

DEPARTMENT OF EDUCATION

Impact of mobile digital devices in schools

Centre for Education Statistics and Evaluation



Introduction

Many teachers, parents and school communities have been expressing increasing concern over the use of mobile digital devices¹ in schools and the impact on student wellbeing (see, for example, Bia 2018; Baluch 2018; Moore 2018). Concerns about mobile digital device use and student wellbeing relate to a variety of issues including cyberbullying, access to inappropriate material, social interaction, and distraction from school work. In May 2018, Finnish education expert Pasi Sahlberg claimed smartphones were distracting students from reading, school-related work, physical activity, and high-quality sleep. He has also speculated that mobile phone-related distraction is the main reason for Australia's slide down the PISA rankings (Baker 2018).

In June 2018, the NSW Government announced a review of mobile digital device use in NSW schools to address these concerns. The review is looking at the evidence related to the benefits and risks of non-educational mobile digital devices in schools for children and young people; and approaches and practices to support students' use of such devices in safe, responsible, and informed ways. This paper, which forms part of the review process, explores the evidence behind mobile digital device use in schools, the impacts on student wellbeing, and responses to mobile digital device use in schools.

Background

The use and ownership of mobile digital devices has expanded rapidly since the first mass-produced smartphone, the iPhone, was introduced in 2007, the first mass-produced tablet, the iPad, was introduced in 2010 and the first internet-enabled smartwatch was mass-produced in 2015. Today 9 out of 10 Australian teens aged 14 to 17 own a smartphone (Roy Morgan 2016) and 67% of primary school-aged children own their own mobile screen-based device, according to the Australian Child Health Poll 2017 (The Royal Children's Hospital Melbourne 2017). A 2015 survey of 2,658 US children aged 8 to 18 years old showed that mobile devices account for 41% of screen time among tweens (8-12 year olds) and 46% among teens (13-18 year olds). Among teens surveyed for the US study, 39% of time spent on computers, tablets and smartphones in any given day is devoted to passive consumption (watching TV or videos, reading or listening to music), 25% is interactive consumption (playing games and browsing the internet) and 3% of time is creating content (Common Sense 2015). An Australian study of 156 teens conducted by the Australian Psychological Society, found that teens predominantly use their mobile phones to access apps (89.7%), to browse the internet (88.5%) and to text (88.5%), and 79.8% use their phones to make phone calls. Thirty five percent of teens in this study reported finding the thought of being without their mobile phone distressing (Australian Psychological Society 2017).



Scope of the literature review

This literature review only looks at mobile digital device use in schools and the impact on student wellbeing. It does not look at mobile phone use out of school, although it acknowledges that mobile digital device use and the issues associated with mobile digital device use, occur around the clock and not only at school. It also does not consider educational uses of mobile digital devices in school.

The literature review similarly does not look specifically at mobile digital device use in Schools for Specific Purposes (SSPs) or central schools (K-12 schools). This is because there is scant research specifically looking at mobile digital device use in these school settings.

The parameters of this paper have been determined in accordance with the terms of reference of the 2018 NSW government review of mobile digital device use in schools.

¹ For the purposes of this review, 'mobile digital device' refers to a hand-held electronic device that can receive, store, process and send digital information. This is the definition used by the NSW government review of mobile digital device use in schools. This literature review also considers use of personal tablets where relevant.

Use of mobile digital technology in schools has become increasingly prevalent both in Australia (Thomson 2015) and internationally (OECD 2015). Traditionally in schools there has been a focus on institutionally-provided 'shared' forms of technology use, i.e. technology that has been provided through the school's centralised system. More recently, however, there has been a shift towards individually-owned online and networked devices such as smartphones, smartwatches and personal tablets (Selwyn et al. 2017). In NSW, student Bring Your Own Device (BYOD) policies in schools are common in both government and non-government schools. These policies encourage the use of technology for educational purposes. The NSW Department of Education BYOD policy states that individual schools, in consultation with their communities, can allow students to bring their own personal mobile electronic devices to school for the purpose of learning. According to this policy, 'the use of personal mobile devices at school will deepen learning, will be personalised and student-centred, and will meet the expectations of teachers, students, parents and caregivers' (NSW Department of Education 2018). This policy also includes a set of guidelines which states 'acceptable use of devices', and outlines the terms of the 'student agreement' which must be signed before any student can connect to the department's WiFi (NSW Department of Education 2018).

