



Educational Research and Innovation

Education in the Digital Age

HEALTHY AND HAPPY CHILDREN

Edited by Tracey Burns and Francesca Gottschalk



Educational Research and Innovation

Education in the Digital Age

HEALTHY AND HAPPY CHILDREN

Edited by
Tracey Burns and Francesca Gottschalk

This work is published under the responsibility of the Secretary-General of the OECD. The opinions expressed and arguments employed herein do not necessarily reflect the official views of OECD member countries.

This document, as well as any data and map included herein, are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

Please cite this publication as:

Burns, T. and F. Gottschalk (eds.) (2020), *Education in the Digital Age: Healthy and Happy Children*, Educational Research and Innovation, OECD Publishing, Paris, <https://doi.org/10.1787/1209166a-en>.

ISBN 978-92-64-98886-6 (print)

ISBN 978-92-64-70649-1 (pdf)

Educational Research and Innovation

ISSN 2076-9660 (print)

ISSN 2076-9679 (online)

Photo credits: Cover © Sunny studio/Shutterstock.com.

Corrigenda to publications may be found on line at: www.oecd.org/about/publishing/corrigenda.htm.

© OECD 2020

The use of this work, whether digital or print, is governed by the Terms and Conditions to be found at <http://www.oecd.org/termsandconditions>.

Foreword

The COVID-19 pandemic was a forceful reminder that schools are not just places of academic learning. They are part of the social fabric of our lives, and a large body of evidence sets out the important role they play in ensuring well-being and community. School closures also reminded us of the power of the physical world. The rush to remote learning highlighted not only the immense opportunities of the digital world, but also how essential our physicality is. Humans are social, and thrive on face-to-face connection. A hug emoji is not the same as a hug.

School closures also disrupted access to essential programmes such as free school meals, and governments had to move quickly to provide food or vouchers to families who relied on this to feed their children. As many social services were no longer available due to nationwide lockdowns, teachers and school personnel also had to step in, keeping regular contact with families, especially the most vulnerable.

While the situation experienced during school closures was extreme, it highlighted deficiencies in skills, capacity and resources in education that need to be addressed by policymakers around the world. It also emphasised the ongoing shift in the roles of teachers, from primarily academic provision to a more holistic role in supporting student well-being.

This volume emerges from the Centre for Educational Research and Innovation (CERI)'s 21st Century Children project. This project looks at the nature of childhood in the digital age, and asks the question: How can teachers and schools work together with parents and communities to protect and guide children while still allowing them to be children, make mistakes and take risks?

This publication is a companion volume to [*Educating 21st Century Children: Emotional Well-Being in the Digital Age*](#) (2019). Focusing on the intersection between physical well-being and digital technologies, the report explores the important role of play and risk-taking in learning and child development. It looks at the pressures of modern life and a resulting “pursuit of perfection” in physical, cognitive and academic spheres. It examines how education systems empower children to be informed decision-makers when it comes to their own health and well-being, and how it protects them from harm. It ends with a look at the role of teachers and key partnerships in achieving these aims.

Many of these trends are a continuously moving target, and reports such as this can become quickly outdated. This volume provides an important snapshot at this point in time. The work of education systems around the world is to stay ahead of, or at least on top of, the curve. We owe it to children and youth to separate fact from fiction, and help support them to get the best start in life.

This publication was edited by Tracey Burns and Francesca Gottschalk from the OECD Centre for Educational Research and Innovation (CERI). Tracey Burns conceptualised this volume and leads the 21st Century Children project. Francesca Gottschalk was responsible for coordinating the contributions of the external experts. Simona Petruzzella contributed to the drafting of Chapter 3 and text boxes in other chapters. Sophie Limoges and Leonora Lynch-Stein contributed to the final stages of preparation for publication.

Acknowledgements

The process of putting together a publication with a variety of different contributors is necessarily a collaborative one, and this volume benefits enormously from the support of a number of individuals and institutions. The editors thank the CERI Governing Board for consistently supporting this work since its inception. Professor Catrin Finkenauer and her Dynamics of Youth team at Utrecht University, with support from the Dutch Ministry of Education, Culture and Science, made possible an expert workshop in 2020 that provided much of the backbone of the conceptual work and expert contributions in this volume.

The editors would also like to thank the external authors who contributed to this volume (in order of their chapters): Mariana Brussoni, Benoit Bediou, Michael Rich, Daphné Bavelier, Julian Sefton-Green, Rachel Rodgers, Sebastian Sattler, Rebecca Eynon and Kristen Weatherby.

In addition, special thanks to the following countries and systems who completed the 21st Century Children Policy Questionnaire: Australia, Belgium (Flemish Community), Belgium (French Community), Canada, Czech Republic, Denmark, Finland, France, Greece, Ireland, Japan, Korea, Latvia, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Portugal, Russian Federation, Scotland (United Kingdom), Spain, Sweden, Switzerland, Turkey and United States. Your time, expertise, and co-ordination with colleagues from other ministries and departments are very appreciated.

Thank you to Simona Petruzzella for her drafting, ideas and inputs, and to Leonora Lynch-Stein for editorial support and careful review of each chapter. We would also like to thank past and present team members who contributed ideas, drafts and research papers from which this volume is drawn: Ruth Aston, Liam Bekirsky, Anna Choi, Marc Fuster, Julie Hooft Graafland and Alejandro Paniagua. Thanks also to Sophie Limoges for her editorial support.

Thank you also to our colleagues Andras Molnar and Elettra Ronchi from the Directorate for Science, Technology and Innovation, Grainne Dirwan from the Well-Being, Inclusion, Sustainability and Equal Opportunity Centre, and Lisa Robinson from the Université de Cergy-Pontoise for their valuable feedback and comments on individual chapters. We very much appreciate your expertise and collaboration.

We thank Andreas Schleicher, Director, and Dirk van Damme, Head of CERI, for their comments on the draft. The CERI Governing Board provided encouragement, ideas and feedback throughout the process, and we are grateful for their guidance. Thank you.

Tracey Burns and Francesca Gottschalk

Table of contents

Foreword	3
Acknowledgements	4
Executive Summary	9
Part I Setting the stage: Who are 21st century children and how are they shaped by the digital age?	11
1 Healthy and happy children in the digital age	12
A snapshot in time	13
Four themes	14
Special focus: Physical health and digital technologies	17
Overview of the volume	18
Concluding note	20
References	21
Note	22
2 Physical health trends in childhood	23
Introduction	24
Physical health and well-being trends and patterns	24
Factors affecting child health and health behaviours	27
Effective interventions for health	29
Knowledge gaps and research limitations	30
High priority challenges in OECD countries and systems	30
In sum	32
References	33
Note	37
3 Children and digital technologies: Trends and outcomes	38
Introduction	39
Trends in children's use of digital technologies	39
Digital technology use and children's physical health	43
Areas for further research	44
Developing successful policy solutions	44
In sum	45
References	47

Part II Play!	52
4 Outdoor risky play	53
Background	54
Outdoor risky play	54
Creating supportive outdoor risky play environments	57
In sum	61
References	62
5 Digital media and cognitive development	69
The dilemma: implications of the increase in digital technology consumption	70
Which evidence-based recommendations?	70
How to advance the scientific debate around digital media effects	71
Cognitive effects of action video game play and media multitasking	72
The need for balanced research and standardised definitions	74
Conclusion and future directions	75
References	76
6 Play and learning in the digital age	81
Introduction	82
Philosophical and practical definitions, uses and activities	83
The gamification of play	86
What is at stake in the playification of learning?	88
Coda: From a political economy of play and learning to the everyday	91
Summary and implications	92
References	93
Part III The pursuit of perfection	97
7 Media and body image in children and adolescents	98
Body image among children and adolescents	99
Body image: Development and characteristics among children and adolescents	100
Theoretical frameworks	101
Media content	101
Empirical evidence for the relationship between media and body image among children and adolescents	103
Moderators of the relationship between media use and body image	104
Explanatory mechanisms	106
Conclusions	107
References	107
8 Cognitive enhancement in children by using prescription drugs	113
Introduction	114
What is pharmaceutical cognitive enhancement and does it work?	114
What is the controversy about pharmaceutical cognitive enhancement?	115
What is known about the prevalence of pharmaceutical cognitive enhancement?	117
What is known about attitudes and factors affecting pharmaceutical cognitive enhancement?	118
What are potential strategies to decrease risky use of pharmaceutical cognitive enhancement?	120
What are the gaps and future directions for research on pharmaceutical cognitive enhancement in children?	122

Conclusion	123
References	124
9 The myth of the digital native: Why it persists and the harm it inflicts	131
Overview	132
Digital natives vs. digital immigrants	132
Debunking the myth	133
The risks of the digital native discourse	134
Why the discourse persists	137
A future agenda	138
Conclusion	140
References	140
Part IV Policies, practices, partnerships and the pending agenda	144
10 Child empowerment, well-being and inequality	145
Introduction	146
Knowledge as power: Educating children for their health and well-being	146
Striving for equity: Reducing health and digital inequalities for all children	152
In sum	160
References	160
Note	165
11 Education and child safety	166
Introduction	167
Making spaces safe for kids	167
Violence, bullying and abuse	171
Teachers' responsibility for student well-being	176
In sum	179
References	180
12 Building capacity: Teacher education and partnerships	185
Introduction	186
Supporting teachers for modern classrooms	187
Policies and practices to support teachers	190
Cross-sectoral collaboration and partnerships	193
In sum: Working together towards a changing landscape of education	198
References	199
13 The pending agenda	203
Introduction	204
Emerging cross-cutting themes	204
Policy orientations and gaps in our knowledge	207
Concluding note	211
References	212
Contributors	213

FIGURES

Figure 1.1. Four main themes of 21st Century Children project	15
Figure 2.1. Overview of physical health challenges across countries and systems	31
Figure 2.2. Links between most pressing challenges in physical health	32
Figure 3.1. Overview of digital technologies challenges across countries and systems	46
Figure 4.1. Dynamic risk benefit assessment	61
Figure 6.1. Schematic outline of changes in the uses of the concepts “play” and “learning” in the 21st Century	83
Figure 9.1. Percentage of Internet users aged 9-16 who carry out online activities daily	134
Figure 9.2. Relative interest in search term 'digital native' on Google worldwide 2004-2020	138
Figure 10.1. How systems incorporate digital skills into teaching and learning	151
Figure 11.1. Student exposure to different types of bullying across OECD countries (PISA 2018)	173
Figure 12.1. Content of teacher education and sense of preparedness for teaching	188
Figure 12.2. Topics covered in teacher education (initial and continuing professional development)	189
Figure 12.3. Dimensions of school/community engagement	193
Figure 12.4. Partnerships between schools and external actors	194

TABLES

Table 7.1. Characteristics of positive and problematic body image	99
Table 8.1. Common arguments for and against PCE in children	115
Table 8.2. Common factors promoting or inhibiting PCE in children	118
Table 10.1. Learning about health and healthy behaviours	147
Table 10.2. Relationships between affluence and health behaviours and outcomes in adolescents	152
Table 10.3. Food and nutrition policies and practices	153
Table 10.4. Health supports in schools	155
Table 10.5. Initiatives promoting children's physical activity	158
Table 11.1. Promoting digital safety: country examples	169
Table 11.2. Examples of guidelines governing safe play spaces	170
Table 11.3. Raising awareness about bullying: Digital hubs and campaigns	174
Table 11.4. Teacher responsibility for student well-being	179

Executive Summary

The COVID-19 pandemic has reminded us that schools are not just places of academic learning. Schools are part of the social fabric of our communities, and they are increasingly expected to help all children – especially the most vulnerable – thrive academically, socially, physically and psychologically. Balancing these different elements has long been a challenge; doing so well in the digital world even more so.

Understanding the nature of childhood today is an important first step for education to be able to fulfil these goals. Focusing on the intersection between physical well-being and digital technologies, this report explores the important role of play and risk-taking in learning. It looks at the pressures of modern life and a resulting “pursuit of perfection” in physical, cognitive and academic spheres. It examines how education systems empower children to be informed decision-makers when it comes to their own health and well-being, and how it works to protect them from harm. The volume ends with a look at the role of teachers and key partnerships in achieving these aims. This report is the companion to [*Educating 21st Century Children: Emotional Well-Being in the Digital Age*](#).

Part I: Setting the stage: Who are 21st century children and how are they shaped by the digital age?

Part I explores trends in physical health and digital technologies. Chapter 1 provides an overview of the volume, identifying what has changed in the lives of 21st century children and, equally importantly, what has not. Chapter 2 reviews trends in children’s physical health outcomes and behaviours, highlighting improvements in children’s lives in the last half century: better health care, public safety, and support for their physical and mental well-being. At the same time, rates of childhood obesity have risen and children are reporting less sleep and poorer eating habits. The chapter ends with a look at high priority challenges identified by education ministries across OECD members and partner countries, such as overweight and obesity, as well as the interconnections between those challenges.

Chapter 3 highlights trends in the use of digital technologies by children, who are increasingly accessing digital tools more often and at younger ages. Digital technologies empower children’s self-expression, information seeking and socialisation, and in times of need, help could be just a phone call – or WhatsApp message – away. The chapter closes by highlighting top priority policy challenges identified by education ministries across OECD members and partner countries, such as digital citizenship and cyberbullying.

Part II: Play!

Part II of the volume explores the serious side of play and the key role of risk-taking for healthy learning and development. Chapter 4 highlights the importance of exhilarating and scary physical play situations that allow children to gain mastery over their fears. It argues that efforts to protect modern children from injury have reduced their opportunities both for physical activity and in learning how to manage risk. It ends with suggestions of practice and policy necessary to implement sustained and meaningful change. Chapter 5 switches gears to focus on play in the digital environment, exploring the potential cognitive benefits of video games and how the video game industry has influenced the nature of play itself. It highlights the

multi-faceted nature of digital activity and the importance of disaggregating terms such as “screen time” or “media use” to better understand when and how policy and practice can best intervene if needed.

Chapter 6 explores the history of the commodification of both play and learning. It argues that it is important not to subordinate play as an instrumental developmental function of learning and that learning itself should not be conflated with the outcomes of the formal education system. Chapter 6 ends with a series of questions for policy, families, young people and schools.

Part III: The pursuit of perfection

Over the last almost 30 years there has been an increase in socially prescribed expectations for perfection, exacerbated by social media and the success culture that drives it. **Part III** of this volume explores this from three different dimensions: the physical (body image), the cognitive (use of smart drugs) and the digital (pressures from the myth of the digital native).

Chapter 7 examines how the rise in social media is related to body image concerns through the promotion of unrealistic and unattainable appearance ideals. Chapter 8 reveals the pressure children face in terms of academic success, which may contribute to a worrying increase in the use of pharmaceutical cognitive enhancers in the absence of medical need. Although still not widespread, a non-negligible number of children and youth are at risk of side effects, while others may feel pressured to take or administer such drugs. Finally, Chapter 9 ends the section with a look at the narrative of “digital natives”, in which young people are portrayed as inherently savvy digital users. Despite limited empirical support, the chapter highlights the persistence of the term and the negative implications it can have for some young people, particularly those already experiencing forms of social inequalities.

Part IV: Policies, practices, partnerships and the pending agenda

Part IV turns the focus to education systems themselves. Chapter 10 highlights the important efforts countries have made to empower students and youth to make informed decisions for their own health and well-being. Providing a rich set of country examples from across the OECD, it looks at food and nutrition, opportunities for physical activity, and the importance of the school as a hub for health service delivery and support. Chapter 11 examines factors that undermine child safety in both digital and physical environments, and the important role education plays in keeping children safe. It highlights policies ranging from safe playspaces and clean air near schools to digital security and anti-bullying initiatives, and explores how teacher responsibility for student well-being is expressed across systems. Chapter 12 looks at two elements crucial to effective delivery of policy and practice: teacher education and partnerships. Focusing on both the digital skills and physical well-being of students, it provides a powerful set of policy examples aimed at building teacher skills as well as innovative cases of partnerships.

Chapter 13 ends with the pending agenda for research and policy. It highlights difficult tensions that exist in education and society more broadly: for example, the conflict between our desire for youth empowerment and the urge for a zero-risk approach to protecting children. It flags the increasing pressure placed on students and schools to be perfect. It identifies gaps in our knowledge and areas for improvement, followed by orientations for policy, research and practice.

As we move further into the 21st century, education will increasingly be called upon to break down its silos and work across policy sectors and research disciplines. To help children thrive academically, socially, physically and psychologically, education must involve an increasingly broad variety of actors, including the private sector. It must continue to engage with challenges that fall outside of the conventional educational discourse, proactively adapting and changing along with our communities and children. We owe it to our children and youth to separate fact from fiction, take risks towards ambitious but achievable goals, and support them to get the best start in life.

Part I Setting the stage: Who are 21st century children and how are they shaped by the digital age?

1 Healthy and happy children in the digital age

The COVID-19 pandemic has forcefully reminded us that education plays an important role in delivering not just academic learning, but also in developing and sustaining student well-being, both physical and emotional. This volume explores the nature of childhood today, connecting education to trends in child physical health, emotional well-being, families and peers, and digital technologies. Setting the stage for the rest of the volume, this chapter takes a special look at the intersection between two of those themes: physical health and digital technologies. It ends with an overview of the publication and the policy questionnaire that generated the country-level solutions to shared challenges.

A snapshot in time

2020 has been indelibly marked by the COVID-19 pandemic – medically, economically and socially. In education, UNESCO reported that school closures affected almost 1.2 billion learners across the world. At the time of writing (October 2020), students in the Northern Hemisphere are cautiously returning to school. Education authorities are at the same time also preparing for the potential of a series of rolling school closures throughout 2020 and 2021, and perhaps beyond.

Part of the preparation process involves learning from what took place during school closures and in the return to school. Building on this knowledge - to fix weaknesses, to build trust, to rethink outmoded ways of doing things – is essential. In addition to ensuring the safety of students and staff, the two major goals for most systems will be to assess and mitigate the impact of any learning losses, and at the same time support physical and emotional well-being.

