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Moving screen use guidelines:

Nine reasons why screen use guidelines should be separated from public health 24-hour movement guidelines in Australia and internationally

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A MESSAGE FROM PROFESSOR SUSAN DANBY, CENTRE DIRECTOR

In 2021, the Australian Research Council (ARC) funded a Centre of Excellence devoted to studying and researching ‘the digital child’. The focus of this Centre is on very young children from birth to age 8, and describes and examines their everyday lives with and through digital technologies, their learning and their health in the family, and various kinds of kindergarten, childcare and early primary education experiences.

The Centre brings together six universities across Australia, as well as partner investigators from North America, Asia and Europe and a range of public bodies and civil society stakeholders, to focus on a holistic understanding of what it might mean to ‘grow up digital’ today.

The Digital Child Working Paper Series reports on our work in progress. There are five series of papers aimed at different audiences:

A **‘how to’** series offers instructional papers aimed at early career researchers or those new to the principles and practices of structured review.

A **‘discussion’** series consisting of discussion papers aimed at the scholarly community, raising larger conceptual challenges faced by researchers at the Centre and drawing on forms of literature review.

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Each of the working papers has been authored by members of the Centre and has been subject to review as explained in each paper. The arguments in each paper represent the view of the authors.

We hope that readers find each of these papers stimulating and generative and that all sections of society can draw on the insights, arguments and ideas within the papers to create healthy, educated and connected futures for all and every child.

Professor Susan Danby

Director, Centre of Excellence for the Digital Child

June 2022

EXECUTIVE SUMMARY

This paper is part of a series of review papers aimed at stimulating discussion and debate about key themes, concepts, and theories underpinning research and practice related to children in a digital world. This paper has been checked by the sub-series editorial team to ensure it meets basic standards around clarity of expression and acceptable and inclusive language and content.

Screen use by children is an issue of broad community concern, with children, their parents, professionals working with families, government and service organisations and technology developers seeking guidance on how children can gain the potential benefits from using screens whilst minimising the potential harms. Guidelines from government health departments and health organisations are important contributions to enable communities to support their children growing up in a digital world. Over the past two decades there has been increasing scrutiny of these guidelines, including their evidence base and the utility of the information they provide. The current guidelines in Australia and several other countries have essentially retained the focus on limiting the amount of time children are exposed to screens, which was initially proposed at the end of the last century when the sociotechnical system in which children were developing was very different. Recent international guidelines have moved away from time based guidelines to better reflect the evidence base and provide information that is potentially of more use to families and those people and organisations interested in supporting families.

The aim of this paper is to stimulate health policy, practice and research thinking around how guidelines could best support children's wise use of screens. To do so it outlines the historical development of Australian screen use guidelines including reasons for them being embedded in physical activity and 24 hour movement guidelines. The evolution of guidelines in other countries is also outlined, highlighting recent changes in thinking. Nine reasons are presented for why screen use guidelines should be separated from physical activity/movement guidelines:

1. Enable adequate considerations of aspects of screen use other than time
2. Enable better guidance on how screen use can have a positive impact on child health and development
3. Recognise the varying needs and vulnerabilities of different children
4. Recognise rights of children growing up in a digital society
5. Enable transdisciplinary guidelines
6. Enable a neutral approach to screen use
7. Enable the clear separation of sitting time from screen use
8. Encourage better measures of screen use
9. Enable moderate/vigorous physical activity and sleep guidelines to be better received by the community.

The paper concludes by suggesting principles for the development of guidelines which could better support children growing up in a digital world.

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What is the aim of this paper?

Screen use by children is an issue of broad community concern, with children, their parents, professionals working with families, government and service organisations and technology developers seeking guidance on how children can gain the potential benefits from using screens whilst minimising the potential harms. Guidelines from government health departments and health organisations are important contributions to enable communities to support their children growing up in a digital world. Over the past two decades there has been increasing scrutiny of these guidelines, including their evidence base and the utility of the information they provide. The current guidelines in Australia and several other countries have essentially retained the focus on limiting the amount of time children are exposed to screens, which was initially proposed at the end of the last century when the sociotechnical system in which children were developing was very different. Recent international guidelines have moved away from time-based guidelines to better reflect the evidence base and provide information that is potentially of more use to families and those people and organisations interested in supporting families.

Therefore this paper aims to stimulate health policy, practice and research thinking around how to best support families enabling children to gain the benefits of screen use whilst minimising the potential for harm. To do so it will:

- provide an overview of the development and rationale for screen use guidelines in Australia and internationally;
- present nine practical and conceptual reasons why we consider the current health guidelines are not fit for purpose. These include that the community dismisses current time-based guidelines as unrealistic and therefore the utility of the guidelines is minimised. It also includes the reason that by only considering the time aspects of screen use and focussing on sedentary behaviour the current guidelines miss the opportunity to provide useful guidance on other key aspects; and
- provide suggestions for key characteristics of better screen use guidelines, separate from movement guidelines.

Internationally screen use research and guidelines use a range of terms such as ‘electronic media time’ and ‘digital technology engagement’. In this paper the term ‘screen use’ will be used to encompass the broad nature of use including the variety of hardware, software, content and purposes and context of use. Screen hardware includes devices such as televisions, desktop computers, laptop computers and game consoles, virtual reality headsets, as well as more recent mobile touch screen hardware innovations such as tablet computers and smart phones (iPhone released in 2007 and iPad in 2010), often with internet connection. Contemporary screen use includes content and software enabling viewing live broadcast and on-demand content, game play, social media interaction, image/video/audio capture, editing and communication, research, report writing, and reading. Screen use can also be for a variety of purposes including formal schooling, self-directed learning, relaxation, interacting with family and friends and daily living activities such as shopping. Screen use can be conducted in a range of contexts including being alone, with peers, family and strangers in person and virtually. While screen use encompasses more than

just ‘time’ aspects it does not include non-screen digital technologies such as robots, smart speakers and non-screen dependent software such as generative artificial intelligence (Leaver et al., 2023). These technologies do not have the same visual constraints as screen based technologies and thus may have a different range of issues which should be considered, but are outside the scope of this paper.

