and write birthday invitations for his friends. Studies have highlighted how pre-schoolers can learn communication skills by using digital devices to creatively explore their world and express themselves (Hisrich & Blanchard, 2009; Levy, 2009; Marsh, 2005; Plowman & McPake, 2013).

In contrast, other research has found that spending too much time on digital devices may lead to antisocial behaviour and reduced attention, verbal ability, and time spent reading (Christakis & Zimmerman, 2007; Christakis, Zimmerman, DiGiuseppe, & McCarty, 2004; Vanderwater, Bickham, Lee, Cummings, Wartella, & Rideout, 2005). In particular, time spent watching TV has been positively associated with childhood obesity (Hancox & Poulton, 2006). Parents have also reported concerns about their pre-schoolers' over use of touch screen tablets (Ofcom, 2014) voicing that the addictive features of tablets may negatively impact on children's social, physical, and cognitive development and reduce time for more traditional non-digital activities (Ebbeck, Yim, Chan, & Goh, 2015; Karupiah, 2015; Livingstone et al., 2014). Due to these types of concerns Australian and US policy makers recommend that children under two have no screen time, two to five year olds have one hour per day and children older than five years have one to two hours per day; and that pre-schoolers be physically active for at least three hours across the day (American Academy of Pediatrics, 2001; Australian Government, 2014). However, there is substantial evidence that pre-school children are exceeding these recommended screen time guidelines (Sweetser et al., 2012; Rideout, 2011) especially since the release of touch screen tablets (Livingstone et al., 2014; Marsh et al., 2015).

For example, a report that examined tablet and app use showed that 0 to 5 year olds from the UK used tablets on average for 79 minutes on a typical weekday (Marsh et al., 2015) and Australian 3 to 4 year olds watched TV for nearly two hours per day spending less time on video games (6 mins/day) and computers (17 mins/day) (Sweetser et al., 2012). Sweetser et al., (2012) suggests that national screen time parameters should be reassessed to take into account the array of digital media children are using. Furthermore, the purpose children are using specific devices should also be considered. For example, video games (e.g., Wii or play station) may provide more physically and cognitively demanding experiences compared with passive TV and DVD watching or parents might use home computers to interact and play educational games with their child. A one size fits all approach may not be the best way to approach screen time as Sweetser et al. (2014) highlights that a more comprehensive measure is required to assess various aspects of screen time. Therefore, it is important to take into account pre-schoolers' circumstances and their use of a wider range of digital devices by gaining a deeper understanding of their home digital

environments. Lauricella, Wartella, and Rideout (2015) highlights the value of understanding family use of digital technology more holistically when exploring ways to address screen time concerns and support pre-schoolers' positive use of digital devices.

Therefore, the present study aims to provide a current snapshot of the home digital environment in a sample of Australian families to firstly determine which digital devices (TV, mobile phone, laptop or Desktop computer, tablet/iPad, X-Box or Playstation, iPod or MP3 player, Nintendo DS) are currently most popular among pre-schoolers and to measure child screen time. Secondly, parental digital activities are also important to examine as parent's use of digital devices is strongly associated with children's screen time (Lauricella et al., 2015). Young children's use of digital technology is influenced by their parent's use of digital devices (Plowman, Stevenson, McPake, Stephen, & Adey, 2011; Plowman, Stevenson, Stephen, & McPake, 2012) and parent behaviours provide important insights into digital activities occurring at home. These findings will be discussed in relation to Australian National screen time recommendations and be used to guide the development of strategies parents can use at home to foster positive pre-schooler use of digital technology.

Method

Participants

Sixty-nine families each with a child aged 2 to 4 years (33 girls and 36 boys) in South-East Queensland, Australia participated in this home survey. There were on average 2 children per family with families having from 1 to 6 children. The majority of parents were married (94%) and identified as Australian (76%). Most families were from middle socioeconomic backgrounds (SES) backgrounds (M SES = 46.19; range = 16.00 – 63.50) as calculated by the Hollingshead index (parental occupation and education levels) and range (8-66; Hollingshead, 1975).

Home digital technology survey

A survey was completed by parents that asked for demographic information and questions about the types of digital devices families had at home, how much time children spent using these devices, how easy the devices were for children to use (1: very difficult to 5: very easy), the frequency that parents engaged in digital activities at home (1: never to 6: several times daily), and parent beliefs about children's access to touch screen tablets at home and pre-school (1: strongly disagree to 5: strongly agree). Following approval from the university ethics committee, parents who volunteered to participate in the survey completed the survey questionnaire at home and returned it to the researcher.