While schools often employ educational technology as a learning tool, there is growing public conversation about the effect of non-educational uses of mobile digital devices on student wellbeing. In a Growing up Digital Alberta survey (The Alberta Teachers' Association 2015) of 2,200 teachers and principals in Alberta, Canada, two-thirds of teachers said they felt that digital technology was a growing distraction in class for students, and more than half said that they themselves felt distracted. More than three-quarters of teachers surveyed also said that they felt students were having more difficulty focusing in school, and about two-thirds of educators said more students were coming to school sleepy. Most teachers also said they had seen a dramatic change in emotional, social, behavioural and cognitive challenges in students during the last three to five years preceding the study. Teachers in a Kentucky and Tennessee study of 1,121 teachers (Thomas et al. 2014) were worried about cheating, access to inappropriate material on the internet, cyberbullying and disruptions when mobile phones were used in the classroom. Similar views have been expressed in the media and online forums. For instance an editorial in *The Guardian* in June 2018, raised three types of 'damage' mobile phones in schools could cause: students getting 'carried away' by the latest games and apps; bullying and 'cliquishness'; and interruption and 'half-attention' promoted by mobile phones (The Guardian 2018). Similarly, *The Sydney Morning Herald* led with a headline in September 2018 that said that mobile phones in schools are 'distracting and addictive' (Taylor 2018).

Research limitations

Evidence into the benefits and risks of non-educational use of mobile digital devices on student wellbeing is limited. One of the reasons for this is the rate of rapid technological change. Since 2007, when smartphones were first mass-produced, there has been a rapid (and evolving) uptake of this new technology. It is difficult for researchers to undertake quality research in a context that is constantly evolving and changing. It is also difficult to separate out the impact of technology from other variables, with findings of correlation rather than causality common.

The research literature also lacks consistency of definition and fields of reference. For example, the research often does not distinguish between types of mobile digital devices or between types of use – e.g. non-educational or educational use. It also frequently does not distinguish between 'in-school' use and 'out of school' use. Moreover much of the research, particularly that on distraction, focuses on university students, rather than school-aged students.

It has been widely acknowledged amongst researchers that there is a need for more longitudinal and representative studies on the impacts of mobile phone use on school students, and that a lack of consistent studies in this area is problematic (UNICEF 2017; Rosen et al. 2013; Beland & Murphy 2016).

Schools and school systems in Australia have different policies in place for the use of mobile phones and other digital devices in schools, from banning mobile digital devices to using them as learning devices (see, for example, Russell 2018²). Internationally there have also been different responses to mobile digital devices in schools. In France, smartphones, tablets and smartwatches were banned in all schools for students aged 15 and under in July 2018. This ban was put in place as a result of concerns about public health and children not playing during breaks anymore. The ban also aims to help children focus better on lessons, better socialise and reduce social media use, and reduce online bullying, theft and violence in schools (Hudson 2018; SBS 2018) In New York, mobile phones were banned in public schools in 2005 but this ban was overturned in 2015 in response to concerns around safety (a belief that students should be able to text their parents if need be) and equity issues (the ban was seen to be more rigidly enforced at schools with metal detectors in poor neighbourhoods) (Allen 2015). By contrast, in the Australian Capital Territory, the government has made concerted efforts to integrate mobile phones into school life, which teachers describe as an attempt to 'future proof' students and help them engage with their learning (see, for example, Evans 2018).

2 This article looks at two Australian schools, one in NSW and one in Victoria, and their different responses to mobile digital device use in schools.



Use and impact of mobile digital devices on student wellbeing in schools

Student wellbeing can be defined as 'a sustainable state of positive mood and attitude, resilience and satisfaction with self, relationships and experiences at school' (Australian Catholic University & Erebus International 2008, p. 5). Mobile digital device use in schools has the potential to disrupt student wellbeing and affect the education of the 'whole child'. In particular, concerns have been raised by teachers, parents, educators and the media about the impact of non-educational mobile digital device use on interactions between students, cyberbullying, exposure to harmful material, mental and physical health and disruption of school work.