What are the current Australian guidelines for screen use?

Currently the main Australian national government guidelines providing advice to families and professionals about children and young people’s screen use are embedded in the “24-hour Movement Guidelines” issued by the federal Department of Health and Aged Care (Australian Government Department of Health, 2018) . Whilst this department has responsibilities for the health of young children it does not have responsibility for early childhood education and care. However, these guidelines have influence for families with young children and all professionals working with these families. The current versions of these state:

- for children under 2 years, “*Sedentary screen time is not recommended*“ (Australian Government Department of Health, 2018).
- for children aged 2-5 years, “*Sedentary screen time should be no more than 1 hour; less is better.*” (Australian Government Department of Health, 2018)(and the government website says “*avoid sedentary screen-based activities*”) (Australian Government Department of Health and Aged Care, 2021).
- and for children (aged 5-12 years) and young people (aged 13-17 years), “*Sedentary recreational screen time should be limited to no more than 2 hours per day*” (Australian Government Department of Health, 2018).

Why are screen use guidelines embedded in ‘movement’ guidelines?

One of the historical reasons why screen use guidelines in Australia are a part of physical activity/movement guidelines was because of the connection with the public health issue of childhood obesity.

At the turn of the last century there was increasing concern with the rising rates of childhood obesity (e.g. Flegal et al., 1998). Studies were reporting that TV viewing time was associated with unhealthy weight, possibly due to unhealthy snacking, exposure to food marketing and displacement of physical activity (Gortmaker et al., 1996; Robinson, 1999). These findings provided a rationale for guidelines to limit screen time. Thus in 2003 the American Academy of Pediatrics Committee on Nutrition, in their position statement “Prevention of Pediatric Overweight and Obesity” recommended limiting television and video

viewing time to a maximum of 2 hours per day (American Academy of Pediatrics Committee on Nutrition, 2003).

In 2004 the Australian Physical Activity Guidelines for school-aged children (Australian Government Department of Health and Ageing, 2004a) and adolescents (Australian Government Department of Health and Ageing, 2004b) were released and included a similar recommendation to limit screen time:

- *“Children should not spend more than two hours a day using electronic media for entertainment (e.g. computer games, TV, Internet), particularly during daylight hours.”*

In 2010 the Australian Physical Activity Guidelines for young children (0-5 years) were released (Australian Government Department of Health and Ageing, 2010). Consistent with the Australian guidelines for school aged children, these included screen time limits. The actual time limit was based on the stakeholder suggestion to be more restrictive than for school-aged children (“no more than 2 hours per day” (Australian Government Department of Health and Ageing, 2010)), and thus ended up being more restrictive for toddlers and preschoolers than other national guidelines (e.g. the American Academy of Paediatrics was recommending “no more than one to two hours per day of quality educational programming among children older than two years of age.” (American Academy of Pediatrics, 2001; American Academy of Pediatrics Committee on Public Education, 1999)). The 2010 Australian recommendations were:

- *“Children younger than 2 years of age should not spend any time watching television or using other electronic media (DVDs, computer and other electronic games)”* and
- *“For children 2 to 5 years of age, sitting and watching television and the use of other electronic media (DVDs, computer and other electronic games) should be limited to less than one hour per day”*

A further historical reason for why screen use guidelines in Australia became a part of the physical activity/movement guidelines was because of the link with the related public health issue of sedentary behaviour as a risk factor for chronic health conditions.

Around 2008-2010 adult research on health risks associated with sitting expanded greatly (e.g. Hamilton et al., 2008) with the impact that sitting was considered a determinant of health independent of physical activity (i.e., a person can meet guidelines for regular moderate/vigorous activity but still have elevated risk of ill-health if they sit for most of the rest of the day.)

Although the evidence for sitting being associated with health outcomes in children and adolescents was not strong at the time, research on screen time (one type of sedentary behaviour, and typically captured as TV viewing time) continued to show adverse associations with health outcomes (Straker et al., 2016). This provided a second rationale for including screen time guidelines along with physical activity/movement guidelines as screen time could be considered detrimental for health because it typically involved sitting. Consequently in the 2014 update of Australian guidelines, sedentary behaviour and screen use were made more prominent. Whilst the two-hour limit for screen time remained, the revised guidelines responded to changes in evidence by acknowledging the importance of purpose of use (focussed on entertainment only) and device (specified seated electronic games), and provided separate

Australian Sedentary Behaviour (Okely et al., 2012a) and Physical Activity guidelines (Okely et al., 2012b) for school-aged children and adolescents. The two-hour limit, however, remained essentially unchanged in 2014 – “Limit use of electronic media for entertainment (e.g. television, seated electronic games and computer use) to no more than two hours a day – lower levels are associated with reduced health risks” (Okely et al., 2012a).

The concerns about obesity as a significant health outcome and sitting time as a health risk factor continued to influence the most recent updates of the Australian guidelines for young children (Australian Government Department of Health, 2017) and school-aged children and adolescents (Australian Government Department of Health, 2018), but new concepts also influenced the updates.