Survey Findings

Home ownership of digital devices

The percentage of home ownership of digital devices and number of digital devices in the homes of the participant families are presented in Figure 1 and Figure 2 respectively. All families had one or more televisions with over 90% of households owning a mobile phone. Game consoles (e.g., X-Box) were more commonly reported in homes than handheld gaming devices (e.g., Nintendo DS). Fewer families own

desktop computers compared with laptops, with 80% of families owning on average at least one touch screen tablet, laptop, and mobile phone. Televisions, mobile phones, laptop computers, and touch screen tablets were the most common digital devices found in participants' homes.

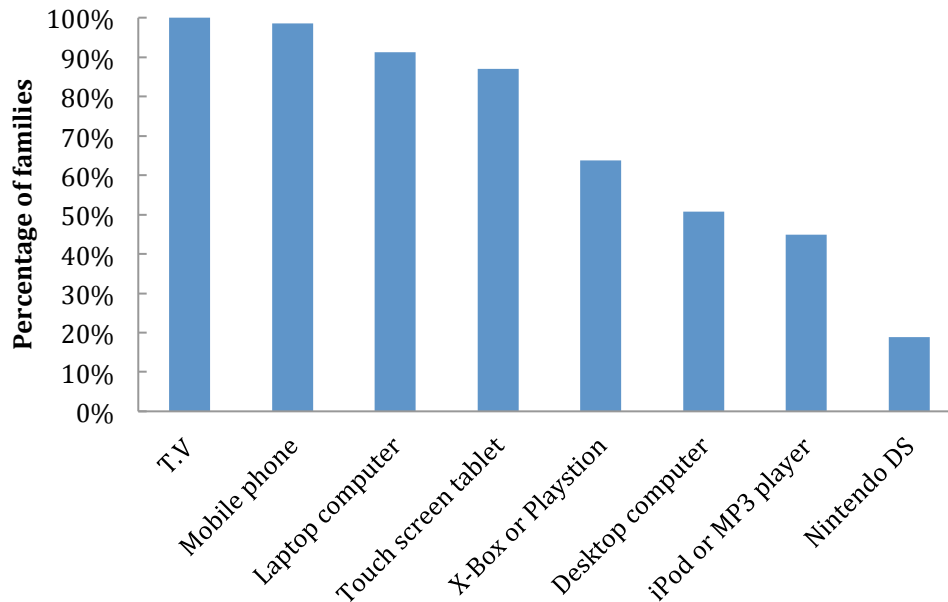


Figure1. Percentage of families with digital devices at home

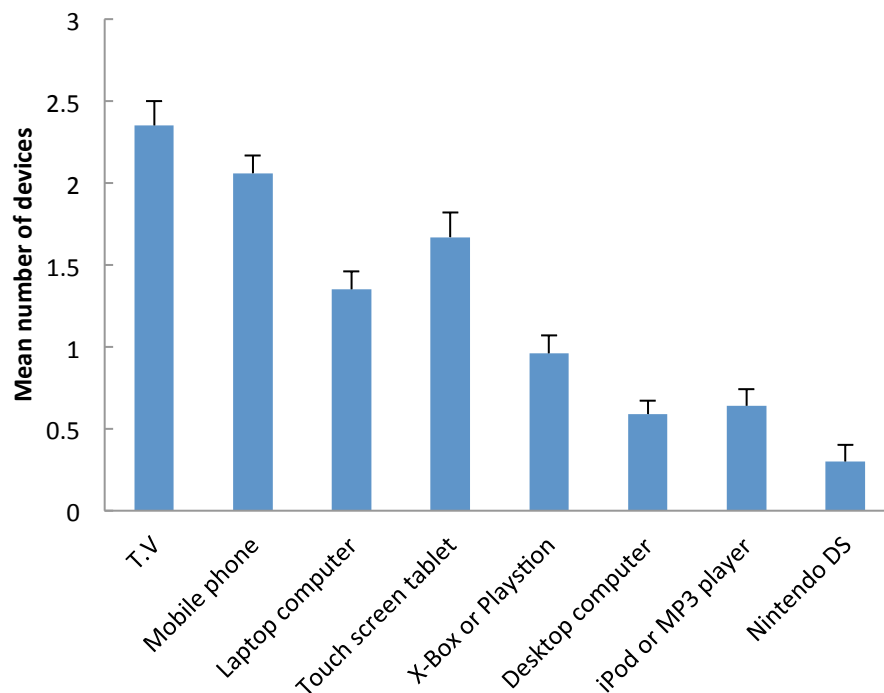


Figure 2. Mean number of digital devices in family homes

Young children's use of digital technology at home

Figure 3 shows children using a range of digital devices at home with over 90% of children watching television at home for on average 80 minutes per day (Figure 4). Interactive touch screen tablets are being used by over 60% of children and mobile

phones by 40% of children for on average 20 minutes and 10 minutes per day respectively. Nearly a quarter of children are accessing the internet on average for 5 minutes per day with only a small proportion of children using the desktop or laptop computers or gaming consoles and handheld gaming devices. Young children are spending the least amount of their time (less than 5 minutes/day) interacting with laptop and desktop computers and game consoles (Figure 4).