Since the Melbourne Declaration on Education was signed in 2008, the remit of schools has broadened from achievement of academic outcomes, to include education of the 'whole child'. Ministers collectively declared that:

Schools play a vital role in promoting the intellectual, physical, social, emotional, moral, spiritual and aesthetic development and wellbeing of young Australians, and in ensuring the nation's ongoing economic prosperity and social cohesion (Ministerial Council on Education, Employment, Training and Youth Affairs 2008, p.4).

Higher levels of wellbeing at school are associated with positive outcomes, including better educational outcomes (Graziano et al. 2007; Gumora & Arsenio 2002), better mental health (Hayes et al. 2006; Kashdan et al. 2006), and a more pro-social, responsible lifestyle (Sancassiani et al. 2015).

Cyberbullying

Cyberbullying is the use of technology to bully a person or group with the intent to hurt them socially, psychologically or even physically (Office of the eSafety Commissioner n.d.). With increased access to, and use of, information and communication technologies, such as mobile digital devices, there is an increased risk of students being cyberbullied and cyberbullying others (Vaillancourt et al. 2017). Cyberbullying can include: abusive texts and emails; hurtful messages, images or video; imitating others online; excluding others online and humiliating others online; and nasty online gossip and chat (Office of the eSafety Commissioner, n.d.). Cyberbullying is deeply connected to offline bullying (Field 2018) and, like the latter, is fundamentally the effect of power dynamics and social relations. It is 'generally seen as a new form of an old problem, rather than as a consequence of internet use itself' (NSW Commission for Children and Young People 2014, p. 1).

The exact number of Australian children who experience cyberbullying remains uncertain, with estimates varying widely depending on definitions and survey assumptions (NSW Parliamentary Research Service 2016). Data from the *Tell Them From Me* (TTFM) student engagement survey³ shows that in 2018, around 15% of NSW government secondary school students surveyed reported having experienced cyberbullying one or more times in the past four weeks. This compares to 31% who said they had been verbally bullied, and 17% who said they had been physically bullied. The rates of cyberbullying reported by NSW government primary school students (Years 4 to 6) are lower than those reported by secondary school students. In 2018, 8% of primary schools students surveyed reported having experienced cyberbullying more than once in the past four weeks, compared to 35% who reported they had been verbally bullied, and 21% who said they had been physically bullied (NSW Department of Education, unpublished data).

³ The *Tell Them From Me* (TTFM) student survey is an online student engagement survey offered annually by the NSW Department of Education to NSW public schools. The survey captures a range of academic and non-academic outcomes, including socio-emotional wellbeing and behavioural engagement. In 2018, over 300,000 secondary students in NSW government schools completed the student survey and over 120,000 primary school students in NSW government schools completed the survey.

Extensive research demonstrates that bullying (including cyberbullying) in school can have serious short-term and long-term consequences, both for students who bully and for those who are bullied (Centre for Education Statistics and Evaluation 2017). Negative consequences of bullying include feeling unsafe at school, psychological distress, lower levels of academic achievement and lower levels of school attendance (Centre for Education Statistics and Evaluation 2017). Bottino et al (2015), in their systematic review of cyberbullying and adolescent mental health, found that experiences of traditional bullying were associated with students who cyberbully others and students who experience cyberbullying; and that both students who cyberbully others and students who experience cyberbullying had more emotional and psychosomatic problems, social difficulties and did not feel safe and cared for in school. Cyberbullying was also associated with moderate to severe depressive symptoms, substance use, suicidal ideation and suicide attempts. Patchin and Hinduja (2013; Hinduja and Patchin 2018) also find that both young people who cyberbully others and young people who experience cyberbullying report lower self-esteem, greater participation in other problematic offline behaviour and higher rates of suicidal thoughts and suicide. Field (2018) in her narrative review of cyberbullying, found the characteristics most frequently cited for students who were cyberbullied, were their frequent use of the internet, depression and being bullied in person. The characteristics most commonly noted for students who cyberbullied were frequent internet use, having issues at school, knowing the victim and being themselves victims of cyberbullying. Bottino et al (2015) in their systematic review, similarly found that daily use of three or more hours of internet, web camera, text messages, posting personal information and harassing others online were associated with cyberbullying.