In 2016 the Canadian Society of Exercise Physiology (CSEP) shifted from ‘physical activity’ to ‘24-hour movement behaviour’ guidelines to reinforce that behaviours across the whole day matter, including not just moderate/vigorous physical activity but also sedentary time and sleep time (i.e. too little physical activity, too much sitting and too little sleep might all be bad for health) (Canadian Society of Exercise Physiology, 2016). This new terminology was adopted for the Australian 2017 and 2018 guidelines, and screen use and physical activity guidelines were recombined. Whilst the prior screen time limits were retained there was an explicit recognition of the importance of sitting as a risk factor with the addition of the term ‘sedentary’. Thus the 2017/2018 Australian guidelines stated:

- “For those aged 2 years, sedentary screen time should be no more than 1 hour; less is better.” (Australian Government Department of Health, 2017)
- “Sedentary recreational screen time should be limited to 2 hours per day” (Australian Government Department of Health, 2018)

So in Australia, screen time guidelines for children have been embedded in physical activity/movement guidelines initially because of concerns about childhood obesity as a public health issue and the connections between physical activity, screen time and obesity in children. Screen time limits for children continued to be justified through the emergence of sitting/sedentary behaviour as a potential independent determinant of health, separate from physical activity, and the connection between sitting/sedentary behaviour and screen time. Similar to other jurisdictions screen time limits were restricted to ‘recreational’ purposes (to exclude schooling and/or educational purposes), and sedentary guidelines focussed on screen use and not on other sedentary behaviours as screen use was often considered bad, whereas some other sedentary behaviours were considered good – such as reading from hard copy books (Okely et al., 2017). More explicitly than other jurisdictions, Australian guidelines are restricted to ‘sedentary’ screen time (to exclude whole body active electronic game time, which can be physically active rather than sedentary) (Straker & Abbott, 2007).

Table 1 provides a summary of the historical development of the Australian guidelines and highlights that screen time limits in Australia have remained relatively unchanged since 2004 (school-aged children and adolescents) and 2008 (young children).

Table 1: Summary of development of Australian Government Health Department screen use guidelines over time

	Young children (0-5y)	School-aged children (5-17y)
2004 (Australian Government Department of Health and Ageing, 2004a, 2004b)		“Children should not spend more than two hours a day using electronic media for entertainment (e.g. computer games, TV, Internet), particularly during daylight hours.”
2010 (Australian Government Department of Health and Aging, 2010)	<p>“Children younger than two years should not spend any time viewing television and other electronic media (DVDs, computer and other electronic games).</p> <p>“For children 2 to 5 years of age, sitting and watching television and the use of other electronic media (DVDs, computer and other electronic games) should be limited to less than one hour per day.”</p>	
2014 (Okely et al., 2012a)	Separate Sedentary Behaviour Guidelines provided	
	<p>Children aged less than 2 years: “Should not spend any time watching television or using other electronic media (DVDs, computer and other electronic games)”</p> <p>Children aged 2 to 5 years: “Sitting and watching television and the use of other electronic media (DVDs, computer and other electronic games) should be limited to less than one hour per day.”</p>	“Limit use of electronic media for entertainment to no more than two hours a day - lower levels are associated with reduced health risks”
2017 (Australian Government Department)	<p>Birth to 1 year: “Screen time is not recommended.”</p> <p>Toddlers 1-2 years: “For those aged 2 years, sedentary screen time should</p>	

of Health, 2017)	be no more than 1 hour; less is better” Preschoolers 3-5 years: “Sedentary screen time should be no more than 1 hour; less is better”	
2018 (Australian Government Department of Health, 2018)		“Sedentary recreational screen time should be limited to 2 hours per day”

As this is a global issue, what is happening overseas?

Concerns over the potential impacts of screen use on child health, well-being and development are global and, as indicated above, the guidelines developed outside Australia have influenced past Australian guidelines. Thus, a review of international trends provides important context for consideration of revised Australian and international guidelines. Table 2 provides a summary of the development of some key international guidelines over the past few decades.

The earliest screen use guidelines with wide recognition came from the American Academy of Paediatrics (AAP) around the turn of the century (American Academy of Pediatrics, 2001; American Academy of Pediatrics Committee on Public Education, 1999). Since then the AAP has released revisions in 2011 (for children under 2 years) (American Academy of Pediatrics Council on Communications and Media, 2011), 2013 (for children of any age and adolescents) (American Academy of Pediatrics Council on Communications and Media et al., 2013), and 2016 (separately for both young children and for children and adolescents) (American Academy of Pediatrics Council on Communications and Media, 2016; American Academy of Pediatrics Council on Communications and Media et al., 2016). The AAP guidelines include time limits, but also mention aspects of content (e.g. quality programming), purpose of use (e.g. video chat), and context (e.g. co-viewing) (American Academy of Pediatrics Council on Communications and Media, 2011, 2016; American Academy of Pediatrics Council on Communications and Media et al., 2016; American Academy of Pediatrics Council on Communications and Media et al., 2013).

While these guidelines have been widely cited, issues have been raised concerning the validity and scope of these guidelines. For example the AAP guidelines were based on expert consensus, so claims about the effects of screen use on health and development may be at risk of bias (e.g., mis-represent/over-estimate effects by selectively using evidence) (Elson et al., 2019). Similarly, as no systematic review or evidence grading was conducted the quality of evidence and strength of confidence in conclusions is unknown (Elson et al., 2019; National Health and Medical Research Council, 2000, 2009; World Health Organization.

Global Programme on Evidence for Health Policy, 2003). A further critique has been that guidelines for young children focussed strongly on minds to the exclusion of bodies (Straker et al., 2016).

In Canada, guidelines from the Canadian Paediatric Society for young children (Canadian Paediatric Society Digital Health Task Force, 2017) and school-aged children and adolescents (Canadian Paediatric Society Digital Health Task Force, 2019) (2019) were very similar to the AAP guidelines. These were developed following systematic literature searches, with a focus on contrasting the potential benefits for development or health compared to the potential risks. The guidance statements for clinicians and families focused on four principles: healthy management, meaningful screen use, positive modelling, and balanced, informed monitoring of screen time and behaviours. The guidelines for young children have recently been updated taking into account the impact of the COVID-19 pandemic on families, and emphasising that besides time, families can mitigate risks and enable benefits to physical and psychosocial health and development through mindful use (Canadian Paediatric Society Digital Health Task Force, 2022).