Of all the digital devices children used at home, parents reported that the touch screen tablet was the easiest device for young children to use with 75% rating it easy or very easy to operate (Table 1). This was closely followed by mobile phones and TV. The most difficult devices for young children to operate were reported to be desktop and laptop computers and gaming devices. Web browsing on both touch screen tablets and laptops was rated as difficult for young children. However, nearly 12% of parents rated web browsing with tablets as easy for young children with only 2% rating desktops and laptops easy for young children to explore the web.

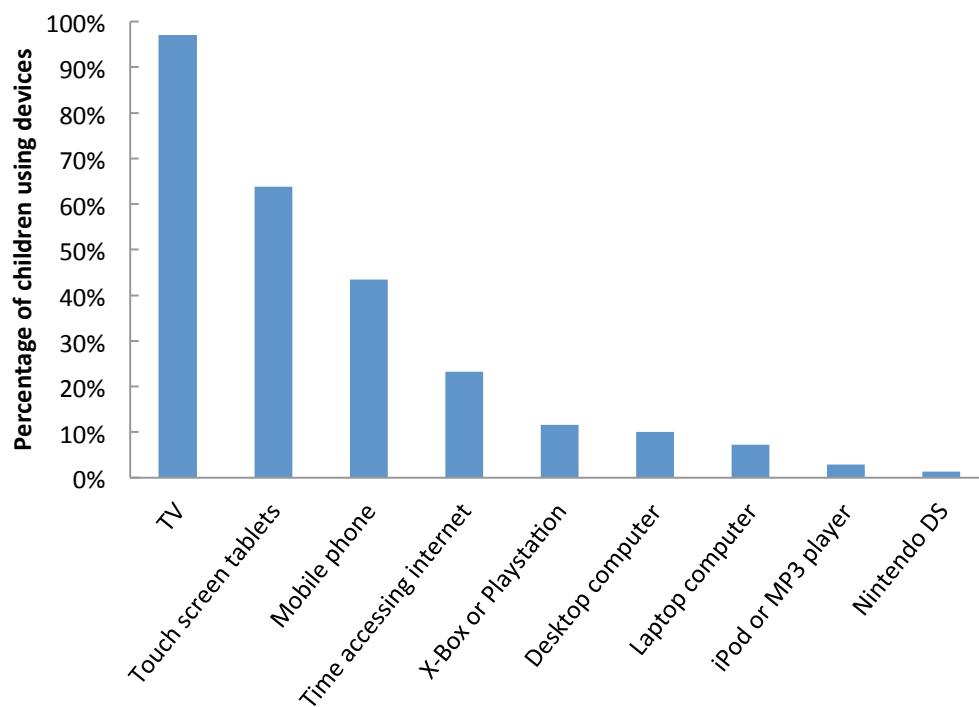


Figure 3. Percentage of young children using digital devices at home

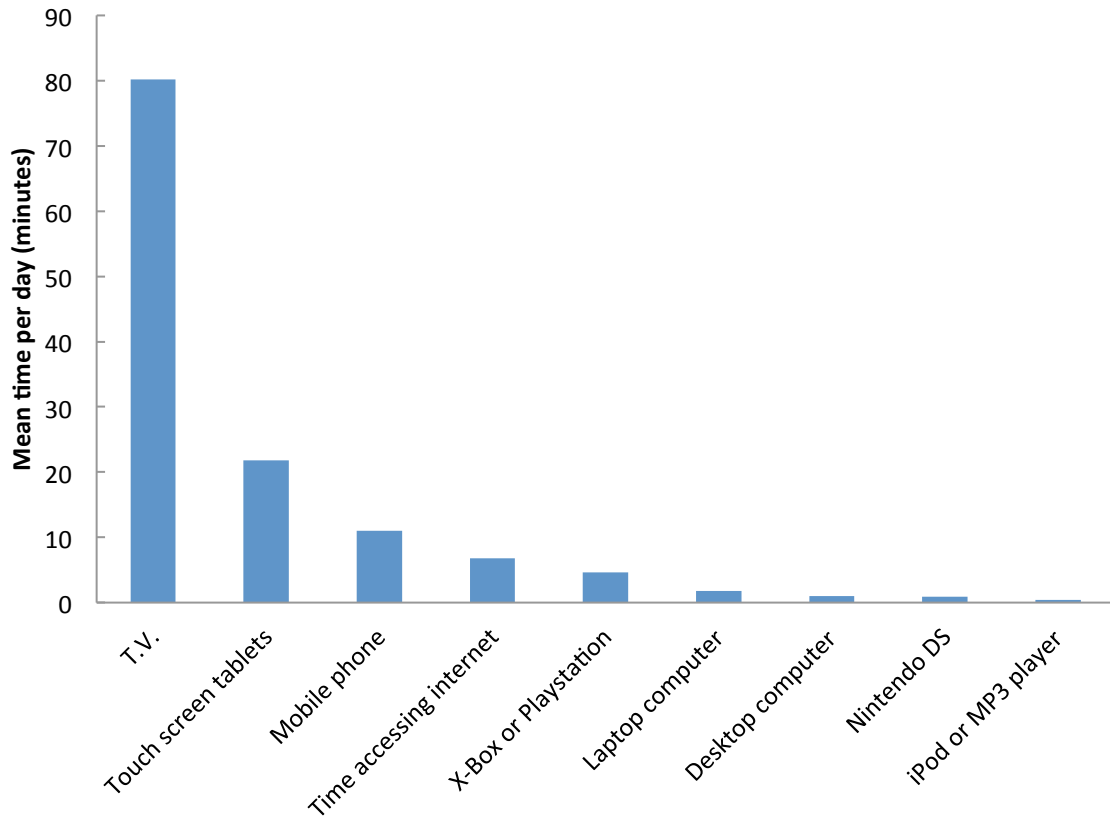


Figure 4. Mean time (minutes/day) young children spent on digital devices

Table 1. Percentage of parents rating the difficulty of child use of digital devices

| Digital Device | Very Difficult (%) | Difficult (%) | Neither Difficult nor Easy (%) | Easy (%) | Very Easy (%) |
|--------------------------------|--------------------|---------------|--------------------------------|----------|---------------|
| T.V | 0 | 14.5 | 40.6 | 34.8 | 10.1 |
| Mobile phone | 2.9 | 7.2 | 21.7 | 46.4 | 21.7 |
| Desktop/Laptop | 18.8 | 42.1 | 29 | 8.7 | 1.4 |
| Touch screen tablet | 0 | 7.2 | 17.4 | 43.5 | 31.9 |
| X-Box or Playstation | 23.2 | 43.5 | 21.7 | 7.2 | 4.3 |
| iPod or MP3 player | 20.3 | 14.5 | 52.2 | 11.6 | 1.4 |
| Nintendo DS | 20.3 | 47.8 | 31.9 | 0 | 0 |
| Web browsing on tablet | 27.5 | 37.7 | 23.2 | 4.3 | 7.2 |
| Web browsing on Desktop/laptop | 36.2 | 33.3 | 27.5 | 0 | 2.0 |

Parent use of technology at home and beliefs about tablets