Schools are not just places of academic learning. They are part of the social fabric of our lives, and a large body of evidence sets out the important role they play in ensuring well-being and community. This was highlighted during school closures, along with another important reminder: that of the power of the physical world. In the rush to digital and distance learning, we were reminded of [how important our physicality is](#). Students need to move, play, actively learn. Humans are social, and thrive on face-to-face connection. A hug emoji is not the same as a hug.

How can we balance this “old” knowledge with new digital opportunities? How can we deliver education that helps children, especially the most vulnerable, thrive academically, physically and psychologically? Addressing these questions requires taking stock of the nature of childhood today.

Understanding childhood today

The last decades have seen some fundamental shifts. Older, better educated parents are increasingly playing an active role in their children’s education. Safer environments and better regulations (e.g. on physical play spaces, more effective bicycle helmets and car seats) have helped reduce child mortality due to accidental injury across the OECD. Digital technologies empower children’s self-expression and socialisation, and in times of need, help could be just a phone call – or WhatsApp message - away. On a number of measures, modern children’s lives have clearly improved: better health care, public safety, and support for their physical and mental well-being (OECD, 2019^[1]).

At the same time, 21st century children are reporting more stress and anxiety, including increased pressure to excel in an ever more competitive educational environment. On a physical level, they are reporting less sleep. Child obesity is increasing across the OECD, bringing with it potential physical, social and psychological challenges. There are worries that children are spending less time on old-fashioned activities like running around outside in favour of screen time. And the omnipresent nature of the digital world means that risks like cyberbullying follow them from the school yard into their homes.

Education must evolve and grow with our communities and children, anticipating change rather than simply reacting to problems. Delivering on this requires innovative, collaborative models that bring together parents, communities and schools to strengthen children’s resilience, lower their stress levels, enhance well-being and improve learning. To do this, we must address a series of questions:

- What is the nature of childhood today?
- How can teachers and schools work together with parents and communities to protect and guide children while still allowing them to be children, and learn by making mistakes?
- What are the impacts on education, from early childhood education and care to high school, and what does this mean for teaching and learning at each stage?

One last note: the first decades of the 21st century are the intersection of a turn of a millennium and rapid technological change. However, it is important to remember that we do not start with a blank slate just because we are in a new century. While there is a need to understand what has really changed in children's lives, it is equally important to understand what has *not* changed.

As part of this, it is important to guard against a very human tendency to over-dramatise, particularly when it comes to turns of the century and disruptive technological change. In order to do this, it is important to return to research and evidence as a starting point, in order to understand the reality of children's lives and to devise responsible policy solutions to challenges observed. This volume, along with its sister volume on emotional well-being in the digital age (Burns and Gottschalk, 2019^[2]), aims to help with this process. They emerge from the OECD/CERI project 21st Century Children.

Box 1.1. OECD/CERI 21st Century Children project

The OECD/CERI [21st Century Children](#) project explores the nature of childhood in the 21st century and what this means for education. It is deliberately multidisciplinary, cutting across silos and bringing together diverse policy and research traditions. It takes a lifespan approach, looking at childhood (ages 0-18) as a whole, regardless of the structures of our education systems. The project aims to:

- identify relevant multidisciplinary research and develop an analytic framework to link to education research and policy.
- share common challenges countries are facing and identify examples of good practice.
- determine research gaps and issues in need of further study.

The first major publication was [Educating 21st Century Children: Emotional Well-Being in the Digital Age](#) (2019^[2]). The full set of outputs, including a number of research reviews and working papers, infographics and policy briefs, can be found on the website.

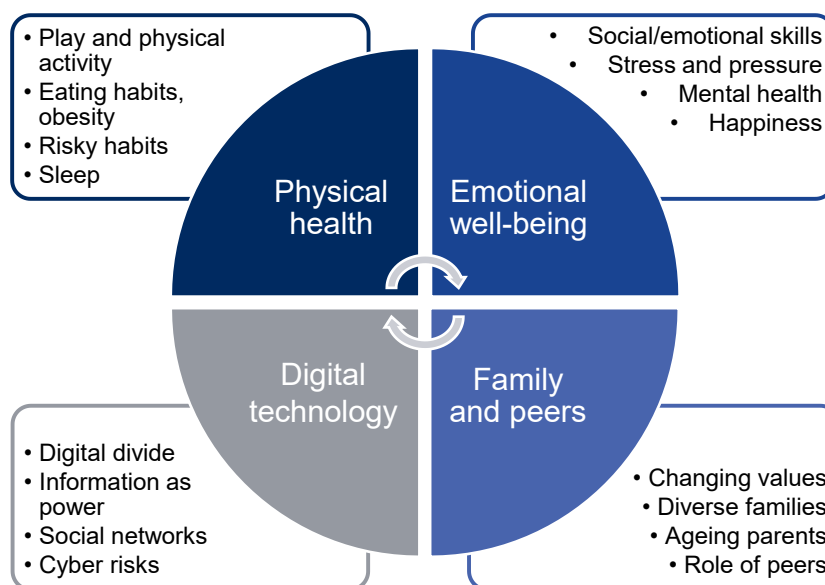
Four themes

In order to operationalise our understanding of the transformed context of childhood, a decision was made to focus on four main themes¹: physical health, emotional well-being, digital technologies, and peers and families (Figure 1.1).

This is to some extent an artificial separation, as the four themes are interrelated and do not all operate on the same level. They also interact with broader societal trends, such as inequality. For example, greater income inequality is associated with lower life satisfaction and a higher likelihood of reported stress, anger, pain, worry and sadness (Burkhauser, Neve and Powdthavee, 2016^[3]). Socio-economically disadvantaged individuals are more likely to engage in risky lifestyle behaviours and have reduced access to services, including safe facilities for physical activity and green space (OECD, 2015^[4]). Disadvantaged children are also more likely to have poorer educational attainment, lower academic performance and increased rates of grade repetition (OECD, 2018^[5]).

This volume will focus specifically on two of these themes and their intersections: physical well-being and digital technologies. It is a companion volume to a report looking at the intersection of emotional well-being in the digital age (Burns and Gottschalk, 2019^[2]). Peers and families – both how they shape and are shaped by these themes – are interwoven into the discussion throughout. Before turning to the specific focus of this volume, this chapter will provide a brief overview of each of the four themes.

Figure 1.1. Four main themes of 21st Century Children project



Physical health

As Mahatma Gandhi once said, “it is health that is real wealth and not pieces of gold and silver”. Unfortunately, many behaviours related to poor physical health outcomes among children and young people have increased on average across the OECD since 2000 (see Aston (2018^[6]) for a full review; also Chapter 2 of this volume). Examples include:

- decreases in rates of adequate physical activity (less than 60 minutes of moderate to vigorous physical activity per day) (Inchley et al., 2020^[7])
- increased overweight and obesity, and poor dietary habits including increasing overconsumption of soft drinks, sweets, salty snacks and fast food (OECD, 2017^[8])
- decreases in the duration and quality of sleep (Reiter and Rosen, 2014^[9]).

Encouragingly, for some OECD countries rates of overweight and obesity have now stabilised in children (OECD, 2017^[8]). Other positive trends include increased fruit and vegetable consumption among children in some OECD countries and a reduction in alcohol consumption and tobacco use (OECD/EU, 2016^[10]).

Despite this, rates of preventable health conditions like type II diabetes and poor cardiovascular health are still increasing (Institute for Health Metrics and Evaluation, 2017^[11]). It is important not to understate the concerning nature of these statistics: historically considered diseases of adulthood, they are now evident in children as young as two years old (Van Buren and Tibbs, 2014^[12]).

Improving and maintaining physical health can be achieved by supporting and modelling healthy lifestyle behaviours in school, at home and in the community (OECD, 2019^[13]). Including educators, parents/caregivers and primary care providers in the design and implementation of programmes can effectively change the behaviour of children and adolescents (see Chapter 2 of this volume for more detail).

Emotional well-being

Emotional well-being is crucial for our daily lives and overall well-being. Childhood and adolescence are critical neurological developmental periods and nearly one in two mental health problems among adults begins by age 14. On average across OECD countries the following trends in emotional well-being have been identified (see Chapter 3 in (Burns and Gottschalk, 2019^[2]), also (Choi, 2018^[14]) for a full overview):

- According to the latest WHO data from 2016, rates of suicide decreased between 1990 and 2015 for 15-19 year-olds, with some notable exceptions (e.g. Korea, Mexico and New Zealand).
- Levels of bullying and somatic complaints (e.g. headache, stomach ache, feeling dizzy) have remained unchanged.
- There are higher rates of depression and anxiety, and lower reported life satisfaction.

It is important to raise awareness and to seek help early on for mental health problems, particularly for children and adolescents, as these problems tend to recur and have lasting negative consequences on life satisfaction, education and labour market outcomes.

Stable and positive relationships with parents and teachers are essential for improving children's well-being and social and emotional skills. Parents and teachers who respect and trust children, provide support when they are facing difficulties and care about their well-being can help them become resilient and better cope with adversities in life (Ulferts, 2020^[15]). On the contrary, poverty, family dysfunction, abuse and history of mental health disorders pose significant risks to child well-being (Choi, 2018^[14]).

Families and peers

Socialisation and relationships have a significant impact on one's life and well-being. Families play a huge role in children's cognitive, developmental, educational, labour and health outcomes, particularly at the youngest ages (Ulferts, 2020^[15]).

Box 1.2. Parenting 21st Century Children

Parents often feel enormous pressure to help their children succeed, whether in making friends, at school or beyond. Digital technology has potentially amplified that pressure. While on the one hand parents can reach likeminded others and receive support and advice, on the other parents who turn to the Internet for help will find a bewildering amount of information, not to mention plenty of “perfect” parenting moments portrayed on social networks. Every kind of parenting style imaginable is promoted, from positive parenting to holistic parenting, free-range parenting, tiger parenting and more. However, there is often little or no evidence to support these claims (Burns and Gottschalk, 2019^[2]).

A recent meta-analysis of the literature (Ulferts, 2020^[15]) demonstrates that warm parenting that provides children with age-appropriate autonomy and structure is key for a healthy and prosperous development of children and adolescents. The positive impacts of warm parenting are observed in cognitive, emotional, social and physical development and in job success, well-being, relationships and health.

While parenting is a private matter, public policies can create structures and services that enable parents to acquire and practice parenting skills beneficial for prosperous and healthy development of children. Successful policies are multi-layered and include considerations about individual and community interactions, as well as context, culture and history (Ulferts, 2020^[15]).

Peers also play an important part in social and emotional development, especially from middle childhood on. Increasing diversity means that children and adolescents in OECD countries are more likely to meet and interact with peers and teachers from different cultural backgrounds, ethnicities and sexual orientations. In addition, the distinction between online and offline friendships has become increasingly blurred (Burns and Gottschalk, 2019^[2]).

Digital technologies

Whether it is to acquire new skills, or connect with distant as well as near friends and family, the Internet plays a central role in children's lives. Access to digital information and services has become so important that several national governments, including those of Costa Rica, Estonia, Finland, France, Greece and Spain, have formally recognised Internet access as a human right. The COVID-19 pandemic further emphasised its importance, not just as a technological tool, but as fundamental to participating as an active citizen in a democracy.

A review of the literature on digital technologies highlights the following trends (Burns and Gottschalk, 2019^[2]); see also Chapter 3 in this volume):

- *Children and youth are connecting more and at younger ages.* From 2009 to 2018, the proportion of 15 year-olds in OECD countries with home Internet access increased from 85% to 95% and reported time spent using the Internet increased to 27 hours per week in 2018 (OECD, 2019^[16]). Children now tend to have their first experience with digital technologies before the age of two, often before they can even walk or talk (Chaudron, Di Gioia and Gemo, 2018^[17]).
- *There are long-standing inequalities in skills and use.* Disadvantaged students tend to have lower digital skill levels on average and are less likely than advantaged students to use the Internet to read the news or to obtain practical information (OECD, 2019^[16]). The challenge is intergenerational: children's digital skills, opportunities and exposure to risk are all affected by the digital skills of their parents (Burns and Gottschalk, 2019^[2]).
- *Education is expected to even the playing field but there are systemic challenges to achieving this.* There are concerns about the capacity of schools and teachers to equip children with sound digital skills, particularly in disadvantaged environments. Teachers consistently report "use of ICT skills for teaching" as their second highest need for professional development, after teaching students with special needs (OECD, 2019^[18]).

Special focus: Physical health and digital technologies

The increasing use of digital technologies and devices has raised questions about their impact on the health and development of children (OECD, 2019^[19]). There is thus an urgent need to better understand the relationship between physical well-being and digital technologies. A review of the literature highlights the following (see (Gottschalk, 2019^[20]) for a fuller overview):

- *Physical activity:* reducing screen time may not motivate adolescents and children to engage more in physical activity (Kardefelt-Winther, 2017^[21]). Active video games such as *Pokémon GO!* have shifted how children engage with digital tools, requiring a certain level of movement to participate. However, simply providing children with access to active video games is unlikely to provoke spontaneous engagement and may not provide a public health benefit (Baranowski et al., 2012^[22]).
- *Sleep:* excessive screen time can affect sleep quality by delaying bedtimes, lengthening sleep onset, shortening sleeping hours and delaying melatonin secretion (a sleep-promoting hormone). However, recent studies suggest that the real reduction in sleep time associated with digital engagement is small (Przybylski, 2019^[23]; Orben and Przybylski, 2020^[24]).
- *Obesity:* extended screen time has also been linked to obesity in children, either by displacement of physical activity or through mindless eating while watching television (Bellissimo et al., 2007^[25]). However, the displacement effect is contested, the overall causal relationship is not clear and there are other important factors that might play a role, such as targeted advertising and marketing of unhealthy foods and sugar-sweetened beverages to children (Inchley et al., 2020^[7]).

Everything in moderation

The mass use of digital technologies is a relatively recent phenomenon and there is limited hard evidence to date on the impact of digital technologies, including social media, on child health (Gottschalk, 2019^[20]). The “Goldilocks” hypothesis argues that moderate use of technology can have a positive effect on children’s mental well-being (Przybylski and Weinstein, 2017^[26]). Moderate use allows children to take advantage of the opportunities provided, such as connecting to friends through social networks and using the Internet to seek information. A systematic review of the literature found that the most robust studies suggest that the relationship is U-shaped, where no use and excessive use can have a small negative impact on well-being, while moderate use can have a small positive impact (Kardefelt-Winther, 2017^[21]).

This is a fast-changing field and it is key to use high quality research to guide policy and practice. Better research, including accurate measurements and longitudinal studies, is needed. It is also important to research potential benefits, for example, the potential of digital tools to increase young people’s access to health information, peer support and professional services (Swist, Collin and McCormack, 2015^[27]).

Overview of the volume

This volume looks specifically at the intersections between two main themes: physical health and digital technologies. It is the sister volume to [Educating 21st Century Children: Emotional Well-Being in the Digital Age](#) (Burns and Gottschalk, 2019^[2]). It is organised in four parts.

Part I: Setting the stage: Who are 21st Century Children, and how are they shaped by the digital age?

Following this introduction, the next two chapters, also written by the OECD Secretariat, combine extensive reviews of the literature with challenges reported by countries and systems in a policy questionnaire.

Chapter 2 examines *Trends in children’s physical well-being*, covering physical health trends in childhood and adolescence, their modifiers, and some qualities of effective interventions in education. It highlights knowledge gaps and high priority challenges identified by OECD and partner countries as well as the interconnections between these challenges.

Chapter 3 highlights *Children and digital technologies: Trends and outcomes*, covering Internet use and time spent in digital environments with the impacts of those trends. It also looks at high priority challenges identified by OECD and partner countries in this area.

Part II: Play!

Part Two of the volume explores the serious side of play. **Mariana Brussoni** looks at *Outdoor risky play*, highlighting the importance of exhilarating and scary physical play situations that allow children to gain mastery over their fears. The chapter presents the three key ingredients for supportive outdoor risky play environments – time, space, and freedom – and suggests practice and policy necessary to implement sustained and meaningful change.

Chapter 5, by **Benoit Bediou, Michael Rich and Daphne Bavelier**, looks at *Digital media and cognitive development*, with a special focus on action video games. Highlighting the findings that action video game play enhances attentional control and other aspects of cognition, the chapter illustrates the complexity of research in this domain and urges the adoption of standardised definitions and guiding principles to achieve greater granularity, accuracy and consistency in conceptualising and addressing media effects.

The focus on play continues with **Julian Sefton-Green**, who takes a closer look at *Play and learning in the digital age*. Just as learning has increasingly become a commodity to be purchased and used in the

home as much as in the school, the existential open-ended nature of play itself has been significantly influenced by video gaming and the turn to playfulness in public culture. The chapter argues that it is important not to subordinate play as an instrumental developmental function of learning and that learning itself should not be conflated with the outcomes of the formal education system.

Box 1.3. OECD/CERI 21st Century Children project policy questionnaire

The 21st Century Children Policy Questionnaire was circulated to the CERI Governing Board members for responses between September 2018 and February 2019. Respondents were asked to reflect their ministry or government's views along four main themes: digital technologies, emotional well-being, families and peers, and physical health.

26 countries and systems responded to the questionnaire: Australia, Belgium (Flemish Community and French Community), Canada, Czech Republic, Denmark, Finland, France, Greece, Ireland, Japan, Korea, Latvia, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Portugal, Russian Federation, Scotland (United Kingdom), Spain, Sweden, Switzerland, Turkey and the United States.

Responses were submitted by the Ministries of Education or other responsible coordinating body for Education of each system. In many cases information from other ministries was integrated, including International and Foreign Affairs, Public Health, Justice, Social Affairs, Environmental Protection and Regional Development, Culture and Sports.

The responses to this questionnaire offer a detailed illustration of the challenges that education ministries face in working to reinforce student well-being in a digital age and the innovative solutions to these challenges. The publication [Educating 21st Century Children: Emotional Well-Being in the Digital Age](#), highlights the work on emotional well-being. This current volume complements it with a focus on physical health and well-being in the digital age.

Part III: The pursuit of perfection

Part Three of this volume examines the complex interplay between physical well-being and technology and the increasing pressure for success and perfection. **Rachel Rodgers** provides an overview of the theoretical frameworks and empirical work on screen and social media and its relationship to body image. She argues that media use in children and adolescents may be related to poorer body image both through the promotion of unrealistic and unattainable appearance ideals as well as the sexualisation and objectification of individuals in media.