It is difficult to determine the extent to which mobile device use does (or does not) influence cyberbullying and whether or not mobile device use in schools contributes to these outcomes. This is because of the nature of cyberbullying itself, which is often ongoing and non-stop. It can occur at school but also continue outside of school hours, at nights and on weekends and its impacts can be felt at any time. According to Australian data from 2014, around half of 14-17 year olds access the internet through mobile phones (Australian Information Industry Association 2014, p. 2). A survey into student bullying (Australian Communications and Media Authority 2013) showed that of students who reported bullying online, the internet was identified as the medium most commonly used to convey this behaviour, with email and text messages the next most common media used. The dissemination of electronic images was the least common. Studies which look at student use of the internet at schools are divided over whether internet use at school increases cyberbullying. For example, a large survey of 13,864 students from 150 high schools in Taiwan found that 'internet use during the timeframe 10am to 2pm [was] the most significant predictor of cyber-bullying behaviour, suggesting that cyberbullying occurred most frequently during school hours' (Chao & Yu 2017, p. 17). On the other hand, a smaller

Australian survey of approximately 600 students aged 11 to 16 years found that, unlike traditional forms of bullying, cyberbullying is experienced more out of school than in school (Smith et al. 2008). The degree to which mobile digital devices in schools may affect rates of cyberbullying is unclear from the available research.

Exposure to inappropriate material

With the growth in internet access, the ability for young people to access 'inappropriate material' has increased as has the potential for interaction with strangers online and online predators. Inappropriate material may include 'adult' content (such as pornography) or other content that could be potentially damaging for children and young people, such as websites which encourage self-harm or eating disorders. An online poll of 2,200 Australian parents about health and safety issues facing Australian children today, found that online safety was parents' biggest concern, with 95% of parents citing online safety as 'very important' to them. Online safety ranked ahead of illegal drugs, smoking and alcohol use (Life Education 2018).

One of the specific concerns relating to inappropriate material and use of mobile digital devices by students in schools, is 'sexting'⁴. Sexting is the 'sending or posting of sexually suggestive text messages and images, including nude or semi-nude photographs, via mobiles or over the internet' (Cooper et al. 2016, p. 2). The National Survey of Australian Secondary Students and Sexual Health 2013⁵ (Mitchell et al 2014) revealed that 45% of all students reported having received a 'sexually explicit nude or nearly nude photo or video', with over 54% having received a 'sexually explicit written text message'. Over 45% reported sending a sexually explicit written text message, and 27% sent a sexually explicit nude or nearly nude photo or video of themselves. Lee et al (2015) in their study of Australian young people aged 13-25, found that while the receiving of sexually suggestive pictures by young people can have serious consequences such as embarrassment, humiliation, paedophilia and cyberbullying, young people themselves rarely reported these issues. They found that the majority of young people who engage in sexting do so with a romantic partner in a climate of perceived mutual trust and this trust is not regularly broken. Klettke et al (2014) also found that, contrary to popular belief, young adults are more likely to engage in sexting than teenagers, and, similarly to Lee et al (2015), found that sexting may be a common behaviour in established young adult relationships, as opposed to necessarily being problematic behaviour. They found that only 10% of adolescents aged 10-19 had sent a sext and only 16% had received one. This is opposed to young people aged 18-30, for whom the figures were 52% and 57% respectively.

⁴ Sexting can also be known as 'image-based abuse' when it consists of images or videos only.

⁵ The survey involved a sample of over 2,000 Year 10, 11 and 12 students from 415 schools across government, independent and Catholic school sectors in every jurisdiction in Australia.