Table 2 shows that parents engaged in a range of digital activities at home. The most frequent digital activity was emailing that occurred daily or several times a day. Two thirds of parents search for information on Google and engage with online social

media sites daily to several times daily. Over a quarter of parents read the online news and played app games on a daily basis. Watching videos on You Tube, searching online classifieds, downloading music, and reading e-books were the least frequent digital activities parents engaged in (Table 2). Table 3 shows that over a third of parents agreed that young children should have access to touch screen tablets at home and pre-school. A third have neutral views about children’s access to tablets and 20% of parents believed that homes and pre-schools should not have touch screen tablets (Table 3).

Table 2. The percentage of parents indicating their frequency of engaging in digital activities at home

| Parent digital activity | Never (%) | Occasionally (less than a fortnight) (%) | Fortnightly (%) | Weekly (%) | Daily (%) | Several times daily (%) |
|---------------------------|-----------|--|-----------------|------------|-----------|-------------------------|
| Email | 2.9 | 0 | 0 | 4.3 | 60.9 | 31.9 |
| Search Google | 1.4 | 4.3 | 4.3 | 18.8 | 46.4 | 24.6 |
| Social media | 17.4 | 1.4 | 0 | 1.4 | 56.5 | 23.2 |
| Messaging | 33.3 | 7.2 | 2.9 | 20.3 | 26.1 | 10.1 |
| Read online news | 30.4 | 20.3 | 4.3 | 8.7 | 30.4 | 5.8 |
| Purchase online products | 10.1 | 42 | 15.9 | 27.5 | 4.3 | 0 |
| Play app games | 34.8 | 29 | 2.9 | 8.7 | 20.3 | 4.3 |
| Watch YouTube | 18.8 | 42 | 13 | 11.6 | 13 | 1.4 |
| Search online classifieds | 40.6 | 36.2 | 8.7 | 10.1 | 2.9 | 1.4 |
| Read e-books | 68.1 | 13 | 0 | 7.2 | 10.1 | 1.4 |
| Download music | 49.3 | 39.1 | 10.1 | 0 | 1.4 | 0 |