Sebastian Sattler explores the use of prescription drugs with the aim of enhancing the cognitive performance in children in the absence of any medical need. Although still not widespread, a non-negligible number of children and youth are at risk of side effects, while others may feel pressured to take or administer such drugs. The chapter looks at the perceptions of parents and children and what affects their decisions to use such drugs. It ends with strategies to prevent risky use.

Finally, the section ends with another angle of “the pursuit of perfection”: *The myth of the digital native: Why it persists and the harm it inflicts*. **Rebecca Eynon** challenges the assumptions behind the argument that young people are inherently a digitally savvy group, distinctively different in how they understand and use technology compared to older generations. The chapter highlights the persistence of the term despite limited empirical basis to support it, and demonstrates the negative implications it can have for some young people, particularly those already experiencing forms of social inequalities.

Part IV: Policies, practices, partnerships and the pending agenda

Part Four looks at designing and implementing policy and practice, and the kinds of partnerships and support for teachers that are required. It also sets out the pending agenda for research and policy in this area. A series of examples from countries are highlighted, drawing from the policy questionnaire.

Chapter 10 looks at *Child empowerment, well-being and inequality*, underscoring the important efforts countries have made to empower students and youth to make informed decisions for their own health and well-being. Having the knowledge and skills required allows them to be agents of change and positively impact their surroundings. However, social inequalities can undermine both health and empowerment, especially as countries are dealing with the economic uncertainty exacerbated by the COVID-19 crisis. They are thus key policy areas to target in order to ensure equitable outcomes for all children.

Chapter 11 focuses on policies for *Education and child safety* and the importance of protecting children from danger in both the physical and digital world. Despite efforts to improve child safety, almost a billion children around the world experience violence in one form or another. Many children also face risks to their digital safety, including cyberbullying and privacy concerns. The chapter highlights programmes for safe play spaces and clean air in and around schools, as well as digital security and anti-bullying initiatives. In many systems, teachers are required to take action when child safety or well-being is suspected of being at risk.

Chapter 12 looks at *Building capacity: Teacher education and partnerships*. As the needs of countries' youngest citizens change, so do policy priorities developed to address these needs. Supporting teachers to respond to new societal, economic and digital needs includes helping schools work with a diverse set of actors, some of whom (for example those from the private sector) have different aims and goals. This chapter provides a rich set of country examples of policies aimed at building teacher skills, as well as innovative cases of partnerships, both focusing on the digital skills and the physical well-being of students.

The book ends with a look to the future and the pending agenda for research and policy. **Chapter 13** highlights difficult tensions in education and society more broadly: for example, our desire for youth empowerment and the urge for a zero-risk approach to protecting children. It explores the impact the increasing pursuit for perfection has on our children, parents, teachers and schools. Gaps in our knowledge and areas for improvement are identified, followed by orientations for policy, research and practice. Education must work to stay ahead of, or at least on top of, the quickly moving curve in terms of research, policy and practice.

Concluding note

This volume takes a comprehensive look at physical health and well-being and digital technologies in childhood, and the intersections between them. Its aim is to identify key changes that may fall outside conventional education discourse and the challenges they could pose for education. It suggests possible solutions to these challenges, with the goal of providing research and policy options that will help countries in educating 21st century children, and the opportunities and challenges they face in the modern world.

Education, like all public sectors, must break down its silos and work from a more holistic perspective that cuts across government departments and research disciplines. It must work with an increasingly broad variety of actors, including the private sector. It must also evolve and grow as our societies and citizens develop, anticipating change and finding preventative solutions rather than simply reacting to problems. By analysing the available research and data from a broad range of disciplines and linking these findings to educational policy and practice, this volume will explore the potential of education systems to proactively adapt and change along with our communities and children.

References

- Aston, R. (2018), “Physical health and well-being in children and youth: Review of the literature”, *OECD Education Working Papers*, No. 170, OECD Publishing, Paris, <https://dx.doi.org/10.1787/102456c7-en>. [6]
- Baranowski, T. et al. (2012), “Impact of an active video game on healthy children’s physical activity”, *Pediatrics*, Vol. 129/3, pp. e636-42, <http://dx.doi.org/10.1542/peds.2011-2050>. [22]
- Bellissimo, N. et al. (2007), “Effect of television viewing at mealtime on food intake after a glucose preload in boys”, *Pediatric Research*, <http://dx.doi.org/10.1203/pdr.0b013e3180536591>. [25]
- Burkhauser, R., J. Neve and N. Powdthavee (2016), “Top incomes and human well-being around the world”, *CEP Discussion Papers*, <https://ideas.repec.org/p/cep/cepdps/dp1400.html>. [3]
- Burns, T. and F. Gottschalk (eds.) (2019), *Educating 21st Century Children: Emotional Well-being in the Digital Age*, Educational Research and Innovation, OECD Publishing, Paris, <https://dx.doi.org/10.1787/b7f33425-en>. [2]
- Chaudron, S., R. Di Gioia and M. Gemo (2018), *Young Children (0-8) and Digital Technology, a Qualitative Study Across Europe*, European Union, <http://dx.doi.org/10.2760/294383>. [17]
- Choi, A. (2018), “Emotional well-being of children and adolescents: Recent trends and relevant factors”, *OECD Education Working Papers*, No. 169, OECD Publishing, Paris, <https://dx.doi.org/10.1787/41576fb2-en>. [14]
- Gottschalk, F. (2019), “Impacts of technology use on children: Exploring literature on the brain, cognition and well-being”, *OECD Education Working Papers*, No. 195, OECD Publishing, Paris, <https://dx.doi.org/10.1787/8296464e-en>. [20]
- Inchley, J. et al. (eds.) (2020), *Spotlight on adolescent health and well-being. Findings from the 2017/2018 Health Behaviour in School-aged Children (HBSC) survey in Europe and Canada. International report. Volume 1. Key findings.*, WHO Regional Office for Europe, Copenhagen. [7]
- Institute for Health Metrics and Evaluation (2017), *GBD Compare | IHME Viz Hub*, <https://vizhub.healthdata.org/gbd-compare/>. [11]
- Kardefelt-Winther, D. (2017), “How does the time children spend using digital technology impact their mental well-being, social relationships and physical activity? An evidence-focused literature review”, *INNOCENTI Discussion Paper*, No. 02, UNICEF Office of Research – Innocenti, Florence. [21]
- OECD (2019), “A healthy mind in a healthy body”, *Trends Shaping Education Spotlights*, No. 17, OECD Publishing, Paris, <https://dx.doi.org/10.1787/eb25b810-en>. [13]
- OECD (2019), *Changing the Odds for Vulnerable Children: Building Opportunities and Resilience*, OECD Publishing, Paris, <https://dx.doi.org/10.1787/a2e8796c-en>. [19]
- OECD (2019), *PISA 2018 Results (Volume I): What Students Know and Can Do*, PISA, OECD Publishing, Paris, <https://dx.doi.org/10.1787/5f07c754-en>. [16]
- OECD (2019), *TALIS 2018 Results (Volume I): Teachers and School Leaders as Lifelong Learners*, TALIS, OECD Publishing, Paris, <https://doi.org/10.1787/1d0bc92a-en>. [18]

- OECD (2019), *Trends Shaping Education 2019*, OECD Publishing, Paris, [1]
https://dx.doi.org/10.1787/trends_edu-2019-en.
- OECD (2018), *Equity in Education: Breaking Down Barriers to Social Mobility*, PISA, OECD [5]
 Publishing, Paris, <https://dx.doi.org/10.1787/9789264073234-en>.
- OECD (2017), *Obesity Update 2017*, OECD Publishing, <http://www.oecd.org/health/obesity-update.htm>. [8]
- OECD (2015), *How's Life? 2015: Measuring Well-being*, OECD Publishing, Paris, [4]
https://dx.doi.org/10.1787/how_life-2015-en.
- OECD/EU (2016), *Health at a Glance: Europe 2016: State of Health in the EU Cycle*, OECD [10]
 Publishing, Paris, <https://dx.doi.org/10.1787/9789264265592-en>.
- Orben, A. and A. Przybylski (2020), "Teenage sleep and technology engagement across the [24]
 week", *PeerJ*, Vol. 8, p. e8427, <http://dx.doi.org/10.7717/peerj.8427>.
- Przybylski, A. (2019), "Digital screen time and pediatric sleep: Evidence from a preregistered [23]
 cohort study", *Journal of Pediatrics*, Vol. 205, pp. 218-223.e1,
<http://dx.doi.org/10.1016/j.jpeds.2018.09.054>.
- Przybylski, A. and N. Weinstein (2017), "A large-scale test of the Goldilocks Hypothesis", [26]
Psychological Science, Vol. 28/2, pp. 204-215, <http://dx.doi.org/10.1177/0956797616678438>.
- Reiter, J. and D. Rosen (2014), "The diagnosis and management of common sleep disorders in [9]
 adolescents", *Current Opinion in Pediatrics*, Vol. 26/4, pp. 407-412,
<http://dx.doi.org/10.1097/MOP.0000000000000113>.
- Swist, T., P. Collin and J. McCormack (2015), *Social Media and the Wellbeing of Children and [27]
 Young People: A Literature Review*, Australia: Commissioner for Children and Young People,
 Subiaco, WA.
- Ulferts, H. (2020), "Why parenting matters for children in the 21st century: An evidence-based [15]
 framework for understanding parenting and its impact on child development", *OECD
 Education Working Papers*, No. 222, OECD Publishing, Paris,
<https://dx.doi.org/10.1787/129a1a59-en>.
- Van Buren, D. and T. Tibbs (2014), "Lifestyle interventions to reduce diabetes and [12]
 cardiovascular disease risk among children", *Current Diabetes Reports*, Vol. 14/12,
<http://dx.doi.org/10.1007/s11892-014-0557-2>.

Note

¹ The choice of themes was made in conjunction with the OECD Centre for Educational Research and Innovation (CERI) Governing Board members.

2 Physical health trends in childhood

Establishing good physical health and healthy behaviours in childhood and adolescence is essential for well-being, education and health outcomes later in life. The last half century has seen a number of improvements in child and adolescent health on average across the OECD, notably the reduction of rates of accidental death and injury and a decline in alcohol consumption, smoking and teenage pregnancy. On the other hand decreasing rates of physical activity and rising levels of obesity continue to be a challenge.

Education, along with individual, community and society level factors, affects these trends. This chapter explores physical health trends in childhood, their modifiers, and some qualities of effective interventions in education. It covers knowledge gaps and research limitations, and high priority challenges faced by OECD and partner countries.

Introduction

According to the World Health Organization (WHO) “health is a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity” (WHO, 1946^[1]). Good physical health can help children and adolescents to learn in the classroom and participate in society. School, home and community-based interventions to teach and support children and families to engage in healthy lifestyle behaviours have the potential to reduce and over time reverse trends in poor physical health among children and adolescents. Education is uniquely placed to positively influence the health of students and their families while they are in the school environment, establishing and routinising healthy lifestyle behaviours for long-term physical health and well-being (Aston, 2018^[2]).

While some trends in physical health and health behaviours are improving, such as lower rates of accidental child mortality, drinking alcohol and smoking tobacco, other trends paint a less promising picture. Obesity rates are increasing and physical activity is decreasing. Diseases like cardiovascular disease and type II diabetes, generally thought of as diseases of adulthood, are now being diagnosed in children as young as two years old (Van Buren and Tibbs, 2014^[3]).

It is essential to promote healthy habits in childhood and adolescence, as many health-promoting (or undermining) behaviours persist into adulthood. For instance, regular physical activity is associated with improved working memory, and among young children it is also associated with improved academic outcomes (Felez-Nobrega et al., 2017^[4]). Individuals who have poor physical health are more likely to spend time away from school and work and tend to be less productive overall than their healthier peers (Felez-Nobrega et al., 2017^[4]).

This chapter will provide an overview of some physical health trends in children (for a fuller review see (Aston, 2018^[2])). It will explore mediators of these trends, followed by a brief discussion on improving health and well-being. It concludes with a look at high priority challenges facing education systems in OECD and partner countries.

Physical health and well-being trends and patterns

Children move less and weigh more

There is an abundance of literature demonstrating the benefits of physical activity. In the early years, physical activity, especially activity that is at least moderate-to-vigorous, is associated with motor development, fitness, and bone and skeletal health (Carson et al., 2017^[5]). For children of all ages the rule of thumb generally seems to be that more is better when it comes to physical activity and the effects on health outcomes (Carson et al., 2017^[5]; Janssen and LeBlanc, 2010^[6]).

The WHO advocates for 60 minutes per day of moderate-to-vigorous physical activity (e.g. brisk walking, playing basketball or football, bike riding etc.) for children. However, only 19% of adolescents achieve this, and according to the Health Behaviours in School-aged Children (HBSC)¹ study, activity levels have been declining since 2014 (Inchley et al., 2020^[7]), although the prevalence of insufficient physical activity has slightly decreased in boys since 2001 (Guthold et al., 2020^[8]). Only 49% of boys and 35% of girls participate in vigorous physical activity (e.g. running or playing an intense match of football or hockey) four or more times a week (Inchley et al., 2020^[7]). Active transport (walking, cycling etc.) to and from school or work has steadily declined since the early 2000s, contributing to a loss of incidental physical activity (Bassett et al., 2015^[9]; Booth, Rowlands and Dollman, 2015^[10]; Roblin, 2007^[11]).

Between 2000 and 2016, the proportion of overweight or obese children (age 5-19) doubled from one in ten children to one in five (UNICEF, 2019^[12]), although the increases in rates of obesity have plateaued since around 2000 in high-income countries (Abarca-Gómez et al., 2017^[13]). Obesity has been correlated

with depression in children and youth, with females at a higher risk than males (Quek et al., 2017^[14]). Overweight and obese youth have an increased risk of being overweight in adulthood (Singh et al., 2008^[15]), and a resulting risk of comorbidities and impact on healthcare systems in the long term.

Their eating habits have changed

According to UNICEF, “Millions of children are eating too little of what they need, and millions are eating too much of what they don’t need” (UNICEF, 2019^[12]). Poor dietary habits and nutrition are linked to health outcomes such as overweight and obesity and malnutrition, and they are also implicated in education outcomes (Behrman, 1996^[16]). Healthy diet may be predictive of quality of life and better mental health (Jacka et al., 2011^[17]). Despite increasing rates of fruit and vegetable consumption in some OECD countries (OECD/European Union, 2016^[18]), almost half of children in the HBSC study do not eat fruit or vegetables daily, and rates of breakfast consumption are declining (Inchley et al., 2020^[7]).

The proliferation of ultra-processed foods, which tend to be highly palatable and energy dense, and their consumption has been hypothesised as one of the driving factors contributing to obesity rates. A study of empty calorie (i.e. foods with little nutritional value per calorie) intake in the United States found that half of all empty calories in children’s diets came from six main sources: “soda, fruit drinks, dairy desserts, grain desserts, pizza, and whole milk” (Reedy and Krebs-Smith, 2010^[19]). Empty calorie consumption tends to be higher in older than younger children (Banfield et al., 2016^[20]). In some settings empty calorie consumption is declining: in Denmark the overall prevalence of daily sugar sweetened soft drink intake decreased from 10% to 6% between 2002 and 2018 (Holstein et al., 2020^[21]). However on average 16% of adolescents still consume them every day (Inchley et al., 2020^[7]).

They are drinking and smoking less, but illicit drug use remains stable

From 1994 to 2014 the consumption of alcohol (weekly alcohol consumption and repeated drunkenness) declined (Aston, 2018^[2]), although overall the levels of alcohol use have remained stable since then (Inchley et al., 2020^[7]). Boys are more likely than girls to have consumed alcohol in their lifetime, and about one in five 15-year-olds had been drunk twice or more in their lifetime, with one in seven having been drunk in the last 30 days. Alcohol exposure in adolescence, especially when repeated, has negative associations with attention, memory and brain development (Spear, 2018^[22]).

Similarly, tobacco use has been declining and projections for 2025 show continued reductions for most OECD countries (Aston, 2018^[2]). Since 2014, lifetime prevalence rates of smoking tobacco decreased by four percentage points for 13-year-olds and seven percentage points for 15-year-olds. Prevalence rates are similar for boys and girls, with 15% of boys and 13% of girls reporting having ever smoked cigarettes, and 7% reporting having smoked within the previous month (Inchley et al., 2020^[7]).

Despite reductions in both smoking tobacco and drinking behaviours, rates of cannabis use (which is the most popular drug used by adolescents) have remained relatively stable. Although there have been reductions in use in boys and girls in some OECD countries such as Estonia, France and Poland. About one in seven adolescents have used cannabis in their lifetime (Inchley et al., 2020^[7]). In 2015, 6% of 15-16 year-olds on average in European Union countries had reported using at least one other illicit drug (ESPAD Group, 2016^[23]). Most children who have used cannabis have also consumed alcohol and tobacco (OECD/European Union, 2018^[24]). There is a concerning growth in the use of synthetic opioids (e.g. fentanyl and related drugs) by adolescents, particularly in North America.

Box 2.1. A growing problem: Fentanyl and synthetic opioid overdoses

Fentanyl is 100 times stronger than morphine and is the strongest opioid available for medical use in humans (Chodoff and Domino, 1965^[25]). It is a legal drug, used as an anaesthetic and to treat severe pain. A synthetic opioid, this category of drug also includes Carfentanil, estimated to be about 10 000 times more potent than morphine. Carfentanil is intended for veterinary use on large animals (Janssen, 1982^[26]) and is not approved for use in humans.

In the 1970s and 1980s, products containing fentanyl and analogues appeared on the illicit drug market. The illegal manufacturing of fentanyl and analogues like carfentanil has recently risen to unprecedented levels, with the required materials for manufacture readily available online, at a low cost (UNODC, 2017^[27]). The resulting product can be shipped to market anywhere in the world.