Other Canadian guidelines released by the CSEP in 2016 for children and youth (Canadian Society of Exercise Physiology, 2016) and in 2017 for young children (Canadian Society of Exercise Physiology, 2017). The CSEP adopted a development process which attempted to provide a stronger evidence base for the guidelines, including by the use of systematic reviews. However these reviews were updates of reviews in 2011 (school-aged children) (Tremblay et al., 2011) and 2012 (young children) and maintained the same narrow focus and did not acknowledge the limited capacity of existing epidemiological studies to inform guidelines. Despite the attempts to provide a stronger evidence base, the screen time guidelines were mostly unchanged suggesting that the thinking had not evolved concerning the information on screen use that guidelines might usefully provide, despite rapid changes in children's digital technology use and new evidence on the importance of aspects of screen use other than time.

The CSEP guidelines and process have been adopted by countries other than Australia, including South Africa (Sports Science Institute of South Africa, 2019) and New Zealand (New Zealand Ministry of Health, 2017a, 2017b) and were also used by the World Health Organisation (WHO) (World Health Organization, 2019, 2020a). Thus some of the limitations of the CSEP guidelines and development have been replicated in other guidelines. For example in Australia - the literature review conducted in 2017 (Okely et al., 2017) to update the CSEP literature review (Tremblay et al., 2012) focused only on total screen time, common screen types (time - TV/DVDs, video games) and dose (time - eg \leq 2 hrs). The narrow focus did not consider evidence on contextual aspects of screen time (co-viewing, content, timing, etc) despite these aspects being included in other guidance statements (USA, Canada, UK) (American Academy of Pediatrics Council on Communications and Media, 2016; American Academy of Pediatrics Council on Communications and Media et al., 2016; Canadian Society of Exercise Physiology, 2016, 2017; Royal College of Paediatrics and Child Health, 2019; Tremblay et al., 2011).

Further, the development process in Australia (and elsewhere) used what some have considered a flawed principle of not changing existing guidelines unless there was evidence to change them, rather than requiring sufficient evidence to support a guideline. This was despite the acknowledgment of scant

evidence on the now common mobile touch screen devices. This has resulted in guidelines retaining recommendations established around the turn of the century in USA, when the digital environment for children was very different.

Recently international guidelines have been released by the WHO and these provide useful insight into the contemporary shifts in thinking about screen use guidelines. The WHO Guidelines on physical activity, sedentary behaviour and sleep for young children (under 5 years of age) released in 2019 (World Health Organization, 2019) were underpinned by, and included updates of, the CESP and Australian systematic reviews (Okely et al., 2017; Tremblay et al., 2011). The WHO young children guideline development group included the guideline development leads from Canada, Australia and South Africa.

However the subsequent 2020 WHO Guidelines on Physical Activity and Sedentary Behaviour for school-aged children (6-17y) (2020) (World Health Organization, 2020a) were developed by a different group of researchers, and used a somewhat different approach, although they also conducted a literature review (World Health Organization, 2020b). This development group concluded that there was insufficient evidence to support a dose limit for screen time, reflecting a growing recognition that the evidence was not as clear and supportive as previously presented. The group also used a process whereby prior recommendations were not retained unless there was adequate evidence. These guidelines therefore did NOT include a screen time limit.

This shift in thinking was clearly evident in what has been seen as a radical shift in the guidelines released slightly earlier by the UK Royal College of Paediatrics and Child Health. Despite political pressure to adopt traditional time based guidelines, the development group conducted an umbrella review (Stiglic & Viner, 2019) and concluded there was insufficient evidence to justify time limits. This was supported by sophisticated analysis examining the consistency and the size of effects of social media exposure on adolescent mental health (Orben & Przybylski, 2019), an issue of increasing community concern. The 2019 UK guidelines therefore did NOT include screen time limits, counter to the approach previously used by CSEP and Australia to retain the existing time limits unless there was evidence to change. (The voices of children were also prominent in the UK guideline development for the first time.) The impact of this change in approach was a substantial change in the guidance provided to families, encouraging them to assess whether screen use interfered with sleep or what the family wanted to do, and whether screen use was controlled and whether snacking during screen use was controlled.

Given these recent changes in guidelines in the UK, as well as WHO and US/AAP guidelines for school-aged children, that have moved away from simple time-based screen use guidelines it is timely for Australia and other countries to reflect on their own guidelines.

The historical development of screen use guidelines also needs to be considered in the context of technical and social changes in screen use. When screen time guidelines were first promulgated over two decades ago the nature of screen use was quite different to the current screen use sociotechnical system. At that time many children had access to television screens in one or more rooms of their home, and interaction with screens was typically limited to viewing broadcast programs at scheduled times or viewing pre-recorded videos. Later, console based electronic games enabled more cognitive and physical

interaction, with the development of whole-body active electronic games providing a non-sedentary type of screen use. Mobile touch screen devices such as tablet computers and smart phones extended the possibilities for the opportunities for screen use to be anywhere. Additionally, the development of content streaming and apps extending the opportunities for screen use to be anytime, and their intuitive interfaces requiring only simple motor and cognitive skills extending screen use opportunities to be for nearly anybody, including young children.

The contemporary screen use sociotechnical system in which children are now developing is very different to when the screen time guidelines were first developed. These changes in society, together with the changes in evidence and international guidelines approaches, suggest it would be worthwhile for Australia and other countries to reconsider on how guidelines could best support their communities.