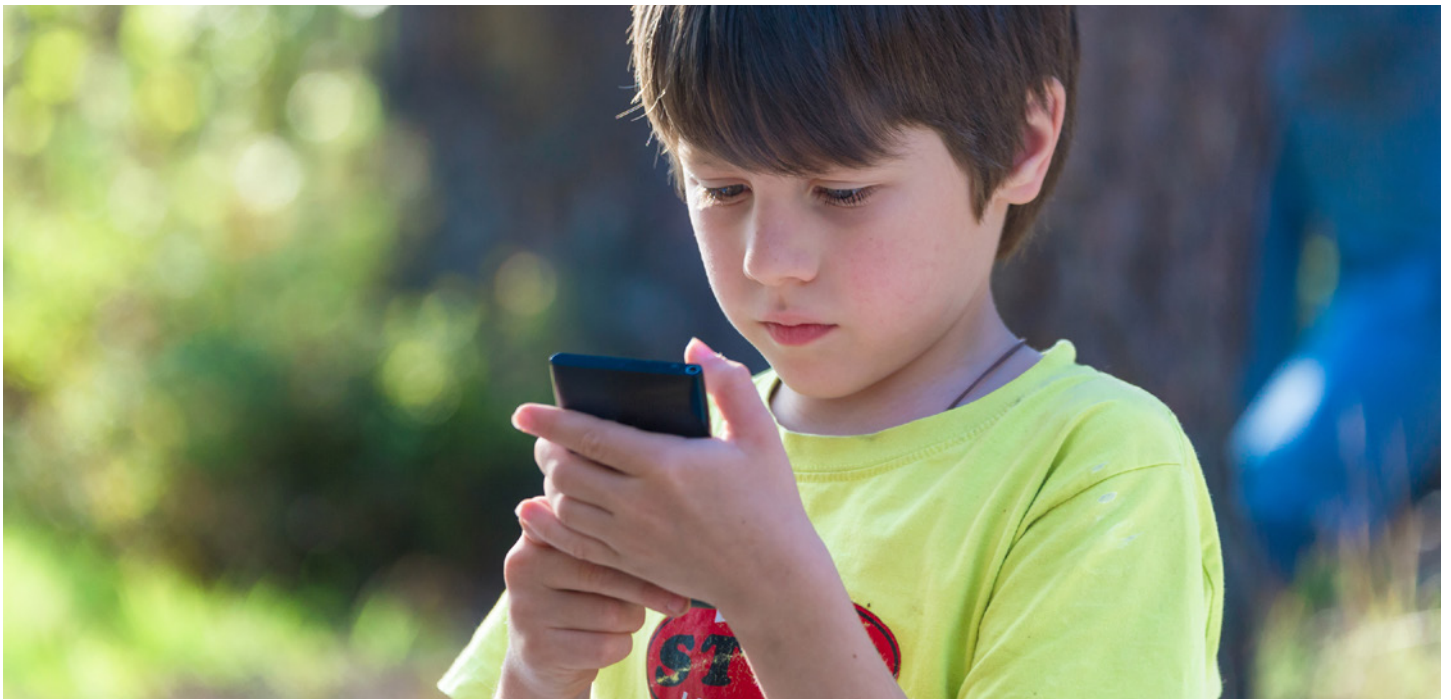
Social interaction

Concerns of parents, the media and educators that the increased use of mobile digital devices in schools is limiting face-to-face social interaction among students, particularly during recess and lunchtime, were one cited reason for France's decision to ban smartphones in schools. In Australia, individual schools have also banned mobile phones due to concerns about the effect mobile digital devices are having on meaningful social interactions (see, for example, McNeillage 2013⁶). Research indicates that, in contrast to previous generations, teenagers in the 2010s spend more time on electronic communication than in-person interaction (Twenge et al 2017). According to US research from the Pew Research Center, 82% of all adults say that when people use their mobile phones at social gatherings, it at least occasionally hurts the conversation and atmosphere of the gathering (Rainie & Zickuhr, 2015). US research also shows that 72% of parents feel their teenager is at least somewhat distracted by their mobile phone when they are trying to have a conversation with them (Jiang 2018). On the other hand, 33% of Americans say that when people use their phones at social gatherings it at least occasionally contributes to the conversation and helps the atmosphere of the gathering (Rainie & Zickuhr, 2015).

Several studies from the field of psychology make a link between decreased social interaction as a result of mobile digital device use and lower levels of psychological wellbeing (see, for example, Twenge et al 2018, Rotondi 2017 etc). Twenge et al (2018) in a study of 1.1 million American Year 8, 10 and 12 students from 1991 to 2016, found that students who spent more time on electronic communication and screens (e.g. social media, the internet, texting, gaming) and less time on non-screen activities (e.g. in-person social interaction, sports/exercise, homework, attending religious services) had lower levels of psychological wellbeing. According to this study, students who spent only a small amount of time on electronic communication (defined as a few hours a week) were the happiest.