A miniscule amount of pure fentanyl (about the size of a pinch of salt) can be fatal. In the last few years numbers of overdose deaths have risen rapidly, particularly in Canada, the United States and some European countries (OECD, 2019^[28]). This has been exacerbated by the COVID-19 crisis, with social distancing increasing isolation and making it more difficult to access services.

The prevalence of use by youth and children is not fully known. In the United States, drug overdose death rates in 15-24 year-olds increased from 3.2/100 000 to 12.6/100 000 between 1999 and 2017 (NCHS, 2019^[29]). Given these stark numbers and the fact that two in three adults treated for opioid use disorder first used opioids when they were younger than age 25, there have been increasing calls to develop a specific strategy for adolescents and young adults (Uchitel et al., 2019^[30]). Efforts include raising awareness of the problem, highlighting the specific needs of youth and young adults, and developing campaigns and outreach strategies, such as the community health tips and tools for youth and parents in Vancouver, Canada (Vancouver Coastal Health, 2020^[31]).

Children don't sleep enough or well enough

Across many countries, children are not getting sufficient sleep or sufficient good sleep. HBSC data suggests that on school days children sleep on average between 7:47 to 9:07 hours, and on non-school days this ranges from 9:31 to 10:22 hours, and in general older adolescents tend to sleep less and go to bed later than their younger counterparts (Garipey et al., 2020^[32]). On weekend days, young people tend to go to bed two or more hours later than during the week despite getting more sleep overall (Gradisar, Gardner and Dohnt, 2011^[33]). In terms of sleep quality, using data from Finnish children from the mid-1990s through the first decade of the 21st century, children reported more frequent insomnia symptoms (i.e. issues in falling asleep or staying asleep) and increased levels of tiredness (Kronholm et al., 2014^[34]). 24% of respondents in the HBSC survey reported difficulty in getting to sleep, one of the highest individual health complaints alongside nervousness and irritability (Inchley et al., 2020^[7]).

Violence, fighting and bullying are prominent risks in childhood

Violence and bullying are high on the policy agendas in many countries, with rates of bullying higher than rates of physical fighting in children (Elgar et al., 2015^[35]). Rates of bullying have declined slightly in recent years, although the overall proportion of children reporting being bullied has remained the same (Inchley et al., 2020^[7]). Violence against children can result in a number of adverse health outcomes apart from death and injury. It is linked to children engaging in risk behaviours (e.g. using drugs and alcohol) and can negatively affect child development. A number of factors influence violence against children as it is a multifaceted issue (for more on this topic see Chapter 11), but some contributing factors include low social cohesion, low education, socio-economic disadvantage, identifying as LGBTQ+ or having a disability (WHO, 2020^[36]).

Factors affecting child health and health behaviours

Gender and age

Gender differences are noted across a number of physical health trends and patterns. Boys are more likely than girls to do more physical activity, but they are also more likely to be overweight or obese. Boys are more likely to bully or cyberbully others, and while the proportion of boys and girls who are victims of traditional bullying is similar, girls are more likely to be cyberbullied (Inchley et al., 2020^[7]). While boys are slightly more likely to use cannabis than are girls (although this varies across countries and in some like Portugal and the Slovak Republic the difference is negligible), the gender gap in the use of different types of illicit drugs has narrowed slightly in recent years (OECD/European Union, 2016^[18]).

Age is also a significant modifier of trends and patterns. As children move through adolescence, they are more likely to drink alcohol and smoke tobacco than their younger counterparts. They also tend to sleep less, and they engage in less physical activity; rates of physical activity may start declining from as early as age seven (Farooq et al., 2017^[37]). Physical fighting also tends to decrease with age (OECD, 2019^[38]).

Socio-economic status

Poverty and deprivation have an impact on child health. In general, children and adolescents from more affluent families have healthier eating habits, are more likely to eat breakfast every day, sit down at the table together as a family for meals, and eat fruit and vegetables every day. Children in poorer households are less likely to eat fruit, vegetables or protein every day than their more advantaged counterparts (OECD, 2018^[39]), and have lower rates of breakfast consumption (OECD, 2017^[40]). Socio-economic status also affects physical activity levels, with children from low-affluence families engaging in less activity than their more affluent peers (Inchley et al., 2020^[7]). Across the OECD, almost one child in seven lives in income poverty.

In addition, lower levels of income and educational attainment are linked to obesity (Ahrens et al., 2014^[41]). Individuals from socio-economically disadvantaged backgrounds also have a greater tendency to engage in risky lifestyle behaviours and are more likely to have reduced access to services (cost, location, transportation) including safe facilities for physical activity and green space (OECD, 2014^[42]; OECD, 2015^[43]; OECD, 2010^[44]; Sassi et al., 2009^[45]).

Box 2.2. Green spaces for physical activity

The environment in which children live shapes opportunities for their engagement in physical activity (Wolch et al., 2011^[46]). Walkable neighbourhoods, proximity of things to do and accessible green areas together with infrastructure that permits walking and cycling are all particularly important for children as they are not able to move as far and as easily as adults (Arup, 2017^[47]). The importance of green spaces for children's health is internationally recognised in the Parma Declaration which commits to providing children with access to healthy and safe environments.

Despite potential risks such as exacerbating symptoms of asthma or allergies, green spaces may promote increased physical activity and reduced rates of obesity (Dadvand et al., 2014^[48]). It is therefore important for policy makers and urban planners to rely on objective and comparable indicators to identify the impact of such spaces on health and develop targeted interventions if necessary. Three aspects of green spaces are key (WHO, 2010^[49]):

- availability – define neighbourhood green spaces, without specifying their public or private accessibility and their proximity

- accessibility – define green spaces proximity to residences or communities, public accessibility and points of access
- use – define actual use of green spaces by individuals.

To fully enjoy both the built and natural aspects of children's environment, it is crucial to engage children, parents and the wider community to express their views and participate in the planning and evaluation of the spaces in which they live (Arup, 2017^[47]).

Relationships and families

Good relationships are good for people. Social support and a sense of belonging have been positively correlated with health perceptions and fewer physical symptoms of ill health (Hale, Hannum and Espelage, 2005^[50]), while loneliness has been associated with premature mortality and adverse mental health outcomes (Finkenauer et al., 2019^[51]).

Parents and family environments play a big role in children's health and development. For example, parents spending more time outside of the home in employment or commuting to work mean that more children are eating pre-prepared food outside of the home, which is generally related with obesity prevalence (Roblin, 2007^[11]). Early food experiences are predictive of nutrition and eating behaviours later in life, and children with poor dietary habits are thus at risk of perpetuating these throughout life (OECD, 2017^[40]; Roblin, 2007^[11]). Parents can also be barriers or enablers of physical activity. Parents who lack time and resources to role model healthy habits for their children and participate in activities together, as well as being unable to provide active opportunities serve as barriers to physical activity (Hesketh, Lakshman and van Sluijs, 2017^[52]).

Digital technologies

The increasing use of technology and changing society and family structures have also affected physical health trends (see Chapter 3 for a discussion). Research suggests use of digital technologies may have some effect on outcomes such as sleep, physical activity and dietary habits (in (Gottschalk, 2019^[53])). For example, high exposure to alcohol-related content posted by peers on social media has been correlated with higher alcohol consumption in teens (Pegg et al., 2018^[54]). However it is important to keep in mind that it is difficult to ascertain causation in these studies as they are often cross-sectional in nature and tend to rely on self-report measures which can be biased. The notion that digital screen time displaces other, more health-promoting activities is seriously contested in scholarly circles (Kardefelt-Winther, 2017^[55]).

Education

Education is an important modifier of health, and can act as a buffer against other determinants of health such as socio-economic disadvantage (Aston, 2018^[2]). It can improve both public health and health equity. As it promotes important skills such as reasoning abilities, problemsolving, and social and emotional skills it can increase individual agency, helping students feel a sense of personal control that can encourage adopting healthy habits (Hahn and Truman, 2015^[56]; Mirowsky and Ross, 2005^[57]). This can create a virtuous cycle, helping children achieve and stay in school, which is in turn linked to a series of positives: a greater likelihood of pursuing further education, having an occupation with a good income, and thus moving into a higher socio-economic strata and enjoying the health benefits associated with this (provided they still engage in healthy lifestyle behaviours) (Solar and Irwin, 2010^[58]).

Box 2.3. COVID-19, school closures and child health

In 2020, the WHO announced that COVID-19 had reached global pandemic status, triggering wide-spread school closures. By early April 2020, over 1.6 billion learners were affected by school closures across 56 countries (UNESCO, 2020^[59]).

In addition to disrupting learning, school closures affected student health. Many children rely on free or subsidised meal programmes at school, and the ways in which children typically obtain physical activity during the day including active travel to school, physical education and recess, organised sports and spending time in playgrounds were seriously curtailed (Guan et al., 2020^[60]). School closure also affected social connectedness and was linked with increases in loneliness and exposure to higher levels of domestic violence (OECD, 2020^[61]). As schools open again, ensuring access to in-school health services, resuming physical education curriculum and meal programmes and providing adequate opportunities for children to reconnect with friends are important to reinforce healthy habits.

UNICEF, the WHO and the International Federation of Red Cross/Red Crescent have produced guidelines for protecting student health in schools while COVID-19 is still a threat. These include ensuring sick children and staff do not attend school, regular and proper hand washing and promoting physical distancing. Suggested distancing practices include staggered start and end times of the school day, leaving one metre between student desks, and cancelling events like sports matches and assemblies that could create crowded conditions (UNICEF, 2020^[62]).

Effective interventions for health

In general, interventions to improve attitudes towards healthy behaviours that involve parents/caregivers in modelling healthy behaviours build healthy school environments and deliver health promotion messaging have positive effects. Specific features of intervention designs that can directly improve overall effectiveness include (Aston, 2018^[2]):

- *Community involvement in intervention design and implementation* can improve the relevance and appropriateness of the intervention to the target group, and enable intervention designs to utilise existing infrastructure and/or resources.
- *Targeting multiple behaviours and change strategies*: addressing mutually beneficial behaviours, such as dietary habits and physical activity simultaneously, can improve overall indicators such as overweight/obesity more quickly.
- *Coordinating efforts across sectors*: interventions that involve collaboration among professionals, such as health professionals and educators, can be more effective for sustained behaviour change.
- *Using digital technology*: digital resources allow for more flexible delivery and can be tailored to individuals' readiness to change their behaviours.

Health Promoting Schools

Recognising the important links between health and education, the WHO's Health Promoting Schools (HPS) framework recommends a whole-of-school approach to promoting health. HPS seeks to strengthen capacity to promote healthy living, working and learning conditions, while providing responses to the health needs of students and they focus on non-communicable risk factors for health such as diet, alcohol and tobacco use and physical activity (WHO, 2017^[63]). Some of the main features of the framework include:

- engaging diverse actors such as teachers, teacher unions, students, parents, health professionals and the community in making the school a healthy place and in promoting health in the wider community.
- providing a healthy environment with opportunities for physical activity and access to programmes for nutrition, social support, health services etc.
- providing effective skills-based health education.

HPSs aims to improve children's health by improving metrics for non-communicable health risk factors (WHO, 2017^[63]), and there is some evidence of its effectiveness (Langford et al., 2016^[64]).

Knowledge gaps and research limitations

Despite the deep body of literature, there are still elements of the interactions within and between education, physical health and well-being that are unclear and require further study.

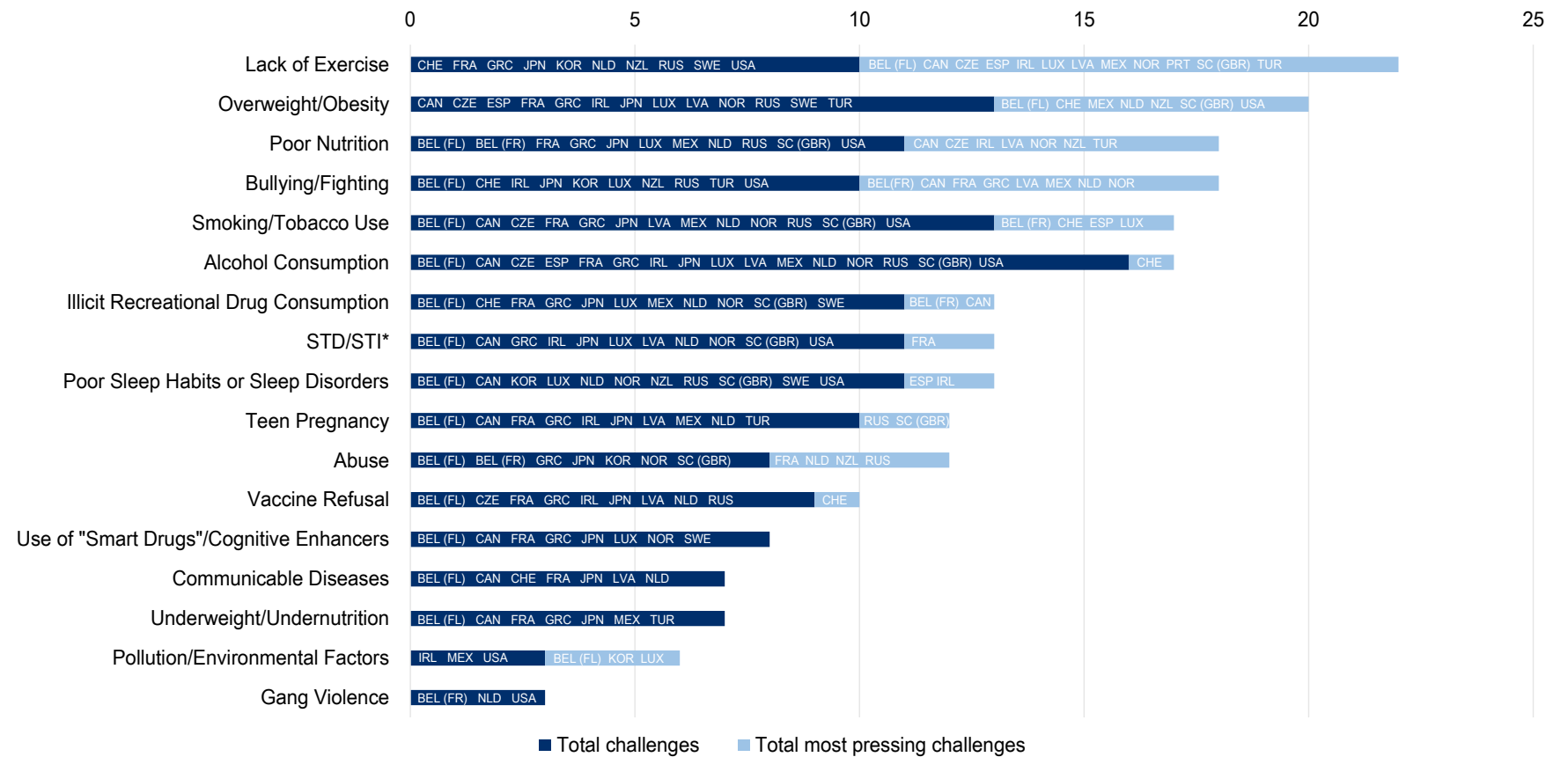
- External variables including family structure and the school environment influence physical health and well-being, yet there is an absence of data that documents the degree or magnitude of how these variables affect physical health outcomes.
- There are few published examples in the literature of intervention design and implementation plans, despite the importance of implementation on the intervention effect. There is also a paucity of longitudinal research on interventions.
- There is a need for more high quality data on how digital technologies might have an effect on physical health outcomes such as sleep and overweight, and whether they can be operationalised to improve health outcomes (i.e. active videogames or augmented reality requiring movement).
- We do not know to what degree the use of technology and the involvement of school, family, community and the broader government can maximise intervention effectiveness independent of other features of intervention design and implementation.
- Large scale national and international data often relies on self-report data from children or their parents. This can be problematic for health behaviours and other indicators such as screen time as people often have difficulty accurately reporting how much time they spend engaging in this behaviour (Boase and Ling, 2013^[65]; Orben and Przybylski, 2020^[66]).

High priority challenges in OECD countries and systems

The 21st Century Children Policy Questionnaire surveyed some of the challenges education systems around the OECD and partner countries face in terms of the physical health of children, and which of these are considered high priority in terms of policy relevance (see Figure 2.1). Systems highlighted issues such as lack of exercise, poor nutrition and overweight/obesity. These were often identified together (see Figure 2.2). Other pressing challenges include bullying and fighting, as well as smoking/tobacco use.

Fewer systems indicated that underweight/undernutrition was a concern. This is a pressing challenge in many non-OECD countries: UNICEF reports at least one in three children under the age of five is not growing well due to malnutrition (UNICEF, 2019^[12]).