Table 2: Summary of key international guidelines for children’s screen use. (Blue font represents guidelines related to screen time, grey font represents guidelines related to other aspects of screen use.)

	Young children (0-5y)	School-aged children (5-17y)
United States of America- American Academy of Pediatrics Guidelines		
1999 (American Academy of Pediatrics Committee on Public Education, 1999)	“Paediatricians should urge parents to avoid television viewing for children under the age of 2 years”	“Advice to parents should include the following: <ul style="list-style-type: none"> - Encouraging careful selection of programs to view - Coviewing and discussing content with children and adolescents - Teaching critical viewing skills - Limiting and focusing time spent with media”
2001 (American Academy of Pediatrics, 2001)	“Discourage television viewing for children under the age of 2.”	
	“Limit children’s total media time (with entertainment media) to no more than 1-2 hours of quality programming per day”	
	“...encourage more interactive activities that will promote proper brain development, such as talking, playing, singing and reading together”	
	“View television programs along with children and discuss the content”	
	“Remove television sets from children’s bedrooms”	

	<p>“Monitor the shows children and adolescents are viewing. Most programs should be informational, educational and non violent.”</p> <p>“Use controversial programming as a stepping-off point to initiate discussions about family values, violence, sex and sexuality, and drugs”</p>	
2011 (American Academy of Pediatrics Council on Communications and Media, 2011)	“... discourages media use by children younger than 2 years”	
2013 (American Academy of Pediatrics Council on Communications and Media et al., 2013)	“Discourage screen media exposure for children <2 years of age”	
	“Limit the total amount of total entertainment screen time to <1 to 2 hours per day”	
	“Coview TV, movies, and videos with children and teenagers, and use this as a way of discussing important family values”	
2016 (American Academy of Pediatrics Council on Communications and Media et al., 2016)	Encouraged use of a Family Media Plan to “Address what type of and how much media are used and what media behaviors are appropriate for each child or teenager, and for parents. Place consistent limits on hours per day of media use as well as types of media used”	
Canada- Canadian Paediatric Society		
2017 (Canadian Paediatric Society Digital Health Task Force, 2017)	<p>“Screen time for children younger than 2 years is not recommended.”</p> <p>“For children 2 to 5 years, limit routine or regular screen time to less than 1 hour per day.”</p> <p>“Be aware of content and prioritize educational, age-appropriate and interactive programming”</p>	

<p>2019 (Canadian Paediatric Society Digital Health Task Force, 2019)</p>		<p>“Make and regularly review or revise a Family Media Plan, including individualized time and content limits”</p> <p>“Prioritize screen activities that are educational, active, or social over those that are passive or unsocial”</p> <p>“encourage parents to review their own media habits, and plan time for alternative hobbies, outdoor play, and activities”</p> <p>“Monitor for signs of problematic screen use at any age, including the following: oppositional behaviour in response to screen time limits”</p>
<p>2022 (Canadian Paediatric Society Digital Health Task Force, 2022)</p>	<p>“Screen time for children younger than 2 years is not recommended apart from video-chatting with caring adult. There is no evidence to support introducing technology at an early age”</p> <p>“For children 2 to 5 years, limit routine or sedentary screen time to about 1 hour or less per day”</p> <p>“Ensure that sedentary screen time is not a routine part of child care for children younger than 5 years.”</p> <p>“Be present and engaged when screens are used and, whenever possible, co-view with children to model and encourage digital media literacy. Help children recognize and question advertising messages, stereotyping, and other content.”</p>	

	<p>“Be aware of content and prioritize educational, age - appropriate, and interactive programming. Encourage the use of screen devices for creative activities, such as drawing, over passive viewing.”</p>	
<p>Canada- Canadian Society for Exercise Physiology</p>		
<p>2012 (Tremblay et al., 2012; Tremblay et al., 2011)</p>	<p>“For those under 2 years, screen time (e.g. computer, electronic games) is not recommended.”</p> <p>“For children 2-4 years, screen time should be limited to under 1h per day; less is better.”</p>	<p>“Limiting recreational screen time to no more than 2 h per day – lower levels are associated with additional health benefits”</p>
<p>2017 (Canadian Society of Exercise Physiology, 2017)</p>	<p>Children <1 year old: “Screentime is not recommended”</p> <p>Children 1-2 years old: “For those younger than 2 sedentary screen time is not recommended. For those aged 2 years, sedentary screen time should be limited to 1 hour per day - less is better.”</p> <p>Children 3-4 years old: “Sedentary screen time should be limited to 1 hour per day- less is better”</p>	
<p>South Africa- Sports Science Institute of South Africa</p>		
<p>2019 (Sports Science Institute of South Africa, 2019)</p>	<p>< 1 year old: “NO screen time”</p> <p>Children 1 & 2 years old: “NO screen time for toddlers up to 24 months, < 1 hour of screen time for toddlers between 24 &36 months”</p>	<p>“< 2 hours of recreational screen time”</p>