Table 3. The percentage of parents indicating their belief about children’s access to touch screen tablets at home and in an early childhood education setting

| Access to touch screen tablets | Strongly disagree (%) | Disagree (%) | Neither agree or disagree (%) | Agree (%) | Strongly agree (%) |
|--------------------------------|-----------------------|--------------|-------------------------------|-----------|--------------------|
| At home | 2.9 | 18.8 | 34.8 | 33.3 | 10.1 |
| At pre-school | 7.2 | 14.5 | 42 | 26.1 | 10.1 |

Discussion

In order to gain a current view of pre-schoolers’ and parents’ home use of digital devices and screen time usage, the present study obtained a snapshot of the home digital environment of sixty-nine Australian pre-schoolers. Gathering this type of information can contribute to helping researchers, educators, and policy makers develop strategies to assist parents in providing children with positive and healthy experiences and interactions with digital technology. This is especially important with young children’s increasing use of new and popular digital technologies such as touch screen tablets. The home digital environment and screen time findings will be

discussed followed by potential ways in which parents can create a mindful approach to their pre-schoolers' use of digital devices.

Home digital environment

The present study showed that TVs and tablets in this sample of Australian families were the most popular digital devices used by pre-schoolers. The average daily time pre-schoolers in the present study spent watching TV was less (80 mins/day) than the mean time reported in an Australian National report of 2 to 5 year olds (Sweetser et al., 2012; 120 mins/ day). More households had mobile computers compared to traditional desktop computers with over 80% of families owning one or more tablets perhaps reflecting a shifting home preference to mobile computers. Children's average TV screen time alone (80 mins) exceeded the recommended National daily screen time recommendation (Australian Government, 2014). In contrast parents reported that children only spent 20 minutes on tablets which is less than UK pre-schoolers who use tablets on average for 79 mins per day (Marsh et al., 2015).

Pre-schoolers in the current study spent the least amount of time accessing the internet, playing video games, and using laptop and desktop computers (less than 10 minutes/day) and preferred the easily operated touch-based tablet over less intuitive mouse operated computers. Children gained considerable exposure to a rich variety of digital activities at home with over two-thirds of their parents writing and sending emails, searching Google for information, engaging with social media, and playing app games on their digital devices. Parents preferred reading online news rather than reading e-books on their digital devices. Overall, this snapshot reveals that the majority of the pre-schoolers in the present study lived in home environments containing a diverse range of opportunities to engage and learn with different digital devices and media.

TVs, tablets, and screen time

The families of this present study engaged with digital devices for a range of purposes. More specifically the snapshot reflects a need to focus on pre-schooler's use of two most popular digital devices, namely TV and tablets. These devices potentially provide the most concern for screen time policy. This is especially the case for TV viewing which is regarded as a passive activity that tends to promote little cognitive, physical, and social activity (Sweetser et al., 2012). Therefore, as policy recommends providing pre-schoolers with approximately one hour of TV screen time per day with quality educational TV programs sounds reasonable. Although parent concerns have arisen over possibilities that over use of tablets may have negative effects on young children's development (Ebbeck et al., 2015) the snapshot gained from the present study showed that children tend to be spending more of their screen time on TV (over 1 hour/day) compared with 20 mins per day on a touch screen tablet. Also, the majority of parents in the present study viewed tablets in a positive way and reported engaging in a range of digital activities at home such as emailing, searching the web, and interacting with social media. Therefore, children's exposure to these types of digital behaviours modelled by parents may create potential opportunities for positive learning interactions to occur (Lauricella et al., 2015) and these factors should be considered when recommending reasonable tablet screen time guidelines.

A tablet's touch screen based operating and mobile features afford pre-schoolers a potentially greater opportunity to engage in active screen time based activities

compared with TV. For example, although research on the effects of touch screen tablets on young children's physical, cognitive, and social development is limited due to the relatively recent release of tablets (Ebbeck et al., 2015; Michael Cohen & USDOE, 2011; Neumann & Neumann, 2014), studies have shown that through tablets children can actively play, create, write, read, explore, and learn (Conn, 2012; Geist, 2014; Hatherly & Chapman, 2013; Lee, 2015).

However, in order to inform whether screen time recommendations should be revised for tablet use, more empirical research is needed that examines how young children in the years prior to formal schooling are using tablets at home and for what purpose. For example, are pre-schoolers taking their tablets outside to explore their back yard and to what extent are they physically active during tablet play? It is also important to examine the types and quality of apps (e.g., educational, gaming, creating; Neumann, 2014) that children are using which may influence learning experiences. The extent to which parents are involved in children's tablet activities and are scaffolding children's digital experiences will also influence the quality of tablet activities (Connell et al., 2015; Neumann & Neumann, 2014; Nikken & Jansz, 2014).