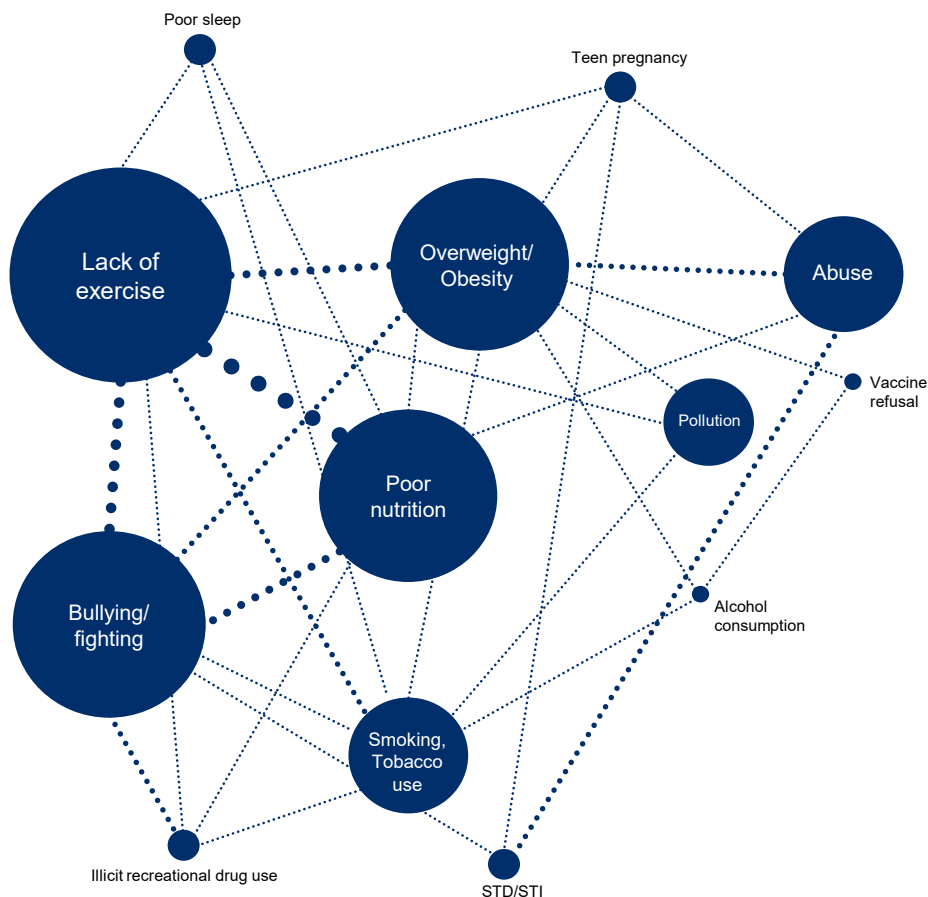
Figure 2.1. Overview of physical health challenges across countries and systems



Note: 23 of 26 systems responded to this question. X-axis is the number of systems indicating this was a challenge/pressing challenge. Number of challenges was unlimited; most pressing was limited to three options.
 *STD/STI=Sexually transmitted diseases/infections
 Source: 21st Century Children Policy Questionnaire

Figure 2.2. Links between most pressing challenges in physical health

As identified by Ministries of Education or relevant system-level educational authority



Note: The width of the connectors reflects the number of times the respective challenges were selected together. The size of the circles reflects the number of times each challenge was selected as pressing.

*STD/STI=Sexually transmitted diseases/infections

Source: 21st Century Children Policy Questionnaire

In sum

On a number of measures the physical health of children and their health behaviours are improving. However, rising rates of obesity and decreasing physical activity are cause for concern and demand effective policy action. Different stakeholders such as educators, parents and caregivers, policy makers and primary care providers play a role in supporting children's physical health. Effective co-ordination of policy action across these different groups and within the greater community is essential to promote healthy environments for children that are conducive to good health. Building capacity through teacher education and forging strategic partnerships is required to ensure all children have access to the resources and information they need to get the healthiest start in life.

References

- Abarca-Gómez, L. et al. (2017), "Worldwide trends in body-mass index, underweight, overweight, and obesity from 1975 to 2016: A pooled analysis of 2416 population-based measurement studies in 128·9 million children, adolescents, and adults", *The Lancet*, Vol. 390/10113, pp. 2627-2642, [http://dx.doi.org/10.1016/s0140-6736\(17\)32129-3](http://dx.doi.org/10.1016/s0140-6736(17)32129-3). [13]
- Ahrens, W. et al. (2014), "Prevalence of overweight and obesity in European children below the age of 10", *International Journal of Obesity*, Vol. 38/S2, pp. S99-S107, <http://dx.doi.org/10.1038/ijo.2014.140>. [41]
- Arup (2017), *Cities Alive: Designing for urban childhoods*, <https://www.arup.com/perspectives/publications/research/section/cities-alive-designing-for-urban-childhoods>. [47]
- Aston, R. (2018), "Physical health and well-being in children and youth: Review of the literature", *OECD Education Working Papers*, No. 170, OECD Publishing, Paris, <https://dx.doi.org/10.1787/102456c7-en>. [2]
- Banfield, E. et al. (2016), "Poor adherence to US dietary guidelines for children and adolescents in the national health and nutrition examination survey population", *Journal of the Academy of Nutrition and Dietetics*, Vol. 116/1, pp. 21-27, <http://dx.doi.org/10.1016/j.jand.2015.08.010>. [20]
- Bassett, D. et al. (2015), "Trends in physical activity and sedentary behaviors of united states youth", *Journal of Physical Activity and Health*, Vol. 12/8, pp. 1102-1111, <http://dx.doi.org/10.1123/jpah.2014-0050>. [9]
- Behrman, J. (1996), "The impact of health and nutrition on education", *The World Bank Research Observer*, Vol. 11/1, pp. 23-37, <http://dx.doi.org/10.1093/wbro/11.1.23>. [16]
- Boase, J. and R. Ling (2013), "Measuring mobile phone use: Self-report versus log data", *Journal of Computer-Mediated Communication*, Vol. 18/4, pp. 508-519, <http://dx.doi.org/10.1111/jcc4.12021>. [65]
- Booth, V., A. Rowlands and J. Dollman (2015), "Physical activity temporal trends among children and adolescents", *Journal of Science and Medicine in Sport*, Vol. 18/4, pp. 418-425, <http://dx.doi.org/10.1016/j.jsams.2014.06.002>. [10]
- Carson, V. et al. (2017), "Systematic review of the relationships between physical activity and health indicators in the early years (0-4 years)", *BMC Public Health*, Vol. 17, <http://dx.doi.org/10.1186/s12889-017-4860-0>. [5]
- Chodoff, P. and E. Domino (1965), "Comparative pharmacology of drugs used in neuroleptanalgesia", *Anesthesia and Analgesia*, Vol. 44/5, pp. 558-563. [25]
- Dadvand, P. et al. (2014), "Risks and benefits of green spaces for children: A cross-sectional study of associations with sedentary behavior, obesity, asthma, and allergy", *Environmental Health Perspectives*, Vol. 122/12, pp. 1329-1335, <http://dx.doi.org/10.1289/ehp.1308038>. [48]
- Elgar, F. et al. (2015), "Structural determinants of youth bullying and fighting in 79 countries", *Journal of Adolescent Health*, Vol. 57/6, pp. 643-650, <http://dx.doi.org/10.1016/J.JADOHEALTH.2015.08.007>. [35]

- ESPAD Group (2016), *ESPAD Report 2015: Results from the European School Survey Project on Alcohol and Other Drugs*, Publications Office of the European Union, Luxembourg, <http://www.espad.org/sites/espad.org/files/TD0116475ENN.pdf>. [23]
- Farooq, M. et al. (2017), "Timing of the decline in physical activity in childhood and adolescence: Gateshead Millennium Cohort Study", *British Journal of Sports Medicine*, Vol. 52/15, pp. 1002-1006, <http://dx.doi.org/10.1136/bjsports-2016-096933>. [37]
- Felez-Nobrega, M. et al. (2017), "The association of context-specific sitting time and physical activity intensity to working memory capacity and academic achievement in young adults", *European Journal of Public Health*, Vol. 27/4, pp. 741-746, <http://dx.doi.org/10.1093/eurpub/ckx021>. [4]
- Finkenauer, C. et al. (2019), "The social context of adolescent relationships", in *Educating 21st Century Children: Emotional Well-being in the Digital Age*, OECD Publishing, Paris, <https://dx.doi.org/10.1787/f71c8860-en>. [51]
- Garipey, G. et al. (2020), "How are adolescents sleeping? Adolescent sleep patterns and sociodemographic differences in 24 European and North American countries", *Journal of Adolescent Health*, Vol. 66/6, pp. S81-S88, <http://dx.doi.org/10.1016/j.jadohealth.2020.03.013>. [32]
- Gottschalk, F. (2019), "Impacts of technology use on children: Exploring literature on the brain, cognition and well-being", *OECD Education Working Papers*, No. 195, OECD Publishing, Paris, <https://dx.doi.org/10.1787/8296464e-en>. [53]
- Gradisar, M., G. Gardner and H. Dohnt (2011), "Recent worldwide sleep patterns and problems during adolescence: A review and meta-analysis of age, region, and sleep", *Sleep Medicine*, Vol. 12/2, pp. 110-118, <http://dx.doi.org/10.1016/j.sleep.2010.11.008>. [33]
- Guan, H. et al. (2020), "Promoting healthy movement behaviours among children during the COVID-19 pandemic", *The Lancet Child & Adolescent Health*, Vol. 4/6, pp. 416-418, [http://dx.doi.org/10.1016/s2352-4642\(20\)30131-0](http://dx.doi.org/10.1016/s2352-4642(20)30131-0). [60]
- Guthold, R. et al. (2020), "Global trends in insufficient physical activity among adolescents: A pooled analysis of 298 population-based surveys with 1·6 million participants", *The Lancet Child & Adolescent Health*, Vol. 4/1, pp. 23-35, [http://dx.doi.org/10.1016/s2352-4642\(19\)30323-2](http://dx.doi.org/10.1016/s2352-4642(19)30323-2). [8]
- Hahn, R. and B. Truman (2015), "Education improves public health and promotes health equity", *International Journal of Health Services*, Vol. 45/4, pp. 657-678, <http://dx.doi.org/10.1177/0020731415585986>. [56]
- Hale, C., J. Hannum and D. Espelage (2005), "Social Support and Physical Health: The Importance of Belonging", *Journal of American College Health*, Vol. 53/6, pp. 276-284, <http://dx.doi.org/10.3200/JACH.53.6.276-284>. [50]
- Hesketh, K., R. Lakshman and E. van Sluijs (2017), "Barriers and facilitators to young children's physical activity and sedentary behaviour: A systematic review and synthesis of qualitative literature", *Obesity Reviews*, Vol. 18/9, pp. 987-1017, <http://dx.doi.org/10.1111/obr.12562>. [52]
- Holstein, B. et al. (2020), "Intake of sugar sweetened soft drinks among adolescents: Trends and social inequality in Denmark 2002-2018", *Nutrition and Health*, Vol. 26/1, pp. 3-8, <http://dx.doi.org/10.1177/0260106019900742>. [21]

- Inchley, J. et al. (eds.) (2020), *Spotlight on adolescent health and well-being. Findings from the 2017/2018 Health Behaviour in School-aged Children (HBSC) survey in Europe and Canada. International report. Volume 1. Key findings.*, WHO Regional Office for Europe, Copenhagen. [7]
- Jacka, F. et al. (2011), "A prospective study of diet quality and mental health in adolescents", *PLoS ONE*, Vol. 6/9, p. e24805, <http://dx.doi.org/10.1371/journal.pone.0024805>. [17]
- Janssen, I. and A. LeBlanc (2010), "Systematic review of the health benefits of physical activity and fitness in school-aged children and youth", *International Journal of Behavioral Nutrition and Physical Activity*, pp. 1-16, <http://dx.doi.org/10.1186/1479-5868-7-40>. [6]
- Janssen, P. (1982), "Potent, new analgesics, tailor-made for different purposes", *Acta Anaesthesiologica Scandinavica*, Vol. 26/3, pp. 262-268, <http://dx.doi.org/10.1111/j.1399-6576.1982.tb01765.x>. [26]
- Kardefelt-Winther, D. (2017), "How does the time children spend using digital technology impact their mental well-being, social relationships and physical activity? An evidence-focused literature review", *INNOCENTI Discussion Paper*, No. 02, UNICEF Office of Research – Innocenti, Florence. [55]
- Kronholm, E. et al. (2014), "Trends in self-reported sleep problems, tiredness and related school performance among Finnish adolescents from 1984 to 2011", *Journal of Sleep Research*, Vol. 24/1, pp. 3-10, <http://dx.doi.org/10.1111/jsr.12258>. [34]
- Langford, R. et al. (2016), "The health promoting schools framework: Known unknowns and an agenda for future research", *Health Education & Behavior*, Vol. 44/3, pp. 463-475, <http://dx.doi.org/10.1177/1090198116673800>. [64]
- Mirowsky, J. and C. Ross (2005), "Education, learned effectiveness and health", *London Review of Education*, <http://dx.doi.org/10.1080/14748460500372366>. [57]
- NCHS (2019), *NCHS Data Brief Number 329*, https://www.cdc.gov/nchs/data/databriefs/db329_tables-508.pdf. [29]
- OECD (2020), "Coronavirus special edition: Back to school", *Trends Shaping Education Spotlights*, No. 21, OECD Publishing, Paris, <https://dx.doi.org/10.1787/339780fd-en>. [61]
- OECD (2019), *Addressing Problematic Opioid Use in OECD Countries*, OECD Health Policy Studies, OECD Publishing, Paris, <https://dx.doi.org/10.1787/a18286f0-en>. [28]
- OECD (2019), *PISA 2018 Results (Volume III): What School Life Means for Students' Lives*, PISA, OECD Publishing, Paris, <https://dx.doi.org/10.1787/acd78851-en>. [38]
- OECD (2018), "Poor children in rich countries: Why we need policy action", *Policy brief on child well-being*, <http://www.oecd.org/els/family/Poor-children-in-rich-countries-Policy-brief-2018.pdf>. [39]
- OECD (2017), *PISA 2015 Results (Volume III): Students' Well-Being*, PISA, OECD Publishing, Paris, <https://dx.doi.org/10.1787/9789264273856-en>. [40]
- OECD (2015), *How's Life? 2015: Measuring Well-being*, OECD Publishing, Paris, https://dx.doi.org/10.1787/how_life-2015-en. [43]

- OECD (2014), *OECD Factbook 2014: Economic, Environmental and Social Statistics*, OECD Publishing, Paris, <https://dx.doi.org/10.1787/factbook-2014-en>. [42]
- OECD (2010), *Obesity and the Economics of Prevention: Fit not Fat*, OECD Publishing, Paris, <https://dx.doi.org/10.1787/9789264084865-en>. [44]
- OECD/European Union (2018), *Health at a Glance: Europe 2018: State of Health in the EU Cycle*, OECD Publishing, Paris/European Union, Brussels, https://dx.doi.org/10.1787/health_glance_eur-2018-en. [24]
- OECD/European Union (2016), *Health at a Glance: Europe 2016: State of Health in the EU Cycle*, OECD Publishing, Paris, <https://dx.doi.org/10.1787/9789264265592-en>. [18]
- Orben, A. and A. Przybylski (2020), "Teenage sleep and technology engagement across the week", *PeerJ*, Vol. 8, p. e8427, <http://dx.doi.org/10.7717/peerj.8427>. [66]
- Pegg, K. et al. (2018), "The role of online social identity in the relationship between alcohol-related content on social networking sites and adolescent alcohol use", *Cyberpsychology, Behavior, and Social Networking*, Vol. 21/1, pp. 50-55, <http://dx.doi.org/10.1089/cyber.2016.0665>. [54]
- Quek, Y. et al. (2017), "Exploring the association between childhood and adolescent obesity and depression: A meta-analysis", *Obesity Reviews*, Vol. 18/7, pp. 742-754, <http://dx.doi.org/10.1111/obr.12535>. [14]
- Reedy, J. and S. Krebs-Smith (2010), "Dietary sources of energy, solid fats, and added sugars among children and adolescents in the united states", *Journal of the American Dietetic Association*, Vol. 110/10, pp. 1477-1484, <http://dx.doi.org/10.1016/j.jada.2010.07.010>. [19]
- Roblin, L. (2007), "Childhood obesity: Food, nutrient, and eating-habit trends and influences", *Applied Physiology, Nutrition, and Metabolism*, Vol. 32/4, pp. 635-645, <http://dx.doi.org/10.1139/h07-046>. [11]
- Sassi, F. et al. (2009), "The obesity epidemic: analysis of past and projected future trends in selected OECD countries", *OECD Health Working Papers*, No. 45, OECD Publishing, Paris, <https://dx.doi.org/10.1787/225215402672>. [45]
- Singh, A. et al. (2008), "Tracking of childhood overweight into adulthood: a systematic review of the literature", *Obesity Reviews*, Vol. 9/5, pp. 474-488, <http://dx.doi.org/10.1111/j.1467-789x.2008.00475.x>. [15]
- Solar, O. and A. Irwin (2010), *A conceptual framework for action on the social determinants of health. Social Determinants of Health Discussion Paper 2 (Policy and Practice)*, World Health Organization, Geneva, https://www.who.int/sdhconference/resources/ConceptualframeworkforactiononSDH_eng.pdf. [58]
- Spear, L. (2018), "Effects of adolescent alcohol consumption on the brain and behaviour", *Nature Reviews Neuroscience*, Vol. 19/4, pp. 197-214, <http://dx.doi.org/10.1038/nrn.2018.10>. [22]
- Uchitel, J. et al. (2019), *The Opioid Epidemic: A Needed Focus On Adolescents And Young Adults*, <http://dx.doi.org/10.1377/hblog20191115.977344>. [30]
- UNESCO (2020), *COVID-19 Educational Disruption and Response*, <https://en.unesco.org/themes/education-emergencies/coronavirus-school-closures>. [59]

- UNICEF (2020), *Key Messages and Actions for COVID-19 Prevention and Control in Schools*, [62]
https://www.unicef.org/media/65716/file/Key%20Messages%20and%20Actions%20for%20COVID-19%20Prevention%20and%20Control%20in%20Schools_March%202020.pdf.
- UNICEF (2019), *The State of the World's Children 2019. Children, Food and Nutrition: Growing well in a changing world*, UNICEF, New York. [12]
- UNODC (2017), "Fentanyl and its analogues- 50 years on", *Global Smart Update*, Vol. 17, [27]
https://www.unodc.org/documents/scientific/Global_SMART_Update_17_web.pdf.
- Van Buren, D. and T. Tibbs (2014), "Lifestyle interventions to reduce diabetes and cardiovascular disease risk among children", *Current Diabetes Reports*, Vol. 14/12, [3]
<http://dx.doi.org/10.1007/s11892-014-0557-2>.
- Vancouver Coastal Health (2020), <http://www.vch.ca/public-health/harm-reduction/overdose-prevention-response>. [31]
- WHO (2020), *Violence against children fact sheet*, <https://www.who.int/news-room/fact-sheets/detail/violence-against-children>. [36]
- WHO (2017), *Health promoting schools: An effective approach to early action on noncommunicable disease risk factors*, [63]
<https://apps.who.int/iris/bitstream/handle/10665/255625/WHO-NMH-PND-17.3-eng.pdf?sequence=1>.
- WHO (2010), *Urban Green Spaces: A Brief For Action*, WHO Regional Office for Europe. [49]
- WHO (1946), *Preamble to the Constitution of WHO*, <https://www.who.int/about/who-we-are/frequently-asked-questions>. [1]
- Wolch, J. et al. (2011), "Childhood obesity and proximity to urban parks and recreational resources: A longitudinal cohort study", *Health & Place*, Vol. 17/1, pp. 207-214, [46]
<http://dx.doi.org/10.1016/j.healthplace.2010.10.001>.