	Children 3, 4 & 5 years old: “< 1 hour of screen time”	
	“Furthermore, children should be encouraged to do more energetic play, and age appropriate, interactive activities should be favoured”	
New Zealand- New Zealand Ministry of Health		
2017 (New Zealand Ministry of Health, 2017a, 2017b)	“Discourage screen time for under two year olds and limit screen time to less than one hour every day for children aged two years or older- less is best!”	“No more than 2 hours per day of recreational screen time”
United Kingdom- Royal College of Paediatrics and Child Health		
2019 (Royal College of Paediatrics and Child Health, 2019)	<p>“Because the effect of screen time depends so much on context, and the uncertain nature of the evidence, it is impossible to give comprehensive national guidance or limits. However, we think that families should examine their own screen time regime using the following questions as a guide”</p> <ul style="list-style-type: none"> • “Is screen time in your household controlled?” • “Does screen use interfere with what your family want to do?” • “Does screen use interfere with sleep?” • “Are you able to control snacking during screen time?” <p>If families are satisfied with their responses, they can be assured that they are likely doing as well as they can navigating the issue of screen use.</p>	
World Health Organization		
2019 (World Health Organization, 2019)	<p>Infants (<1 year): “Screen time is not recommended”</p> <p>Children aged 1-2 years: “For 1-year-olds, sedentary screen time (such as watching TV or videos, playing computer games) is not recommended. For those aged 2 years, sedentary screen time should be no more than 1 hour, less is better.”</p> <p>Children aged 3-4 years: “Sedentary screen time should be no more than 1 hour; less is better”</p>	
2020 (World Health)		Children and adolescents aged 5-17 years: “Children and adolescents should limit the

<p>Organization, 2020a)</p>		<p>time spent being sedentary, particularly the amount of recreational screen time. Strong recommendation, low certainty evidence.”</p>
<p>United Nations</p>		
<p>2021 (United Nations Committee on the Rights of Children, 2021)</p>	<p>“Meaningful access to digital technologies can support children to realize the full range of their civil, political, cultural, economic and social rights. However if digital inclusion is not achieved, existing inequalities are likely to increase, and new ones may arise.”</p> <p>“Opportunities provided by the digital environment play an increasingly crucial role in children’s development and may be vital for children’s life and survival, especially in situations of crisis.”</p> <p>“Training and advice on the appropriate use of digital devices should be given to parents, caregivers, educators and other relevant actors, taking into account the research on the effects of digital technologies on children’s development especially during the critical neurological growth spurts of early childhood and adolescence”.</p>	
	<p>“The use of digital devices should not be harmful, nor should it be a substitute for in-person interactions among children or between children and parents or caregivers. States and parties should pay specific attention to the effects of technology in the earliest years of life when brain plasticity is maximal and the social environment, in particular relationships with parents and caregivers, is crucial to shaping children’s cognitive, emotional and social development.”</p>	

Why should screen use have its own guidelines?

We propose that screen use should have its own guidelines that are separate from movement guidelines due to a number of reasons:

1) Enable adequate consideration of aspects of screen use other than time

The evidence suggests the impacts of screen use on children's health, well-being and development are related to more than just the time children spend interacting with screens.

Growing evidence suggests that the **content** that children engage with on screens may also be associated with developmental outcomes. For example, whether the content is child-directed or adult-directed may be associated with cognitive skills (Barr et al., 2010); whether the content is educational or non-educational may be associated with executive function (Huber et al., 2018), and whether the content is prosocial or violent may be associated with behaviour (Christakis et al., 2013) among young children.

Similarly, the **context** and **purpose** of screen use may also influence developmental outcomes in children. For example, whether the child is using a screen alone or co-viewing with an adult may be associated with their cognitive development (Guellai et al., 2022); whether co-viewing including verbal communication with a parent or not may be associated with the child's attention (Fidler et al., 2010) and whether video-chat interaction paired with a parent who provided modelling of attention, interest, and responsiveness or not may be associated with improved word learning and language acquisition in children (Troseth et al., 2018).

This evidence about the importance of aspects other than time has led to increasing calls to think beyond screen time (Barr et al., 2010; Granic et al., 2020).

Interestingly other national/international guidelines typically extend to mention a few aspects other than time (e.g. quality content, co-viewing context, video-chat), with the Australian guidelines being somewhat isolated with its focus solely on time. This focus on time is conceptually consistent with screen use being forced into a 24-hour time use composition framework. Thus guidelines based on 24-hour movement behaviours can't consider other aspects of the nature of screen use and be conceptually coherent.

2) Enable better guidance on how screen use can have a positive impact on child health and development

The current Australian guidelines view screen time as a 'toxic' (Royal College of Paediatrics and Child Health, 2019) exposure that should be minimised as much as possible. However, evidence suggests that screen use may be associated with positive health and developmental outcomes for children (Arabiat et al., 2022). For example, 'interactive' screen use may be associated with better receptive language

development and better executive function (Arabiati et al., 2022). Similarly, use of a maths app may be associated with better maths scores (Hassler Hallstedt et al., 2018) and playing prosocial video games may be associated with improved ability to cooperate, share, and maintain positive relationships outside of the game, and a tendency to maintain positive affective relationships, cooperation and sharing as well as empathy (Marsh et al., 2015; National Association for the Education of Young Children & Fred Rogers Center for Early Learning and Children's Media, 2012). Parent-child co-play may be associated with positive social development (Ewin et al., 2021). Further, a focus only on time doesn't allow for real discussion of the 'quality' of the experience and what it may or may not offer. Contemporary screen use offers important affordances that would otherwise not be possible for some children (e.g. a virtual visit to a museum, connection to family through video conferencing, access to experts).

Recognition of the potential positive outcomes associated with screen use is probably the reason other national guidelines provide some guidance on nature of use, including aspects of content, context and purpose, as mentioned above. In contrast the Australia guidelines are relatively silent on these other aspects known to be important.

The exception to this is that Australian and many other guidelines limit the recommendation to restricting use for "entertainment" purposes. However this is problematic as creating a clear distinction between education and entertainment use of screens may not be possible. Play is how young children in particular learn, connecting to understandings and theorisations of digital play (Arnott, 2016). Even for older children learning can be associated with play, including what children themselves view or determine as digital play, with this including their use of screens for interacting with peers via online gaming (Ewin et al., 2021; Mavoia et al., 2017).