Therefore, in order to more accurately assess and provide effective screen time guidelines it is suggested that policy makers take into account the broader home digital environment such as types of devices that are used by specific pre-school age groups (e.g., infants, toddlers), independent or joint use of the device, and parental beliefs and behaviours around digital technology. It is also critical to develop strategies that help parents manage their children's tablet and TV screen time in positive ways so that pre-schoolers are also provided with opportunities to engage in at least three hours of non-digital physical activity per day (Australian Government, 2014). Using a family-focussed approach that considers the home digital environment at the child and parent level will help develop effective ways to foster positive screen time experiences (Lauricella et al., 2015; Velduis, van Grieken, Renders, HiraSing, & Raat, 2014).

Creating a mindful approach to digital technology

It is well established that parents play a key role in mediating young children's interactions and experiences with digital technology (Connell et al., 2015; Nikken & Jansz, 2014; Plowman et al., 2012). Although government guidelines aim to benefit the whole population it is also useful to consider that a one size fits all screen time policy may not always lead to the same outcomes for individual families with a range of unique circumstances and needs. Therefore, to address concerns about TV and tablet screen time it may be beneficial to help parents become more mindful about their pre-schoolers' use of digital technology. In this sense, being *mindful* means to develop an active and reflective awareness of a child's use of a particular digital device. In order to apply such a mindful approach to digital technology it is suggested that parents use the following proposed framework of 5W questions (Who? What? Where? Why? When?) during their pre-schooler's interactions with digital devices such as a tablet or TV. The answers to each question will be apparent and help guide parents in adjusting their child's use of the digital device in order to set the activity in a way that will foster positive and healthy screen time experiences.

Adopting a mindful approach that can be used for tablet and TV use is described in Table 4 and parents can ask themselves or their child the 5W questions. Interacting

with pre-schoolers using the 5W questions may have the additional advantage of helping young children learn to critically evaluate and monitor their own use of the devices. If parents find that their response to these questions do not reflect positive child experiences then it will be important to reflect on making individual family adjustments (e.g., forming or re-emphasising family rules such as ‘turn off all digital devices at meal times’ or further identification and selection of better quality learning apps or TV programs).

Table 4. Parent strategies for creating a mindful approach to digital technology

| Mindful Questions | A parent can ask themselves or their child: | Reflect upon: |
|-------------------|---|--|
| 1. WHO? | Who are you playing a tablet game or watching TV with? | Is your child doing the digital activity with a parent, sibling or friend? Is a parent close by to help and interact with the digital activity? Providing opportunities for positive social interaction is important for healthy child development. |
| 2. WHAT? | What app game are you playing or TV program are you watching? | Is the tablet activity or TV program suitable for pre-schoolers and of good quality (e.g., creative, engaging, educational, interactive) and non-violent with child appropriate themes? |
| 3. WHERE? | Where are you playing your tablet? | Is the child in their bedroom, in family areas, or garden where family members can engage with your child? Playing with digital devices in shared settings provides increased opportunities for social interaction. |
| 4. WHY? | Why are you playing this app game or watching this TV program? | Is the tablet or TV activity purposeful and meaningful? (e.g., For tablets: Google searching a favourite topic, exploring, writing, taking nature photos, creating a story, doing an art/craft activity from a Youtube video, FaceTime/messaging). |
| 5. WHEN? | When are you playing this app game or watching this TV program? | Is the time of the day suitable for playing on a tablet or watching TV (e.g., young children’s use of tablets or TV late at night is not conducive to healthy sleep patterns). Is the amount of time your child is spending on the tablet activity reasonable? |

Adopting a mindful approach to digital technology has the advantage of helping families with their own unique home digital environments to actively reflect upon their pre-schoolers’ use of TV and tablets. A mindful approach also provides a framework to make healthy screen time adjustments and reflect upon personal digital practices, which in turn may help to positively influence children’s behaviours. For example, the process of thinking through and asking the 5W questions provides an opportunity for parents to communicate with their child and discuss whether they should play for example, 5 minutes more or stop and go outside to play. Further practical strategies parents can adopt to foster positive home experiences with digital technology include being a positive digital role model when using digital devices, test

out apps before allowing children to use them, turn off the Wi-Fi to avoid children downloading low quality or inappropriate apps or media, and encourage children to play outside and lie on their tummies to play with tablets. In order to prevent extended blocks of digital play it is also useful to break up tablet time into 15-minute play sessions interspersing periods of outdoor physical and non-digital play. Encouraging children in a flexible child centred way to create and explore with both digital and non-digital tools (e.g., drawing and writing words in the sand and on a touch screen tablet) may be a better approach than setting strict limitations on pre-schoolers' use of digital technology.