Conversely, other research has shown that young people use mobile digital devices to support and sustain important family and peer relationships. For example, Cooper (2017, p 13) notes that the ubiquitous use of smartphones by young adults is 'a vehicle for self-expression and collective identity often through the use of text messaging and social media'. She goes on to state that most (American) young people have never known life without a smartphone, and their use is becoming increasingly important for creating and maintaining relationships among peers, and between romantic partners. Similarly Collin et al (2011) in their literature review of the benefits of social networking services, note that internet use (including email, instant messaging and social networking) can address barriers young people may face in forming and maintaining positive social relationships – for example, for some young people, particularly those who are marginalised or otherwise socially isolated, online relationships provided a significant, and sometimes the only, opportunity for such socialisation. Collin et al (2011) also note the important role social networking services play in young people's development

⁶ This article cites a school that has banned mobile phones due to the perception that they are limiting face-to-face interaction among students.



and exploration of intimate relationships; and the role they can play to facilitate a sense of connectedness, community and belonging.

Mental health

Another concern with the use of mobile digital devices in schools is whether their use leads to overall poorer mental health outcomes in young people. A recent study by Twenge et al (2017) using population data found an association between growing rates of 'new media' (electronic device use and social media) screen time and a rise in mental health issues⁷. The study examined the results of two nationally representative surveys of over 506,000 US teenagers in Years 8 to 12. The surveys asked participants to respond to questions about depressive and suicidal symptoms, as well as their use of electronic devices⁸ and social media. It found that young people who spent more time on new media were more likely to report mental health issues including depression, suicide, and suicide-related outcomes than young people who spent more time on non-screen activities such as in-person social interaction, sports and homework. The authors found that adolescents who used electronic devices for five or more hours a day were 66% more likely to have at least one suicide-related outcome than those who only used devices for one hour a day. It is important to note that this study makes correlational findings, and cannot determine causality.

A study by Przybylski and Weinstein (2017) showed that the timing and nature of young people's smartphone use appears to be a factor in mental health. The study surveyed more than 120,000 15-year-olds in the UK, who were asked to complete a 14-item self-report instrument to measure their happiness, life satisfaction, psychological functioning and social functioning. It also asked four questions about their engagement with different kinds of digital activities⁹ during their free time. The researchers found that 'moderate' screen engagement (defined as up to one hour and 57 minutes on weekdays, and four hours and ten minutes on weekend days) was 'unlikely to present a material risk to mental well-being ... although high levels of engagement may have a measurable, albeit small, negative influence' (p. 211). The study did indicate that smartphone use on weekends displaced 'other, more enriching activities essential for adolescents to experience mental wellbeing', but this was not the case for smartphone use on weekdays (p. 211).

Alternatively, there is an argument that mobile digital devices can improve mental health through allowing young people access to online mental health resources and mental health hotlines (see, for example, Black Dog Institute 2018). It can be particularly important to address these concerns in school, given that in Australia, approximately one in seven children experience mental health difficulties and about half of all serious mental health problems in adulthood begin before the age of 14 years (KidsMatter n.d.)). The Black Dog Institute has found that e-mental health services effectively complement traditional face-to-face mental health services (Black Dog Institute 2018). There is little research that directly addresses the impact of digital device use on mental health at school, but Firth et al (2017) in the first meta-analysis of smartphone-based psychological interventions for anxiety, found that there is preliminary evidence that psychological interventions delivered via smartphone devices can reduce symptoms of anxiety (Firth et al. 2017).

⁷ Some researchers dispute Twenge et al's findings, arguing that research from population data as opposed to research with young people themselves is not representative (see, for example, Amanda Third [forthcoming]).

⁸ The study did not distinguish between different types of digital devices, such as Xbox, PlayStation, tablets and smartphones.

⁹ Defined in this paper as watching films and other media (e.g TV programs), playing games on computers and consoles, using computers (e.g. internet and email), and using smartphones (e.g. social networking, chatting online).