Note

¹ The 2018 HBSC report presents key findings from 227 441 young people from 45 countries and regions across Europe and Canada.

3

Children and digital technologies: Trends and outcomes

Digital technologies are an integral part of children's lives in the 21st century. Children spend more time in the digital environment than ever before and at younger ages. However, despite the increase in access and use, digital inequalities are still present and prevent the most vulnerable children from building the digital skills they need for education and life in general in the 21st century. Successful policies need to balance the potential opportunities with risks, while ensuring that all children have the knowledge and skills to fully navigate and participate in digital spheres. This chapter provides an overview of some recent trends in children's digital technology access and use, and highlights some policy challenges faced by education systems.

Introduction

At the end of 2017, the number of high speed mobile subscriptions in OECD countries reached a milestone: more subscriptions than the number of people (OECD, 2017^[1]). The Internet has permeated our lives, and that of our children. This begs the questions: What are the trends in use of technology in children, what is the impact of this use on their health and well-being, and what does this mean for education?

Children's experiences are increasingly characterised by the use of digital technologies, disrupting the divide between the physical and virtual world. The digital environment provides children with many opportunities, but it also exposes them to risks. Participation in the digital environment must therefore be balanced with protection, ensuring that children have the knowledge, skills and resilience to identify and manage digital risks.

Digital inequalities must also be considered when accounting for children's Internet access, knowledge and skills. School closures and digital teaching and learning due to the COVID-19 pandemic repositioned these issues high on the policy agenda. To ensure learning was not disrupted for their children, many families around the OECD, specifically the most disadvantaged, faced several challenges such as access to suitable devices and broadband connectivity

This chapter explores trends in children's access and use of digital technologies in the 21st century. It looks at how children engage in the digital world, and the risks and opportunities this affords. In addition, the chapter will provide insights on the relationship between digital technologies and physical health and well-being, reviewing some of the literature in this realm.

Trends in children's use of digital technologies

Children are more connected than ever before

Children are increasingly using digital technologies from younger ages. Children now tend to have their first experience with digital technologies before the age of two, often before they can walk or talk (Chaudron, Di Gioia and Gemo, 2018^[2]). In England (United Kingdom), Estonia and the United States, on average 83% of five-year-olds use a digital device at least once a week, with 42% using it every day (OECD, 2020^[3]). Rates in home Internet access in the 21st century are also unprecedented. From 2009 to 2018, the proportion of 15-year-olds in OECD countries with home Internet access increased from 85% to over 95% (OECD, 2019^[4]). In addition both Internet quality and the expansion of mobile Internet services have risen in this time period.

With this rise in connectivity, children are spending more time in the digital environment. Across the OECD, time by 15-year-olds increased from 23 hours per week in 2015 to 27 hours per week in 2018 (OECD, 2019^[4]). In Europe, children's estimated time spent on the Internet ranges from 134 minutes per day in Switzerland to 219 minutes per day in Norway, with little variation between boys and girls (Smahel et al., 2020^[5]).

While computers used to be the device of choice for young people to navigate digital environment, the popularity of devices such as tablets and smartphones has constantly increased, exceeding that of computers (Ofcom, 2020^[6]; UNICEF, 2019^[7]). With the shift to more mobile connectivity, and the ability to check messages and notifications at any time during the day, it becomes increasingly difficult to get an accurate estimate of children's time spent in digital spaces. Furthermore, to make matters more complicated, as children increasingly watch videos on the Internet they might not perceive this as spending time on the Internet (Smahel et al., 2020^[5]). This highlights some of the issues around relying on self-report measures when studying these trends.

Box 3.1. Digital opportunities and risks in young children

Young children are avid consumers of digital technologies. Studies in the United Kingdom and the Netherlands showed that by ages five to seven (and sometimes earlier) the majority of young children have mastered the basic skills needed to independently use touchscreen technologies, such as swiping, tapping and navigating desired apps, (Blum-Ross et al., 2018^[8]). Younger children actively engage with digital devices to express themselves. Incorporating using touchscreens into their play also provides them with autonomous ways of engaging in multisensory opportunities (Neumann, 2014^[9]), stimulating their imagination and creativity (Chaudron, Di Gioia and Gemo, 2018^[2]). Younger children usually also play educational and non-educational games (Griffith and Arnold, 2018^[10]).

Despite the opportunities, younger children's use of digital technologies also comes with risks. In a study of 135 apps, Meyer (2019^[11]) found that 39 apps targeting children aged 12 months to 5 years old contained at least one type of advertising that could be misleading or not age-appropriate. This is of particular concern as research suggests that younger children are more vulnerable than their older counterparts to digital risk and have little understanding of privacy rules or the consequences of their actions online (Livingstone and Stoilova, 2018^[12]). Even if basic digital skills are already developed, young children still need effective support and guidance to responsibly engage in digital activities.

Children's digital activities vary

Children engage in a range of digital activities. Across the OECD, 93% of 15 year-olds reported chatting online as one of their most frequently engaged in activities (OECD, 2019^[4]). Social media presence is also high in many countries, as young people claim it can make them feel connected and supported. For example in the United States 97% of teens aged 13-17 are active on at least one social media platform (Pew Research Center, 2018^[13]). Boys in particular tend to be more likely to discuss their personal issues in the digital environment, however the majority of young people prefer speaking face to face when discussing feelings or concerns (Inchley et al., 2020^[14]). Worryingly, a small proportion of young children also have social media profiles, which violates many platforms' age policies (e.g. Facebook, Instagram, Snapchat, Tumblr and Twitter all have a 13+ age policy).

Children also tend to use digital tools for entertainment. TikTok is an increasingly popular video-sharing platform, with children in some countries reporting that they spend at least one hour per day on it (Qustodio, 2020^[15]). According to a sample of 14 children from the United Kingdom, during the COVID-19 lockdown most used the app for several hours per day to "kill time", or to post their own content (either original or reposting content of others) (Ofcom, 2020^[6]). Other video platforms that are popular with children are YouTube and Netflix (Ofcom, 2020^[6]).

Playing video games is also a common activity. On average in Spain, the United Kingdom and the United States, 4-15 year-old children spend around one hour per day playing mobile game apps (Qustodio, 2020^[15]), although there is considerable variation across other countries (Smahel et al., 2020^[5]). In the United Kingdom, 59% of 5-15 year-olds play digital games. The majority of gamers are boys, although the proportion of girls who play videogames has risen from 38-49% from 2018-2019 (Ofcom, 2020^[6]). During the COVID-19 lockdowns, playing videogames became even more popular. The #PlayApartTogether initiative, highlighting the potential for multiplayer games to provide much-needed social interactions while respecting physical distancing guidelines, was even promoted by the World Health Organization.

The digital environment not only provides opportunities for socialising and having fun. It also allows children to develop their civic identity, discuss political issues and get involved with virtual campaigns or protests (Cho, Byrne and Pelter, 2020^[16]). Fostering digital civic engagement is important as it is correlated with 'real' offline political participation such as voting (Cho, Byrne and Pelter, 2020^[16]).

Evolution of digital play: Internet-connected toys

Digital technologies are moving beyond the screen. The Internet of Things (IoT) refers to objects that, when tagged, can communicate with other tagged objects (Pascual-Espada et al., 2011^[17]). Among the growing world of the IoT is the Internet of Toys (IoTos), in which software-enabled toys are wirelessly connected to other toys or databases. These can relate one-on-one to children, presenting opportunities for personalised play and learning and the accessibility of functions such as programming and three-dimensional design (Holloway and Green, 2016^[18]; Mascheroni and Holloway, 2017^[19]).

As the prevalence of Internet-connected toys is projected to increase (Mascheroni and Holloway, 2017^[19]), it is important for both consumers and parents to understand how they work and the implications for their children. This is especially important in terms of privacy protection (e.g. checking if the toy is certified to comply with laws to protect children's privacy (McReynolds et al., 2017^[20]). In addition to privacy and security, there are also social and ethical concerns, for example, the extent to which children perceive IoTos as human and how this impacts their development (Blum-Ross et al., 2018^[8]).

Box 3.2. Social robots and child health behaviours

Social robots are increasingly used to support children's development and respond to their needs. These robots can assist children in performing healthier behaviours, by providing information, exercise demonstration, feedback and support (Dawe et al., 2019^[21]). Recent studies have showed that bonding with social robots helps children with chronic diseases to be educated and motivated for compliance to health treatments (Sinoo et al., 2018^[22]). Other studies have showed how social robots have been successful in contributing to the consumption of healthier snacks (Belpaeme et al., 2018^[23]) and the prevention of childhood obesity (Triantafyllidis et al., 2019^[24]).

During the COVID-19 pandemic, the need to reinforce hand-washing behaviours in children prompted researchers to create social robots: the University of Southern Denmark (SDU), for example, created a child-friendly elephant robot equipped with an intelligent camera able to detect when children are approaching and reminding them to wash their hands by providing soap and/or sanitiser (SDU, 2020^[25]). This might motivate children to engage in this behaviour more frequently as part of their daily routine, reducing the spread of infectious diseases such as COVID-19.

Despite these opportunities, there are still issues around security of data as well as child-robot interactions, namely how children perceive and interact with robots and how that influences their development and learning. While many studies have showed that children usually create a form of friendship with them, developing feelings for them (Sinoo et al., 2018^[22]), others have showed how children might instead develop aggressive behaviour towards them (Brščić et al., 2015^[26]). Further exploring forms of child-robot interactions is therefore crucial in order to understand their possible educative and supportive role, while being aware of their limits and challenges.

Digital inequalities are present across OECD countries

Factors such as gender, socio-economic background and age are correlated with children's digital access and opportunities, affecting how autonomously and frequently they engage in digital activities and the type of activities they engage in (Mascheroni and Ólafsson, 2016^[27]). Digital inequalities are important elements for policy makers to address as they have the potential to both reinforce and exacerbate existing social inequalities (DiMaggio and Garip, 2012^[28]).

On average gender differences in Internet access and use remain modest in most OECD countries, with a small trend for 15 year-old boys to outperform their female peers. Disadvantaged students tend to face

barriers to device ownership and Internet access, and tend to have lower digital skill levels on average and are less likely than advantaged students to use the Internet to read the news or to obtain practical information (OECD, 2019^[41]). More generally, disadvantaged individuals tend to use their smartphones more and perform less news and information activities on their devices, which may contribute to widening digital inequalities (Tsetsi and Rains, 2017^[29]).

Box 3.3. Inequalities, COVID-19 and learning gaps

As schools closed due to COVID-19, many countries faced the reality that many students, especially those from socio-economically disadvantaged households, lacked the access, skills and support to effectively keep learning in the digital environment. While on average across the OECD nine in ten students have access to digital devices and Internet at home, students in advantaged schools are 15% more likely to have access to a computer for school work than their peers in disadvantaged schools. In addition, in many homes devices may need to be shared among parents and siblings, impeding many students from following lessons during school closures (OECD, 2020^[30]).

For instance, in the United States, around 15% of households with school-age children lack high speed Internet connection at home; such students faced a digital “homework gap” – a lack of connectivity to complete schoolwork at home (Auxier and Anderson, 2020^[31]). In Europe, many children live in homes with no suitable place to do homework (5%) or lack access to the Internet (6/9%) (Van Lancker and Parolin, 2020^[32]). Reaching all students, especially those most disadvantaged, and giving them the support they need is crucial to support them in their learning.

Digital divides not only separate the connected and the unconnected. They also reflect how children use digital tools and the quality of their digital experiences (UNICEF, 2017^[33]). The literature points to three main categories of “digital divides” or inequalities:

- The “first-level digital divide” – the gap between those who have Internet and device access and those who do not. Although this divide is decreasing, children still face barriers to material access, as well as access to the Internet (van Deursen and van Dijk, 2018^[34]). Internet quality is also an issue in some countries, with many students lacking access to broadband of sufficient quality to follow digital lessons, especially evident during COVID-19 school closures.
- The “second-level digital divide” – inequalities in skills and usage patterns (Hargittai, 2002^[35]). Access to digital technologies does not ensure equality of opportunities, and children require adequate skills in order to make full use of digital opportunities and to protect themselves from risk.
- The “third-level digital divide” refers to inequalities in offline outcomes (e.g. material or social benefits/outcomes). The inability to make use of digital opportunities may be magnifying existing offline inequalities (Hoofdt Graafland, 2018^[36]).

Balancing digital opportunities and risks

Digital opportunities and risks go hand in hand. Efforts to maximise digital opportunities can also expose children to risks. However, efforts to limit risks and digital exposure can limit children’s opportunities (Livingstone et al., 2011^[37]). Concerns over the increasing privacy risks and “datafication” of children are on the rise, requiring adequate legislative and policy responses (OECD, 2020^[38]; Siibak, 2019^[39]).

When something bad happens online, research shows that 41% of children tend to talk to their parents and 49% to their friends (Smahel et al., 2020^[5]). Educating parents about the opportunities and risks of the digital world is thus crucial. Parental mediation strategies and support from family, friends and teachers (Helsper, 2017^[40]) are key to building responsible citizens and promoting children’s digital resilience. However, the least knowledgeable parents are reported to be more prone to strongly restricting access to

digital technologies (Chaudron, Di Gioia and Gemo, 2018^[2]), which can limit children's development of digital skills (Global Kids Online, 2019^[41]).

Schools are also important actors in promoting children's digital literacy and resilience. Children tend to be more aware of the risks associated with using digital technologies if schools integrate specific programmes on these topics in the curriculum (Chaudron, Di Gioia and Gemo, 2018^[2]). Training teachers in digital risks and implications, and fostering a zero-tolerance approach to behaviours such as cyberbullying are other effective ways for schools to promote resilience (Burns and Gottschalk, 2019^[42]).

Box 3.4. Break the fake

During the COVID-19 pandemic, the strict physical distancing measures made people more reliant on social media and the Internet in general to engage in human interaction and share information about the virus (Limaye et al., 2020^[43]). However, the abundance of information on the virus, defined as an "infodemic" by the World Health Organization, has become a major threat to public health as many people found it hard to detect trustworthy sources (The Lancet, 2020^[44]). The majority of information has been focused on adults, leaving children with many fears and anxieties about the virus (Livingstone, 2020^[45]).

It is important to make sure that children have the skills and knowledge to identify and share trustworthy digital information. Yet, research shows that it can be difficult for children to make the distinction between misinformation and good information and they might have different interpretations of what constitute a trustworthy source of news (OECD, 2020^[46]). It is therefore crucial to teach children how to find and verify digital information. [Break the Fake](#), for example, was launched in 2019 by Canada's Centre for Digital and Media Literacy and helps teach skills to verify information and identify reputable sources. The four main steps are: (i) Check where the information comes from and (ii) if it comes from a trustworthy source, (iii) check what public health authorities and government are saying and then, once you have checked the information, (iv) share it in your network.

Digital technology use and children's physical health

The increasing use of digital technologies and devices has raised questions about their impact on the health and development of children (OECD, 2019^[47]). In particular, there are worries about screen time negatively affecting children's physical health, influencing hours of sleep, engagement with physical activity and obesity. A review of the literature highlights the need to better investigate the links between technology use and child outcomes, by engaging in longitudinal studies and exploring how and why children use technology (Gottschalk, 2019^[48]). It also suggests potential positive benefits that are often overlooked, for example: the accessible, often anonymous and peer-based features of the Internet might increase young people's access to health and well-being information, encouraging help-seeking behaviours as well as receiving peer support and professional services (Swist, Collin and McCormack, 2015^[49]).

Some key take-aways from the literature include (see (Gottschalk, 2019^[48]) for a fuller overview):

- *Physical activity*: A review of literature suggests that reducing screen time may not motivate adolescents and children to engage more in physical activity (Kardefelt-Winther, 2017^[50]). Active video games and global phenomena such as *Pokémon GO!* have also shifted how children engage with digital tools, requiring a certain level of movement to participate. However, simply providing children with access to active video games is unlikely to provoke spontaneous engagement in more activity and may not provide a public health benefit (Baranowski et al., 2012^[51]).

- *Sleep*: excessive screen-time can affect sleep quality (Aston, 2018^[52]) by delaying bedtimes, lengthening sleep onset (Cheung et al., 2017^[53]), shortening sleeping hours and delaying melatonin secretion (a sleep-promoting hormone) (Higuchi et al., 2005^[54]). Interactive screen time such as playing videogames is reported to be more harmful to sleep quality in comparison to passive screen time, such as watching television (Hale and Guan, 2015^[55]). However, recent studies suggest that the real reduction in sleep time associated with digital engagement is small, maybe only a matter of a few minutes, underlining the importance of studying contextual factors surrounding screen time and paediatric sleep (Przybylski, 2019^[56]; Orben and Przybylski, 2020^[57]).
- *Obesity*: Over recent decades, extended screen time has also been linked to obesity in children (Subrahmanyam et al., 2000^[58]). One way in which this might happen is through mindless eating while watching television (Bellissimo et al., 2007^[59]). However, again the relationship is not clear and there are other important factors that might play a role, such as targeted advertising and marketing of unhealthy foods and sugar-sweetened beverages to children (Inchley et al., 2020^[14]).

Areas for further research

Despite the proliferation of research on this topic, there are still many unknowns. Currently, gaps in the research base include (see (Burns and Gottschalk, 2019^[42]) for a fuller review):

- There is a paucity of research on young children.
- There is restricted coverage of countries and contexts, with much research concentrated on higher-income English-speaking and/or European countries.
- There is a heavy emphasis on risks of digital technology use, with not enough knowledge on digital opportunities.
- There is a strong focus on certain risks (e.g. cyberbullying) while others remain relatively unstudied (e.g. cyber-bystanders, or children who witness cyberbullying).
- Research lags behind the rate of technological development especially in terms of digital platforms used by children.
- There is a heavy emphasis on self-report measures, which are difficult to rely on especially in terms of screen time.
- Research regarding well-being tends to be weak, focusing on correlational results often using poor research methodologies, with few longitudinal studies.