Study limitations and future research

The findings of the present study cannot be generalised to the greater population because the participant sample size was small and families were from mainly middle SES backgrounds. As such, the comparisons of screen time measures of the present sample with larger National survey data should be viewed with caution. Also, the present survey data was based upon parent report questionnaires, which can be susceptible to social desirability bias. Future research could obtain more ecologically valid data by directly observing digital device use and measuring screen time in the homes of individual families. Obtaining family diaries of home digital practices would also be useful.

As current national screen time recommendations (Australian Government, 2014) do not differentiate between digital devices it is clear that more research and assessment of screen time use of different types of digital devices (e.g., tablet vs TV) is needed. Further consideration of broader influencing factors in the home digital environment (e.g., parental factors) is also required in order to provide a stronger rationale for screen time guidelines. Developing effective mindful approaches to help parents foster positive experiences with digital devices such as mobile tablets may provide more opportunities for creative and active learning experiences compared with television viewing.

Conclusion

National screen time policies exist to discourage parents from allowing pre-schoolers to be physically inactive for extended periods of time. However, these recommendations do not differentiate between types of digital devices or directly takes into account individual family circumstances. A one size fits all screen time guideline may not be the best way to address screen time concerns. In order to provide a stronger rationale for these guidelines policy recommendations should be presented in a more flexible way that takes into account different digital devices and the purpose of digital activities. Furthermore, providing family based strategies such as helping parents create a mindful approach to digital technology may assist in positively shaping pre-schoolers' early development.

References

- American Academy of Pediatrics. (2001). Children, adolescents, and television. *Pediatrics, 107*, 423-426.
- Anderson, D. R., Hutson, A. C., Schmitt, K. L., Linebarger, D. L., & Wright, J. C. (2001). Early childhood television viewing and adolescent behaviour: the recontact study. *Monographs of the Society for Research in Child Development, 66*, vii-147.
- Australian Government. (2014). *Australia's Physical Activity and Sedentary Behaviour Guidelines*. Department of Health. Retrieved from: <http://www.health.gov.au/internet/main/publishing.nsf/content/health-publth-strateg-phys-act-guidelines>
- Blackwell, C. K., Lauricella, A. R., Wartella, E. (2014). Factors influencing digital technology use in early childhood education. *Computers and Education, 77*, 82-90.
- Christakis, D. A., & Zimmerman, F. J., (2007). Violent television viewing during preschool is associated with antisocial behavior during school age. *Pediatrics, 113*, 708-713.
- Christakis, D. A., Zimmerman, F. J., DiGiuseppe, D. L., & McCarty, C. A. (2004). Early television exposure and subsequent attention problems in children. *Pediatrics, 133*, 708-713.
- Conn, C. (2012). Managing and maximising a class set of iPads. *Learning and Leading with Technology, June/July*, 32-33.
- Connell, S. L., Lauricella, A. R., & Wartella, E. (2015). Parental co-use of media technology with their young children in the USA. *Journal of Children and Media, 9*, 5-21, doi: 10.1080/17482798.2015.997440.
- Downes, T. (2002). Children's and families' use of computers in Australian homes. *Contemporary Issues in Early Childhood, 3*, 182-196.
- Ebbeck, M., Yim, H. Y. B., Chan, Y., & Goh, M. (2015). Singaporean parents' views of their young children's access and use of technological devices. *Early Childhood Education Journal*, in press, doi: 10.1007/s10643-015-0695-4
- Ernest, J. M., Causey, C., Newton, A. B., Sharkins, K., Summerlin, J., & Albaiz, N. (2014). Extending the global dialogue about media, technology, screen time, and young children. *Childhood Education, 90*, 182-191.
- Geist, E. (2014). Using tablet computers with toddlers and young pre-schoolers. *Young Children, 69*, 58-63.