Physical health

Another wellbeing concern often raised in relation to mobile digital device use, is the impact mobile digital device use has on physical health. A UK study of 678 students aged 10 to 15 surveyed participants on their daily sedentary time and digital device use, and found that using social media was associated with higher sedentary time among boys and girls, and low fitness in girls (Sandercock et al. 2016). The presence of iPads at recess has also been shown to have a negative effect on physical activity behaviour in children (Kobak et al. 2018). Kobak et al (2018) assessed children's physical and sedentary (i.e. sitting) activity with and without the presence of a mobile internet-connected tablet and found that children significantly reduced their average physical activity intensity and increased their sedentary behaviour with the iPad present. Csibi et al (2016) in a study of 256 school-aged children aged between 9-16 years found that children who reported high smartphone use reported significantly lower involvement in physical activity compared to children who used their smartphone less.

There are also arguments positing that mobile digital devices such as mobile phones can be used as a tool to increase physical health, although the data for this is limited to date. Lubans et al (2014) evaluated the effects of a multi-component, school-based intervention incorporating smartphone technology for adolescent boys, known as Active Teen Leaders Avoiding Screenshot (ATLAS). A cluster randomised trial was undertaken in 14 secondary schools in NSW with boys aged 12-14. The intervention did not actually increase objectively measured physical activity among boys, but it did decrease screentime and consumption of sweetened beverages.

Distraction from school work

A common argument that is raised in relation to digital device use in schools, is that it distracts students from their work (see, for example, Pasi Sahlberg in Baker 2018). Teachers in the Alberta study found that distraction was a growing issue in regards to digital technology not only for students, but also for teachers (The Alberta Teachers Association 2015).

In a frequently quoted longitudinal study involving students in 91 UK high schools, Beland and Murphy (2015) found that highly multipurpose technology, such as mobile phones, can have a negative impact on productivity through distraction, but not for all students. This study combined survey data on mobile phone policies in schools in four cities in England with data on student performance between 2001 and 2011. It found that there was an improvement in student performance of 6.41% of a standard deviation in schools that banned mobile phones, but banning mobile phones only improved outcomes for low-achieving students (14.23% of a standard deviation). It had no significant impact on high achievers. Studies on university students have also similarly found that the use of mobile digital devices in class for non-academic purposes can impact negatively on academic outcomes as a result of distraction (see, for example, Ravizza et al. 2014; Kuznekoff & Titsworth 2013 etc). Glass and Kang (2018) conducted an experimental study of 118 university students in the US, which examined how using a mobile digital device (laptop, tablet or mobile phone) for non-academic purposes during class affected exam performance. The study found no significant impact on short-term

comprehension in end-of-class tests. However, it also found that, following the lessons in which digital devices were allowed, performance was significantly poorer on end-of-unit exams and final exams. The magnitude of the effect was five per cent, or about half a 'letter' grade. Rosen et al (2011) similarly found, in a controlled study of 185 university students which looked at the effect of text messages on academic outcomes, that students who received eight texts in a 30 minute lecture performed significantly worse on a subsequent test about the lecture, than students who received no texts. The researchers found that students who responded immediately to text messages did significantly worse on the test compared to those who chose to wait up to five minutes to read and respond to the text.

Responses to mobile digital device use in schools

Just as there is general uncertainty in the literature as to the effect of mobile digital device use on students, there is also a lack of agreement on the best approach to mobile digital devices in schools.

Beland and Murphy (2015) suggest that a mobile phone ban could be a low-cost way for schools to reduce educational inequality based on their hypothesis that low-achieving students are more likely to be distracted by the presence of mobile phones, while high-achieving students can focus in the classroom regardless of whether phones are present or not. Gao et al (2014) report that 84% of primary schools in China regulate mobile phone use, 76% of middle schools and 64% of high schools also regulate mobile phone use.