Developing successful policy solutions

The diversity in children's experiences and of social, cultural and economic contexts make it complex to develop policy measures that provide children with the access, skills and knowledge to responsibly engage with the digital world. Generally, policies focus on improving the technological infrastructure and material access to the Internet for all children, while fostering digital skills development. The issue of affordability and quality of Internet access is high on the agenda, particularly with the COVID-19 pandemic.

To allow children to fully exploit digital opportunities while being able to recognise and manage digital risks, successful policies should emphasise building children's digital skills and resilience. Promoting the development of children's digital skills requires a coordinated effort including providing hardware in schools, teacher training and professional development opportunities, as well as supporting the integration and implementation of digital tools in the curriculum (Hooft Graafland, 2018^[36]). Successful policies need to pay particular attention to the most vulnerable children, many of whom are still excluded from the digital world due to social and cultural barriers, unequal access and participation, higher-order skills and literacies

and poor integration with information and services. It is essential to also ensure that the voices and views of children are always included in the debate (Livingstone and Third, 2017^[60]; Hooft Graafland, 2018^[36]).

The 21st Century Children Policy Questionnaire asked systems to identify the most pressing challenges they faced in their national or regional context. Burns and Gottschalk (2019^[42]) provide an overview of those responses and the interactions between them (see Figure 3.1 for a recap). Cyberbullying was the challenge most consistently at the forefront of the policy agenda, with concerns around digital outcomes and emotional well-being highlighted.

Often, programmes targeting behaviours such as cyberbullying feature a digital citizenship component. For example, in 2012 Common Sense Media developed a media education programme for digital citizenship education, with foci on topics such as cyberbullying, copyright and privacy (Common Sense Media, 2012^[61]). Digital citizenship education can be both a preventative and a reactive measure to digital behavioural issues.

Inequality and digital divides were also highlighted as key concerns, especially for large countries and those with large rural populations. It should be noted that this questionnaire was administered in 2018; as the COVID-19 pandemic made clear, large differences exist within and between OECD countries regarding provision and quality of broadband, although this is not reflected in these results.

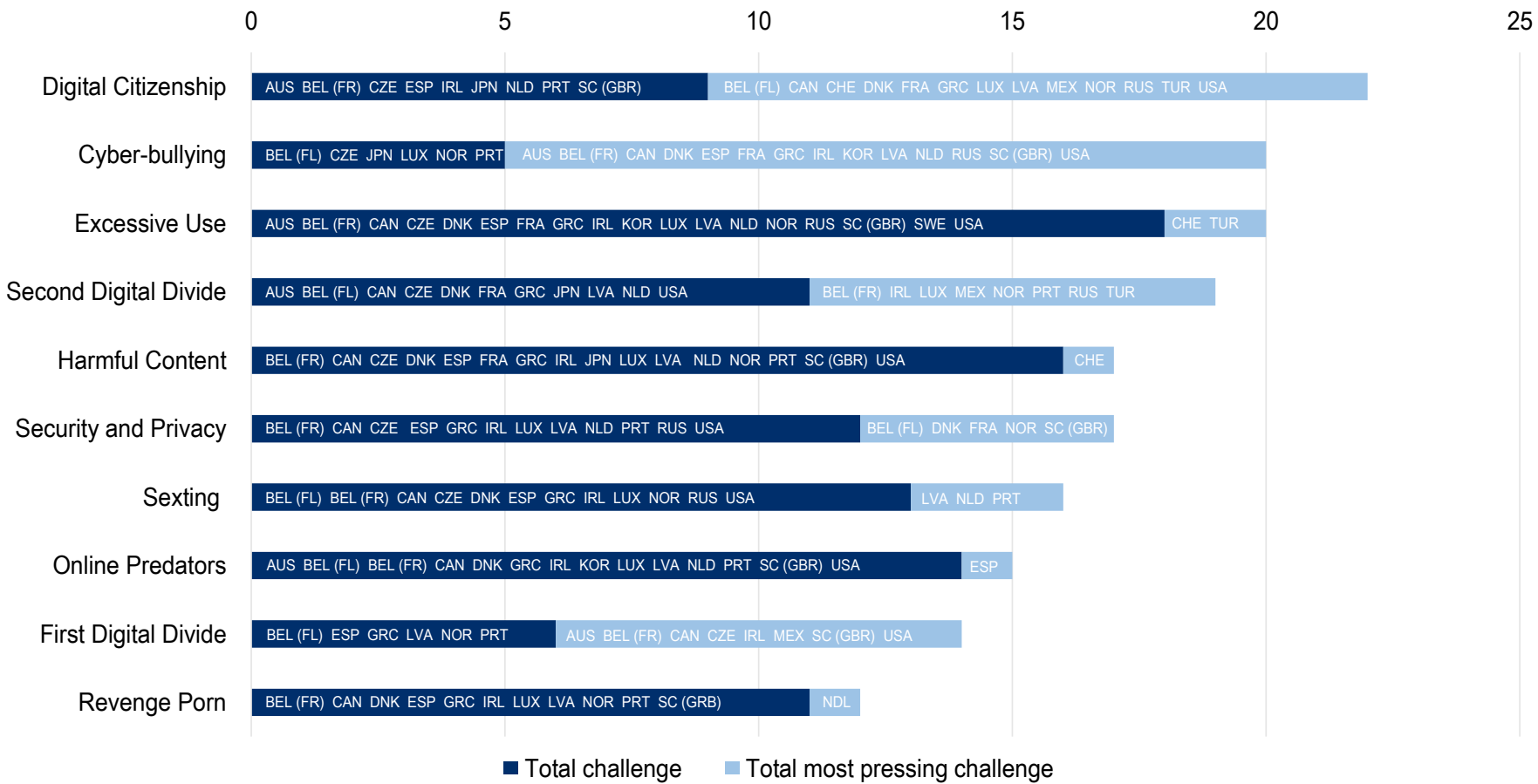
It is important to keep in mind that children, despite being exposed to digital technologies for their entire life, need guidance on safe and responsible use (see also Chapter 9). It is essential that adults are adequately skilled and knowledgeable in the use of digital technologies in order to be able to effectively guide and support children. It of course remains essential to base policies and guidelines on robust, high quality evidence (Burns and Gottschalk, 2019^[42]).

In sum

Digital technologies are a reality in the lives of children in the 21st century, affecting the ways in which they learn, communicate, play and participate. Children are going online more often, for longer, at younger ages, with more devices and for different purposes. Despite the opportunities the Internet affords, there are accompanying risks and not all children can benefit equally from potential opportunities online. Despite the burgeoning body of research in this field, methodological issues, quality issues and difficulty discerning what outcomes are actually caused by children's use of digital technologies remain contentious. There are a myriad of topics requiring more research to fill the knowledge gaps, and to determine (i) how to protect children effectively from emerging risks while encouraging them to take up all available opportunities and (ii) the relationship between technology use and children's physical health and well-being, which will be further explored in this volume.

Policy makers are cognisant of these challenges, and many countries are facing obstacles regarding access, different digital risks and developing a generation of ethical digital users.

Figure 3.1. Overview of digital technologies challenges across countries and systems



Note: 24 of 26 systems responded to this question. X-axis is the number of systems indicating this was a challenge/pressing challenge. Number of challenges was unlimited; most pressing was limited to three options.
Source: 21st Century Children Policy Questionnaire

References

- Aston, R. (2018), "Physical health and well-being in children and youth: Review of the literature", *OECD Education Working Papers*, No. 170, OECD Publishing, Paris, <http://dx.doi.org/10.1787/102456c7-en>. [52]
- Auxier and Anderson (2020), *As schools close due to the coronavirus, some U.S. students face a digital 'homework gap'*, <https://www.pewresearch.org/fact-tank/2020/03/16/as-schools-close-due-to-the-coronavirus-some-u-s-students-face-a-digital-homework-gap/>. [31]
- Baranowski, T. et al. (2012), "Impact of an active video game on healthy children's physical activity.", *Pediatrics*, Vol. 129/3, pp. e636-42, <http://dx.doi.org/10.1542/peds.2011-2050>. [51]
- Bellissimo, N. et al. (2007), "Effect of television viewing at mealtime on food intake after a glucose preload in boys", *Pediatric Research*, <http://dx.doi.org/10.1203/pdr.0b013e3180536591>. [59]
- Belpaeme, T. et al. (2018), "Social robots for education: A review", *Science Robotics*, Vol. 3/21, <http://dx.doi.org/10.1126/scirobotics.aat5954>. [23]
- Blum-Ross, A. et al. (2018), *Looking forward : Technological and social change in the lives of European children and young people*, ICT Coalition for Children Online. [8]
- Bršćić, D. et al. (2015), *Escaping from Children's Abuse of Social Robots*, ACM, <http://dx.doi.org/10.1145/2696454.2696468>. [26]
- Burns, T. and F. Gottschalk (eds.) (2019), *Educating 21st Century Children: Emotional Well-being in the Digital Age*, Educational Research and Innovation, OECD Publishing, Paris, <https://dx.doi.org/10.1787/b7f33425-en>. [42]
- Chaudron, S., R. Di Gioia and M. Gemo (2018), *Young Children (0-8) and Digital Technology, a Qualitative Study Across Europe*, European Union, <http://dx.doi.org/10.2760/294383>. [2]
- Cheung, C. et al. (2017), "Daily touchscreen use in infants and toddlers is associated with reduced sleep and delayed sleep onset", *Scientific Reports*, Vol. 7/1, <http://dx.doi.org/10.1038/srep46104>. [53]
- Cho, A., J. Byrne and Z. Pelter (2020), *Digital Civic Engagement By Young People*, UNICEF Office of Global Insight and Policy. [16]
- Common Sense Media (2012), *K-12 Digital Literacy and Citizenship Curriculum: Scope and Sequency Tool*, <http://commonsensemedia.org/educators/scope-and-sequence>. [61]
- Dawe, J. et al. (2019), "Can social robots help children in healthcare contexts? A scoping review", *BMJ Paediatrics Open*, Vol. 3/1, p. e000371, <http://dx.doi.org/10.1136/bmjpo-2018-000371>. [21]
- DiMaggio, P. and F. Garip (2012), "Network effects and social inequality", *Annual Review of Sociology*, Vol. 38/1, pp. 93-118, <http://dx.doi.org/10.1146/annurev.soc.012809.102545>. [28]
- Global Kids Online (2019), *Global Kids Online: Comparative report*, UNICEF Office of Research – Innocenti, <http://www.unicef-irc.org>. [41]

- Gottschalk, F. (2019), "Impacts of technology use on children: Exploring literature on the brain, cognition and well-being", *OECD Education Working Papers*, No. 195, OECD Publishing, Paris, <https://dx.doi.org/10.1787/8296464e-en>. [48]
- Griffith, S. and D. Arnold (2018), "Home learning in the new mobile age: Parent-child interactions during joint play with educational apps in the US", *Journal of Children and Media*, Vol. 13/1, pp. 1-19, <http://dx.doi.org/10.1080/17482798.2018.1489866>. [10]
- Hale, L. and S. Guan (2015), "Screen time and sleep among school-aged children and adolescents: A systematic literature review", *Sleep Medicine Reviews*, Vol. 21, pp. 50-58, <http://dx.doi.org/10.1016/J.SMRV.2014.07.007>. [55]
- Hargittai, E. (2002), "Second-level digital divide: Differences in people's online skills", *First Monday*, Vol. 7/4, <http://dx.doi.org/10.5210/fm.v7i4.942>. [35]
- Helsper, E. (2017), "A socio-digital ecology approach to understanding digital inequalities among young people", *Journal of Children and Media*, Vol. 11/2, pp. 256-260, <http://dx.doi.org/10.1080/17482798.2017.1306370>. [40]
- Higuchi, S. et al. (2005), "Effects of playing a computer game using a bright display on presleep physiological variables, sleep latency, slow wave sleep and REM sleep", *Journal of Sleep Research*, Vol. 14/3, pp. 267-273, <http://dx.doi.org/10.1111/j.1365-2869.2005.00463.x>. [54]
- Holloway, D. and L. Green (2016), "The Internet of toys", *Communication Research and Practice*, Vol. 2/4, pp. 506-519, <http://dx.doi.org/10.1080/22041451.2016.1266124>. [18]
- Hooft Graafland, J. (2018), "New technologies and 21st century children: Recent trends and outcomes", *OECD Education Working Papers*, No. 179, OECD Publishing, Paris, <https://dx.doi.org/10.1787/e071a505-en>. [36]
- Inchley, J. et al. (2020), *Spotlight on adolescent health and well-being. Findings from the 2017/2018 Health Behaviour in School-aged Children (HBSC) survey in Europe and Canada*, WHO Regional Office for Europe, Copenhagen. [14]
- Kardefelt-Winther, D. (2017), "How does the time children spend using digital technology impact their mental well-being, social relationships and physical activity? An evidence-focused literature review", *INNOCENTI Discussion Paper*, No. 02, UNICEF. [50]
- Limaye, R. et al. (2020), "Building trust while influencing online COVID-19 content in the social media world", *The Lancet Digital Health*, Vol. 2/6, pp. e277-e278, [http://dx.doi.org/10.1016/s2589-7500\(20\)30084-4](http://dx.doi.org/10.1016/s2589-7500(20)30084-4). [43]
- Livingstone, S. (2020), "Coronavirus and #fakenews: what should families do?", <https://blogs.lse.ac.uk/medialse/2020/03/26/coronavirus-and-fakenews-what-should-families-do/>. [45]
- Livingstone, S. et al. (2011), *EU Kids Online: final report 2011.*, EU Kids Online, London, <http://eprints.lse.ac.uk/id/eprint/45490>. [37]
- Livingstone, S. and M. Stoilova (2018), *Children's data and privacy online: Exploring the evidence*, LSE Media and Communications, <https://www.lse.ac.uk/media-and-communications/assets/documents/research/projects/childrens-privacy-online/Childrens-data-and-privacy-online-exploring-the-evidence.pdf>. [12]

- Livingstone, S. and A. Third (2017), "Children and young people's rights in the digital age: An emerging agenda", *New Media & Society*, Vol. 19/5, pp. 657-670, <http://dx.doi.org/10.1177/1461444816686318>. [60]
- Mascheroni, G. and D. Holloway (2017), *The Internet of Toys: A Report on Media and Social Discourses Around Young Children and IoTs*, DigiLitEY, <https://publicatt.unicatt.it/handle/10807/103759#XOVrr8gzZpg>. [19]
- Mascheroni, G. and K. Ólafsson (2016), "The mobile Internet: Access, use, opportunities and divides among European children", *New Media & Society*, Vol. 18/8, pp. 1657-1679, <http://dx.doi.org/10.1177/1461444814567986>. [27]
- McReynolds, E. et al. (2017), "Toys that listen", Proceedings of the 2017 CHI conference on human factors in computing systems, <http://dx.doi.org/10.1145/3025453.3025735>. [20]
- Meyer, M. et al. (2019), "Advertising in young children's apps", *Journal of Developmental & Behavioral Pediatrics*, Vol. 40/1, pp. 32-39, <http://dx.doi.org/10.1097/dbp.0000000000000622>. [11]
- Neumann, M. (2014), "An examination of touch screen tablets and emergent literacy in Australian pre-school children", *Australian Journal of Education*, Vol. 58/2, pp. 109-122, <http://dx.doi.org/10.1177/0004944114523368>. [9]
- OECD (2020), *Combatting COVID-19's effect on children*, <http://www.oecd.org/coronavirus/policy-responses/combating-covid-19-s-effect-on-children-2e1f3b2f/>. [46]
- OECD (2020), "Coronavirus special edition: Back to school", *Trends Shaping Education Spotlights*, No. 21, OECD Publishing, Paris, <https://dx.doi.org/10.1787/339780fd-en>. [30]
- OECD (2020), *Early Learning and Child Well-being: A Study of Five-year-Olds in England, Estonia, and the United States*, OECD Publishing, Paris, <https://dx.doi.org/10.1787/3990407f-en>. [3]
- OECD (2020), *Growing Up Online Addressing the Needs of Children in the Digital Environment*, OECD Publishing, Paris, <https://www.oecd.org/going-digital/growing-up-online.pdf>. [38]
- OECD (2019), *Changing the Odds for Vulnerable Children: Building Opportunities and Resilience*, OECD Publishing, Paris, <https://dx.doi.org/10.1787/a2e8796c-en>. [47]
- OECD (2019), *PISA 2018 Results (Volume I): What Students Know and Can Do*, PISA, OECD Publishing, Paris, <https://dx.doi.org/10.1787/5f07c754-en>. [4]
- OECD (2017), *OECD Digital Economy Outlook 2017*, OECD Publishing, Paris, <https://dx.doi.org/10.1787/9789264276284-en>. [1]
- Ofcom (2020), *Children and parents: Media use and attitudes report 2019*, https://www.ofcom.org.uk/data/assets/pdf_file/0023/190616/children-media-use-attitudes-2019-report.pdf. [6]
- Orben, A. and A. Przybylski (2020), "Teenage sleep and technology engagement across the week", *PeerJ*, Vol. 8, p. e8427, <http://dx.doi.org/10.7717/peerj.8427>. [57]