- Hancox, R. J., & Poulton, R. (2006). Watching television is associated with childhood obesity: But is it clinically important? *International Journal of Obesity, 30*, 171–175.
- Hatherly, A., & Chapman, B. (2013). Fostering motivation for literacy in early childhood education using iPads. *Computers in New Zealand Schools: Learning, Teaching, Technology, 25*, 138-151.
- Hisrich, K., & Blanchard, J. (2009). Digital media and emergent literacy. *Computers in the Schools, 26*, 240-255.
- Hollingshead, A. B. (1975). *The four-factor index of social status*. Unpublished manuscript. Yale University, New Haven, CT.
- Karuppiah, N. (2015). Computer habits and behaviours among young children in Singapore, *Early Child Development and Care, 185*, 393-408, doi:10.1080/03004430.2014.930451.
- Korat, O. (2001). Cultural pedagogy and bridges to literacy: Home and kindergarten. *Early Childhood Education Journal, 28*, 225-230.
- Lauricella, A. R., Wartella, E., & Rideout, V. (2015). Young children's screen time: The complex role of parent and child factors. *Journal of Applied Developmental Psychology, 36*, 11-17.
- Lee, L. (2015). Digital media and young children's learning: A case study of using iPads in American preschools, *International Journal of Information and Education Technology, 5*, 947-950.
- Levy, R. (2009). 'You have to understand words...but not read them': young children becoming readers in a digital age. *Journal of Research in Reading, 32*, 75-91. Doi:10.1111/j.1467-9817.2088.01382.x
- Linebarger, D. L., & Walker, D. (2005). Infants' and toddlers' television viewing and language outcomes. *American Behavioral Scientist, 48*, 624-645
- Livingstone, S., Marsh, J., Plowman, L., Ottovordemgentschenfelde, S., & Fletcher-Watson, B. (2014). *Young children (0-8) and digital technology: a qualitative exploratory study national report - UK*. Joint Research Centre, European Commission, Luxembourg. Retrieved from: <http://eprints.lse.ac.uk/60799/>
- Marsh, J. (2005). Children of the digital age. In M. Marsh, (Eds.), *Popular Culture, NewMedia and Digital Literacy in Early Childhood* (pp. 1-10). New York, NY: RoutledgeFalmer.
- Marsh, J., Yamada-Rice, D., Bishop, J., Lahmar, J., Scott, F., Plowman, L., Piras, M., French, K., Robinson, P., Davis, S., Bird, A., Winter, P. (2015). *Exploring play and creativity in pre-schoolers' use of apps: Technology and play*. Economic and Social Research Council. Retrieved from: <http://www.techandplay.org/tap-media-pack.pdf>

- Michael Cohen Group & USDOE [US Department of Education]. (2011). *Young children apps and iPad*. New York, NY: Michael Cohen Group.
- Neumann, M. M. (2014). An examination of touch screen tablets and emergent literacy in Australian pre-school children. *Australian Journal of Education*, 58, 109-122. doi:10.1177/0004944114523368.
- Neumann, M. M. & Neumann, D. L. (2014). Touch screen tablets and emergent literacy. *Early Childhood Education Journal*, 42, 231-239. doi: 10.1007/s10643-013-06083.
- Nikken, P. & Jansz, J. (2014). Developing scales to measure parental mediation of young children's internet use. *Learning, Media, and Technology*, 39, 250-266, doi:10.1080/17439884.2013.782038.
- Ofcom (2014) *Children and parents: Media use and attitudes report*. London: Office of Communications. Retrieved from: http://stakeholders.ofcom.org.uk/binaries/research/media-literacy/media-use-attitudes-14/Childrens_2014_Report.pdf
- O'Mara, J., & Laidlaw, L. (2011). Living in the iworld: Two literacy researchers reflect on the changing texts and literacy practices of childhood. *English Teaching: Practice and Critique*, 10, 149-159.
- Penuel, W. R., Bates, L., Gallagher, L. P., Pasnik, S., Llorente, C., Townsend, E., Hupert, N. Domínguez, X., & VanderBorgh, M. (2012). Supplementing literacy instruction with a media rich intervention: Results of a randomized controlled trial. *Early Childhood Research Quarterly*, 27, 115-127.
- Plowman, L., Stevenson, O., McPake, J., Stephen, C., & Adey, C. (2012). Parents, pre-schoolers and learning with technology at home: Some implications for policy. *Journal of Computer Assisted Learning*, 27, 361-371.
- Plowman, L., Stevenson, O., Stephen, C., & McPake, J. (2012). Preschool children's learning with technology at home. *Computers and Education*, 59, 30-37.
- Plowman L., & McPake, J. (2013). Seven myths about young children and technology. *Childhood Education*, 89, 27-33.
- Rideout, V. (2011). *Zero to eight: children's media use in America*. San Francisco, CA: Common Sense Media. Retrieved from: www.common Sense Media.org/sites/default/files/research/zerotoeightfinal2011.pdf
- Sweetser, P., Johnson, D., Ozdowska, A., Wyeth, P. (2012). Active versus passive screen time for young children. *Australasian Journal of Early Childhood*, 37, 94-98.

- Tahnk, J. L. (2011). Digital milestones: Raising a tech-savvy kid. *Parenting Early Years, 25*, 78-84.
- Vanderwater, E. A., Bickham, D. S., Lee, J. H., Cummings, H. M., Wartella, E. A., & Rideout, V. J. (2005). When the television is always on: Heavy television exposure and young children's development. *American Behavioral Scientist, 48*, 562-577.
- Veldhuis, L., van Grieken, A., Renders, C. M., HiraSing, R. A., & Raat, H. (2014). Parenting style, the home environment, and screen time of 5-year-old children; The 'Be Active, Eat Right' Study. *PLoS ONE, 9*, p 1-9. e88486.
doi:10.1371/journal.pone.0088486