Nonetheless, there are studies that show that, irrespective of the controls schools have in place to regulate access to mobile digital devices, students are capable of 'workarounds' such as using 4G on personal devices rather than the school WiFi, using web proxies to allow unlimited internet access, or establishing 'virtual private networks' on the school system. This is partly possible because schools do not have 'admin' rights to students' personal mobile devices as they do to school-owned and purchased devices. Selwyn and Bulfin (2016) in a study of 1,174 students across three secondary schools in Australia, found that almost 60% of students 'worked around' school restrictions on new technology. They did this by using low level 'hacks' (e.g. logging on using teacher/admin passwords), technical reconfigurations (e.g. setting up virtual private networks) and simple tactics such as hiding devices under clothing and using parts of the school ground that were not always monitored. Similarly, a US survey of 800 young people aged 12-17 showed that nearly 65% of students at schools that had banned mobile phones, brought their phone to school every day anyway (Lenhart et al. 2010). Gao et al (2014) in a study of 245 elementary, middle and high-school teachers in China found that teachers did not consider the existing school policies – be they banning phones entirely or banning during certain times of the day – effective in limiting students' mobile phone use and that distraction and disturbance from mobile phones continued to interrupt teaching and learning.



Rosen et al (2012) suggest that 'technology breaks' may be a more effective way of responding to mobile digital device use than a complete ban, by allowing students small, allotted windows of time during the school day to use their mobile digital device. They made this suggestion based on the fact that '41% of college students felt moderately to highly anxious if they could not check their text messages and one in five felt the same if they could not check in with their social networks' (Rosen, Cheever & Carrier 2012, cited in Rosen et al. 2013, p. 956).

Thomas and McGee (2012, p. 28) in their review of mobile phones in classrooms, state that instead of teachers, administrators and school boards being 'afraid' of mobile phones and their potential use for 'textese, cheating, cyberbullying, and sexting', teachers and administrators should instead model the 'moral and ethical use' of mobile phones while harnessing the technology of mobile phones to support sound pedagogical instruction. Along similar lines, there are calls from several quarters for 'digital instruction' or 'digital citizenship' to be taught to ensure students are aware of how to best navigate a digital world (see, for example, UNICEF 2017, United Nations Office of the High Commissioner of Human Rights 2014). Digital citizenship refers to 'understanding the rights and responsibilities that come with being online and how to use technology in a positive way' (Brewer 2018, n.p.), while digital literacy can be defined as the 'large variety of complex cognitive, motor, sociological, and emotional skills, which users need in order to function effectively in digital environments' (Eshet-Alkai 2004, p. 93). Jones and Mitchell (2015) in their study of respectful behaviour online and online civic engagement, found, based on an anonymous online survey of 979 students aged 11-17 years in Years 6-10 at six schools in the US, that the more online respect and civic engagement that students reported showing, the less likely they were to harass others online and the more likely they were to engage in helpful bystander behaviour online.

Selwyn et al (2017) note that the presence of personal devices in schools tends to be more mundane in nature and effect than is often pre-supposed. Their ethnographic review of three Victorian high schools found that students continue to use

personal devices at school in the ways they do elsewhere in the lives (listening to music, playing games, checking social media etc) in forms that do not significantly interrupt the classroom context. They found that personal technologies quickly become subsumed into existing conditions and arrangements of school organisation and control.

Conclusion

The issue of mobile digital devices in schools is one that continues to receive considerable attention in the media, in schools and among commentators. There is growing concern about the impact that non-educational use of mobile digital devices in schools can have on student wellbeing. The evidence behind the effect of mobile digital devices on student wellbeing in schools is both mixed and limited. There is some evidence that cyberbullying is increasing, but this link cannot be directly attributed to mobile digital device use in school. There is also evidence that phones do distract students from learning, although this evidence largely comes from studies undertaken at the tertiary level. The evidence in terms of sexting points to the fact that teenagers are not sexting as much as other young adults, and that when they do it is often in the context of perceived mutual trust. Some evidence shows that use of mobile digital devices may hinder social interaction which can lead to lower levels of psychological wellbeing, but other research shows that mobile digital device use may enhance important peer and family relationships. The same mix of evidence is found with regard to mental and physical health. In terms of the most effective response to mobile digital devices in schools, the evidence similarly varies. There is some evidence that banning mobile phones may improve academic outcomes for low-achieving students, but other evidence shows that students are adept at 'getting around' bans on mobile digital device use in schools. Other researchers state that a ban is not the answer, that students need to be taught 'digital literacy' instead, and that mobile digital devices will simply be subsumed within existing school regulations and controls.



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