Further, many apps for children may be labelled as education, but there is currently no consistent, or agreed upon, definition of what constitutes an educational app in the literature and by extension any evaluative mechanism for these labels (Hirsh-Pasek et al., 2015). Similarly, high quality content for children can be predicated on the motive of being primarily entertaining and yet contain strong educational opportunities (e.g. Bluey;) or vice versa, be predicated on being educational but be highly entertaining (e.g. Play School) (Giuffre, 2020).

3) Recognise the varying needs and vulnerabilities of different children

A universal time limit, whilst simple and brief, is unlikely to be appropriate for all children, including not only typically developing children but also children with atypical development, chronic conditions or disabilities (Holtz et al., 2018; Peñuelas-Calvo et al., 2022). For example, the use of tailored electronic games or "serious games" by children with chronic conditions has been shown to improve health and developmental outcomes such as improving attention and cognitive outcomes among children with ADHD (Peñuelas-Calvo et al., 2022) and promoting motor function and physical activity among children with cerebral palsy (Holtz et al., 2018). Assistive technology can also improve learning, behaviour, attention and communication in children with special needs (Parette & Stoner, 2008). Universal time limits without clear

distinctions have the effect of sending the message that all screen use is 'bad', which contradicts the use of evidence-based technology-assisted therapies to improve developmental and health outcomes among children with additional needs.

Separate guidelines would provide space to inform families about the range of issues they may wish to consider, to help empower them decide on what screen use is suitable for their family. This would also acknowledge the variety in family circumstances and needs, for example whether both parents are working full time.

4) Recognise rights of children growing up in a digital society

The UN has now declared that access to digital technologies is a right for children (United Nations Committee on the Rights of Children, 2021). The articulated rights include minimising potential harm including rights to data privacy and protection from discrimination, abuse, and economic exploitation. However rights also include rights to access digital technologies for leisure and play, as well as education. This balance of protection and access is not compatible with the current public health conceptualisation of screen time as 'toxic'.

The UN declaration also outlines expectations that nations provide guidance, education and legal structures to support these rights. Time-based guidelines focussed on sitting do not help inform development of rules, regulations and codes of practice to articulate societal expectations of how children interact with screens. For example regulations and codes of practice for social media platforms need to consider critical aspects of children's use of these platforms other than time.

5) Enable transdisciplinary guidelines

The current conflict between educational and health focussed guidelines has been highlighted (Straker et al., 2018). Educational guidance has focused on helping children be competent screen users and thus be able to be productive citizens participating in a digital world. For example, the Australian Early Years Learning Framework (Australian Government Department of Education Employment and Workplace Relations, 2009) states that children should be taught skills and techniques to use information technologies and encouraged to use technologies to access information and represent their ideas. In contrast the health guidance is focused on reducing physical and mental health risks and thus recommends minimising use. Such conflict does not help families and professionals working with families.

There have been rare attempts to provide guidelines focussed on the whole child. For example the Early Childhood Australia's "Statement on Young Children and Digital Technologies" (Edwards et al., 2018) utilised a multidisciplinary approach to develop practice guidance for early childhood educators that covers health and wellbeing, relationships, citizenship and play/pedagogy aspects.

6) Enable a neutral approach to screen use

Current health screen use guidelines focus on maximum time exposures, following the approach of risk reduction used to manage risks associated with exposure to chemical or biological toxins. This positions screen use as having the potential for only a negative impact on child health and development, despite this not being accurate (as discussed above). Separate guidelines for screen use would enable provision of information covering both the benefits and risks.

A current example of more neutral health guidelines is the Australian dietary guidelines that don't focus on the time taken to eat or total kilojoules consumed, but rather what foods help with health and development and what foods may have a negative impact. For example, “*Enjoy a wide variety of nutritious foods from these five groups every day:...*” and “*Limit intake of foods containing saturated fat, added salt, added sugars and alcohol...*” (Australian Government Department of Health and Aged Care & Australian Government National Health and Medical Research Council, 2022)

A further example of a more neutral way to support families is how Australian society deals with the risks and benefits for children using the beach (Straker et al., 2022). The potential benefits for children in terms of activity, social engagement, learning about nature are recognised and a range of mechanism put in place to manage potential risks including education, skills and supervision.

Providing screen use guidelines in a more neutral manner would support parents in their decision making and empower them, as opposed to exacerbating parental guilt and stress.

7) Enable the clear separation of sitting time from screen use

Sitting time isn't really memorable in the way a child doing vigorous activity would be, so sitting time was previously estimated by using parental reports of TV viewing time as a proxy measure. The last couple of decades have seen the development of objective measures of sedentary time (and physical activity time) (Straker et al., 2014), so there is now less need to rely on parent- or self- reports of screen time.

Interestingly, the fairly consistent associations observed between reports of children's screen time and child health and development outcomes has not been observed in studies using objective measures of sedentary behaviour. For example, from the review that informed the development of the CESP guidelines for young children, associations between screen time, particularly TV viewing time, and indicators of adiposity, were primarily reported to be unfavourable (TV = 20 studies) or null (TV = 24 studies; favourable = 2 studies). However, associations between objectively measured total sedentary time and indicators of adiposity and were predominantly null (unfavourable = 1 study, null = 12 studies) (Poitras et al., 2017). Likewise, from the review that informed the development of the CESP guidelines for children and youth (n = 200 studies) higher durations/frequencies of screen time (particularly TV viewing time) was associated with unfavourable body composition, clustered cardiometabolic risk scores, unfavourable behavioural conduct/pro-social behaviour, and lower fitness (Carson et al., 2016). However, a consistent association between accelerometer measured sedentary behaviour was not observed with any outcome (n = 35

studies) (Carson et al., 2016). The review concluded that current evidence suggests screen time has a bigger impact on health compared with overall sedentary time (Carson et al., 2016). Findings from another systematic review with meta-analyses examining associations between accelerometer measured sedentary behaviour and health outcomes in 2-18 year-olds (n = 88 studies) were consistent, concluding that there is limited available evidence that total sedentary behaviour is associated with health outcomes in children and adolescents (Cliff et al., 2016).

This evidence suggests that parent report of screen time should NOT be used as a proxy measure of sitting time. There is also the broader implication that conceptualising screen use as only a sedentary behaviour is very limiting and misses multifaceted exposure aspects that have the potential to benefit and harm child development (see points 1 and 2) (Straker et al., 2016). These findings have also led to conjecture that screen time might actually be a marker of (or correlated with) other individual/family factors that increase vulnerability of children to poorer outcomes (Ekelund, 2012), rather than the cause of the poor outcomes.

8) Encourage better measures of screen use

The increasing complexity of the sociotechnical system of screen use creates difficulties for creating strong evidence based on parent- or self- reports. At the end of the last century the limited number of devices and broadcasts of a limited number of programs that came in handy half hour/hour chunks made it fairly easy for parents to report on their child's usual viewing habits. But the contemporary system involves multiple and sometimes mobile screens usable anywhere by even very young children, with content available anytime, and a wide variety of activities to do on a screen (including school activities) making it very difficult for parents to accurately report their child's screen use time, let alone other aspects of the nature of engagement. Further, parent reporting creates considerable burden on parents and is known to be biased and inaccurate (LeBlanc et al., 2017).

Sitting time can now be measured more objectively using wearable activity monitors, placing minimal burden on the child and parent and providing detailed data on the amount and pattern of children's sitting. Unfortunately similar objective and low burden methods for measuring the amount and nature of screen use by children are not currently available, despite efforts to develop systems using data such as device data traffic and wearable camera images (Thomas et al., 2022).

Guidelines which recognise that other aspects of screen use are important will encourage researchers to develop better methods to create evidence concerning aspects of screen use other than simply time.

9) Enable moderate/vigorous physical activity and sleep guidelines to be better received by the community

The inclusion of the contentious issue of screen time in 24-hour movement guidelines detracts from the community paying attention to moderate/vigorous activity and sleep guidelines. This is important as there is strong evidence that activity and sleep have a clear impact on child health and development.

The novel aspect of the latest Australian guidelines (Australian Government Department of Health, 2017, 2018) was considering children's 24-hour day and so incorporated sleep for the first time. Sleep is well established as a very important aspect for child health and development. For example, longer sleep duration and improved sleep quality in preschool and school aged children is associated with improved cognition, psychological health and quality of life outcomes (Matricciani et al., 2019). Similarly, several systematic reviews have demonstrated cross sectional and longitudinal associations between poor sleep duration and childhood obesity (Matricciani et al., 2019). However this important new message about sleep was largely overlooked by the Australian community as the general reaction was that the screen time guidelines were out of touch with reality so the overall guidance as a whole was somewhat discounted. Thus the potential positive impact on child health and development from the inclusion of sleep guidelines was not achieved.

The community focus on an unrealistic and unhelpful screen time guideline also meant the guidance on moderate/vigorous physical activity was mainly overlooked also. Like sleep, there is very strong evidence of the potential positive impact of moderate/vigorous physical activity (Poitras et al., 2017). For example, more moderate/vigorous physical activity is associated with better body composition, cardiometabolic health, aerobic fitness, muscular strength and endurance and bone health (Poitras et al., 2017). Similarly, participation in moderate/vigorous physical activity promotes motor skill development as well as reduced psychological distress, improved self-esteem and quality of life (Poitras et al., 2017). So again, the potential positive impact on child health and development from the inclusion of moderate/vigorous physical activity guidelines is unlikely to be achieved without being separated from screen use guidelines.

Time to re-evaluate the approach to screen use guidelines in Australia (and internationally)

In summary, we see at least nine reasons why Australia, and other countries, should move away from simple time based screen use guidelines embedded in 'movement' guidelines to have separate screen use guidelines providing more useful information to families across a broader range of aspects.

The goal of the current Australian screen use guidelines was to fit within the paradigm of 24 hour movement behaviours. For screen guidance to be helpful and relevant to families, health and education professionals, service organisations, policy makers, and technology designers, the goal needs to change.

Given the nine reasons presented above, and the recent changes in evidence and international thinking, we recommend that Australia develops broader screen use guidelines around a goal of providing children, and adults influencing children’s lives, with more useful information. These new guidelines should be developed with consideration of a number of principles, summarised in Table 3, and should:

- cover multiple aspects of screen use likely to be important for child health and development,
- provide advice around aspects to limit given likely maleficent effects but also providing advice around aspects to encourage which are likely to have a beneficial effect, and
- present information in a manner which empowers guideline users to make decisions in the best interests of children.

In conclusion, we recommend Australia embark on a participative and honest process to develop stand-alone screen use guidelines based on these 3 principles, to support children growing up in a digital world.

Table 3: Suggested principles for developing better screen use guidelines

<ul style="list-style-type: none"> • Separate guidelines for screen use from movement and sleep guidelines • Approach screen use as neither inherently good or bad – but as an important part of life for most children and a recognised right of children in a digital world • Aim to help children learn to be competent users to gain the benefits whilst minimising risks • Consider broader aspects of screen use than just time • Consider broad aspects of child health, wellbeing and development and search for and include evidence of aspects other than just time that might make screen use beneficial or harmful for development • Draw on a broader base of primary studies to include evidence from qualitative, laboratory and trial studies in addition to epidemiological studies • Acknowledge limited evidence and contentious evidence • Involve end users from the outset – parents, professionals working with children, organisations providing services for children, companies providing technology used by children, and children

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