- Pascual-Espada, J. et al. (2011), "Virtual objects on the Internet of things", *International Journal of Interactive Multimedia and Artificial Intelligence*, Vol. 1/Special Issue on Computer Science and Software Engineering, <https://ijimai.org/journal/node/184>. [17]
- Pew Research Center (2018), *Teens, Social Media and Technology 2018*, https://www.pewresearch.org/internet/wp-content/uploads/sites/9/2018/05/PI_2018.05.31_TeensTech_FINAL.pdf. [13]
- Przybylski, A. (2019), "Digital Screen Time and Pediatric Sleep: Evidence from a Preregistered Cohort Study", *Journal of Pediatrics*, Vol. 205, pp. 218-223.e1, <http://dx.doi.org/10.1016/j.jpeds.2018.09.054>. [56]
- Qustodio (2020), *Connected More than Ever*, https://qweb.cdn.prismic.io/qweb/e59c2e0f-ef4f-4598-b330-10c430e2ec71_Qustodio+2020+Annual+Report+on+Children%27s+Digital+Habits.pdf. [15]
- SDU (2020), *Elephant robot to remind children to clean their hands*, <https://www.sdu.dk/en/nyheder/forskningsnyheder/elefantrobot#:~:text=RIMEPHAS,various%20interactive%20hand%20cleaning%20robots>. [25]
- Siibak, A. (2019), "Digital parenting and the datafied child", in *Educating 21st Century Children: Emotional Well-being in the Digital Age*, OECD Publishing, Paris, <https://dx.doi.org/10.1787/313a9b21-en>. [39]
- Sinoo, C. et al. (2018), "Friendship with a robot: Children's perception of similarity between a robot's physical and virtual embodiment that supports diabetes self-management", *Patient Education and Counseling*, Vol. 101/7, pp. 1248-1255, <http://dx.doi.org/10.1016/j.pec.2018.02.008>. [22]
- Smahel, D. et al. (2020), *EU Kids Online 2020: Survey results from 19 countries*, <http://dx.doi.org/10.21953/lse.47fdeqj01ofo>. [5]
- Subrahmanyam, K. et al. (2000), "The impact of home computer use on children's activities and development", *The Future of Children*, Vol. 10/2, pp. 123-144. [58]
- Swist, T., P. Collin and J. McCormack (2015), *Social Media and the Wellbeing of Children and Young People: A Literature Review*, Australia: Commissioner for Children and Young People, Subiaco, WA. [49]
- The Lancet (2020), "The truth is out there, somewhere", *The Lancet*, Vol. 396/10247, p. 291, [http://dx.doi.org/10.1016/s0140-6736\(20\)31678-0](http://dx.doi.org/10.1016/s0140-6736(20)31678-0). [44]
- Triantafyllidis, A. et al. (2019), "A social robot-based platform for prevention of childhood obesity", *2019 IEEE 19th International Conference on Bioinformatics and Bioengineering (BIBE)*, <http://dx.doi.org/10.1109/bibe.2019.00171>. [24]
- Tsetsi, E. and S. Rains (2017), "Smartphone Internet access and use: Extending the digital divide and usage gap", *Mobile Media & Communication*, Vol. 5/3, pp. 239-255, <http://dx.doi.org/10.1177/2050157917708329>. [29]
- UNICEF (2019), *Global Kids Online Comparative Report 2019*, <https://www.unicef-irc.org/publications/1059-global-kids-online-comparative-report.html>. [7]

- UNICEF (2017), *The State of the World's Children: Children in a Digital World*, [33]
https://unicef.org/publications/index_101992.html.
- van Deursen, A. and J. van Dijk (2018), "The first-level digital divide shifts from inequalities in [34]
physical access to inequalities in material access", *New Media & Society*, Vol. 21/2, pp. 354-
375, <http://dx.doi.org/10.1177/1461444818797082>.
- Van Lancker, W. and Z. Parolin (2020), "COVID-19, school closures, and child poverty: a social [32]
crisis in the making", *The Lancet Public Health*, Vol. 5/5, pp. e243-e244,
[http://dx.doi.org/10.1016/s2468-2667\(20\)30084-0](http://dx.doi.org/10.1016/s2468-2667(20)30084-0).

Part II Play!

4 Outdoor risky play

Mariana Brussoni

Department of Pediatrics, School of Population and Public Health, University of British Columbia, Canada

British Columbia Children's Hospital Research Institute, Canada

Playing outdoors offers rich play opportunities and has unique characteristics less apparent in indoor play, including taking physical risks. Risky play occurs when children intentionally seek exhilarating and scary physical play situations that allow them to gain mastery over their fears. Opportunities for outdoor risky play have been severely curtailed in recent generations. As research mounts on the importance of risky play for children's health, development and well-being, there is increasing recognition regarding the need for action to create supportive environments for play. This chapter reviews the literature on the importance of risky play. It then presents the three key ingredients for outdoor risky play supportive environments – time, space and freedom – and suggests practice and policy necessary to implement sustained and meaningful change.

Background

Play is a dominant activity of children's lives in all cultures (Hyun, 1998^[1]; Pellegrini, 2009^[2]), and children's right to play is enshrined in Article 31 of the United Nations Convention on the Rights of the Child (UNCRC) (Office of the United Nations High Commissioner for Human Rights, 1989^[3]). When given the choice, children across the world commonly report that they prefer playing outside (Raymund, 1995^[4]; Inter IKEA Systems, 2015^[5]). Similarly, adults' favoured childhood play memories typically occur outdoors, particularly in natural settings (Brunelle et al., 2016^[6]; Raymund, 1995^[4]; Singer et al., 2008^[7]). When reflecting on favourite play experiences, children and adults highlight a sense of joy and fun, freedom to move their bodies as they choose, opportunities to be creative, hang out with friends, challenge themselves and connect with nature – aspects that tend to be more readily available outside than in (Brunelle et al., 2016^[6]; Caro et al., 2016^[8]; Greenfield, 2004^[9]). Growing research documents key differences between play occurring outdoors compared to indoors, and how outdoor play can uniquely contribute to children's health, development and well-being (Brussoni, 2019^[10]).

Outdoor play is unstructured, freely chosen and child-directed outdoor activity (Outdoor Play Canada, 2019^[11]). It can include jumping in a pile of leaves, observing bugs, an impromptu game of street hockey, or any activity shaped by the imagination of children and the freedom they have to act on their surroundings. Risk taking, such as climbing, running, exploring, is a natural and necessary aspect of outdoor play. Over the last 30 years, children's engagement in outdoor play, and particularly risky play, has diminished as their freedom to go outside and engage in risks has decreased (Shaw et al., 2015^[12]; Wyver et al., 2009^[13]). Parent and caregiver concerns over children's safety, a shift to prioritising academic outcomes over play, and increased screen time are among the forces that are shaping children's access to regular high quality outdoor play opportunities (Holt et al., 2016^[14]; Mullan, 2019^[15]; Watchman and Spencer-Cavaliere, 2017^[16]).

This chapter will provide a brief overview of the characteristics and importance of outdoor risky play for children's development, health and well-being. It will examine the key ingredients of supportive play environments to guide practice and policy in supporting 21st century children.

Outdoor risky play

Risky play is defined as “thrilling and exciting forms of physical play that involve uncertainty and a risk of physical injury” (Sandseter, 2010, p. 22^[17]). Children intentionally seek out situations that can be simultaneously exhilarating and fearful and offer the opportunity to experience the joy of mastery while pushing themselves to a potentially dangerous edge. While children are fully aware of the potential for inducing fear or experiencing injury, the inherent uncertainty in the outcome enhances the thrill (Sandseter, 2009^[18]; Sandseter, 2009^[19]).

Risky play primarily occurs outdoors and the research literature outlines eight types of risky play that are typically observed (Kleppe, Melhuish and Sandseter, 2017^[20]; Sandseter, 2009^[18]):

- play at heights, such as climbing, jumping, hanging and balancing
- play at high speed, such as running, sliding and cycling
- play with dangerous tools, such as ropes, hammers and knives
- play near dangerous elements, such as playing near water, fire or cliffs
- play with a chance of getting lost, such as hiding or exploring without an adult
- rough-and-tumble play, such as wrestling
- play with impact, such as repeatedly crashing into objects or the ground for fun

- vicarious risk, can be a precursor to children's personal risk taking offering them opportunities to learn about risk-taking and experience thrill while watching others.

Risky play can involve aspects of play types that have been used to categorise play in previous literature. For example, imaginative play, locomotor or functional play (where the child's body provides the primary play tool, such as when climbing or running), constructive play (where the child is building something), and exploratory play (where the child receives information through engagement with an object) (Cox, Loebach and Little, 2018^[21]). However, a defining and distinguishing characteristic of risky play is intentional physical risk taking.

Importance of outdoor risky play

All children are naturally drawn and evolutionarily adapted to take risks through play. Driven by curiosity and excitement seeking, they learn about their environment, what it affords, how far they can push it and their own body, and how to manage the risks they encounter (Sandseter, 2009^[18]; Sandseter and Kennair, 2011^[22]). Risky play can have wide-reaching benefits for children's health, development, mental health and well-being. With respect to physical health, children's physical activity comes primarily from play, not formal exercise. Extensive research documents that children are more physically active and less sedentary when playing outside than when indoors (Gray et al., 2015^[23]). In particular, children are more physically active when unsupervised by adults and with their peers, such as when they are exploring their neighbourhood or playing in a park with friends (Brussoni et al., 2015^[24]).

Sandseter and Kennair (2011^[22]) theorise regarding the mental health effects of risky play. They argue that children are evolutionarily predisposed to taking risks in play and that this helps them become accustomed to coping with stimuli that could otherwise elicit anxiety or fear (e.g. separation from caregivers, heights), thus extinguishing these fears. Risky play gives children opportunities to experience positive emotions while gaining mastery over situations or stimuli that are a source of fear, and develop the skills to conquer these fears. Depriving them of these opportunities would result in the persistence of the fears, increasing the likelihood of phobias, anxiety disorders and other maladaptive behaviours. Sandseter and Kennair (2011^[22]) provide extensive evidence to support their theory. Likewise, Gray (2011^[25]) suggests a causal link between the decline of play and the rising rates of psychopathology, indicating that play deprivation negatively influences children's socio-emotional learning and self-efficacy, and is associated with social isolation and depressive symptoms. Furthermore, research has linked overprotective parenting with lower self-efficacy, maladaptive behaviours, anxiety and depression in childhood and into adulthood (Bradley-Geist and Olson-Buchanan, 2014^[26]; LeMoyne and Buchanan, 2011^[27]; Schiffrin et al., 2013^[28]; Thirlwall and Creswell, 2010^[29]), even suggesting structural changes in the brain's threat-related function resulting in greater reactivity to interpersonal threat (Farber et al., 2019^[30]).

Research indicates the importance of risky play for developing risk perception and risk management skills (Brussoni et al., 2012^[31]; Lavrysen et al., 2015^[32]). A recent pilot study found a positive association between parents' tolerance for risk in play and children's performance in a virtual pedestrian street crossing task (VanSkiver, 2019^[33]). This would suggest that while adults' and caregivers' fears of injury have limited children's opportunities for outdoor risky play, these limitations may paradoxically place children at greater risk of injury as they lack opportunities to develop the crucial risk management skills that they can use to keep themselves safe (Brussoni et al., 2012^[31]).

The importance of play and risk taking has been seen as critical to preparing children for the changing workforce. The World Economic Forum (WEF) (World Economic Forum, 2016^[34]) anticipates jobs requiring a greater focus on cognitive abilities, complex problem solving and social skills. At the 2018 WEF meeting, the Real Play Coalition, which includes Lego, IKEA, National Geographic and Unilever, described play as the "engine of optimal child development" and declared a "silent play emergency," arguing that abundant time for play for today's children would prepare them to be leaders who can resolve conflict, problem solve,

build social connections and provide inspiration to others (Goodwin et al., 2018^[35]; Real Play Coalition, 2018^[36]).

While there are no available international statistics on how often children engage in outdoor risky play, statistics on outdoor play across 49 countries paint a concerning picture (Aubert et al., 2018^[37]). A letter grade of D+ was assigned to global performance on an indicator of active play, indicating that less than 40% of children met the benchmark minimum of two hours spent playing outdoors daily. Notably, in many cases countries with the highest human development index performed worse than those with the lowest index. The daily necessity for active transport and walking to school for children living in many lower index countries may provide opportunities for play that are less available to children in high index countries where being driven to school and participating in multiple organised activities tends to be the norm.

Injuries: Statistics and risk aversion

Risky play can result in injury, and in extreme cases even death. Parent and caregiver fears of adverse events have resulted in increasingly diminishing freedom and opportunities to engage in risky play in many Western nations (Brussoni et al., 2012^[31]; Wyver et al., 2009^[13]). However, injury statistics indicate that the fear of an adverse outcome may not be commensurate with the likelihood of such an event and may result in excessive limitation of children's risky play opportunities to the detriment of their health, development, learning and well-being. Furthermore, this risk averse approach fails to consider that limiting children's risky play may increase the likelihood of injury because of children's underdeveloped risk management skills.

For risky play that occurs without adult supervision, such as play with a chance of getting lost (e.g. independent mobility), common parental worries relate to their child being abducted by a stranger or struck by a car (Jelleyman et al., 2019^[38]). Abductions by strangers are exceedingly rare, with Canadian statistics indicating a rate of approximately 1 in 14 million (Dalley and Rucoe, 2003^[39]). While injuries are a leading cause of child death worldwide (Peden et al., 2008^[40]) statistics in many nations indicate record low injury rates, largely due to improvements in motor vehicle passenger safety (Richmond et al., 2016^[41]; Sethi et al., 2008^[42]). Motor vehicle crashes and suicides remain the leading cause of death for children in many countries, but it is critical to distinguish that this statistic relates to children as passengers, not pedestrians. Ironically, in a bid to protect their children from injury, many parents drive children from activity to activity, creating the "backseat generation" (Karsten, 2005^[43]), unknowingly exposing them to the most likely cause of mortality. Likewise, with respect to suicides, overprotected children are more likely to experience anxiety and depression into early adulthood, thus putting them at greater risk of self-harming behaviours (LeMoyne and Buchanan, 2011^[27]; Schiffrin et al., 2013^[28]).

Statistics on mortality and morbidity related to play are not readily available due to limitations in coding and data collection. However, the available statistics indicate that serious injuries and deaths resulting from play are exceedingly rare. For example, Canadian mortality statistics for children aged 1-14 years indicate zero deaths due to falls from trees between 2000-2017, and two deaths due to falls from play equipment between 2007-2017, a rate of 1 in 35 million (Statistics Canada, 2017^[44]). With respect to morbidity, a systematic review of medically treated injury incidence for physical activity behaviours (sports, active commuting, play) in children aged 6-12 years indicated that when controlling for exposure time, sports had the highest (0.20-0.67 injuries per 1 000 hours) and play had the lowest (0.15-0.17 injuries per 1 000 hours) injury incidence.

The effects of risk aversion have been wide reaching influencing how children are supervised (increased supervision, stifling limitations and reduced agency in play) and the design of children's play environments (focused around standardised boring fixed play equipment) that has resulted in a claustrophobic vision of play with profound negative impacts on children and their future.

Creating supportive outdoor risky play environments

As part of a commitment to create rich outdoor play environments, in 2014 the Welsh government became the first country in the world to establish a duty requiring Local Authorities to conduct Play Sufficiency Assessments to evaluate and ensure sufficient rich outdoor play opportunities for local children, considering the needs of children of different ages, cultures and abilities (Welsh Government, 2014^[45]). As a signatory of the UNCRC, the Welsh Government recognised the critical importance of outdoor play for children and the role that play can have in mitigating the effects of poverty and inequities on children (Welsh Government, 2014^[45]). The Welsh Play Sufficiency Assessment aims for Wales “to be a country where children are increasingly seen outside enjoying the benefits of play” (Welsh Government and Play Wales, 2015, p. 3^[46]), with action encouraged around the three key ingredients necessary for supporting rich play environments: time, space and freedom (Welsh Government and Play Wales, 2015^[46]). The Play Sufficiency requirements offer helpful and practical guidance in planning for and creating supportive outdoor risky play environments. Further details on the requirements are outlined in the corresponding sections below.

Time

The stark decrease of time spent in play, particularly outdoor play, across generations has been unequivocally established. This time has been superseded by organised activities, academics and screen time. US data document a 37% decline in outdoor activities for 6-12 year-old children between 1997 and 2003 (Hofferth, 2009^[47]). UK data for children aged 8-16 years in 1975, 2000 and 2015 elucidate several important trends: greater commitment of time to academics (particularly for girls), screen-based activities (particularly for boys and older children) and structured activities, associated with stark decreases in outdoor play (for all ages but particularly for younger children) (Mullan, 2019^[15]). Mullan (2019^[15]) concludes that a coalescence of safety concerns and technological change has resulted in a shift to home-based sedentary activities. Canadian research further documents the clear displacement of time outdoors and in nature with screen time (Michaelson et al., 2020^[48]) and the adverse association between screen time and internalised mental health symptoms (Piccininni et al., 2018^[49]).

Free outdoor playtime has come under increasing threat in schools in many countries with the view that time is better spent in academics rather than on recess. This state of affairs has resulted in the release of numerous position statements calling for preserving recess (Global Recess Alliance, 2020^[50]; US Play Coalition, 2019^[51]) and the American Academy of Pediatrics to state that “Recess is a necessary break in the day for optimising a child’s social, emotional, physical, and cognitive development. In essence, recess should be considered a child’s personal time, and it should not be withheld for academic or punitive reasons” (Council on school health, 2012, p. 186^[52]).

Prioritising time for outdoor play requires an understanding of currently available provision, a combined effort to educate parents, childcare environments, schools, the community on its importance and hold local policy makers accountable. This approach is reflected in the Welsh Play Sufficiency Assessment, which requires Local Authorities to assess available play time in communities and school environments (Welsh Government and Play Wales, 2015^[46]). This includes the efforts to publicise information that contributes to positive community attitudes to play, signposting to promote play, information to support parents in encouraging children’s play, and ensuring that schools provide play opportunities during school and access to rich play environments during and after school.

Space

Exacerbating the social and technological factors that have led to children’s retreat indoors has been an approach to urban planning dominated by cars (Arup, 2017^[53]; Bishop and Corkery, 2017^[54]; Hart, 2002^[55]). Furthermore, planning for areas not dedicated to cars has been guided by adult priorities, relegating

children to defined play areas away from the harms of traffic and potentially harmful people (Brussoni et al., 2018^[56]; Hart, 2002^[55]). This approach to planning fails to recognise the importance of the built environment in shaping children's development and future lives and that vibrant and sustainable cities are necessarily inclusive and play friendly, supporting play throughout the community, not just in designated play spaces (Arup, 2017^[53]; Bishop and Corkery, 2017^[54]; UNICEF, 2018^[57]).

Arup (2017, p. 7^[53]) proposes that the “amount of time children spend playing outdoors, their ability to get around independently, and their level of contact with nature are strong indicators of how a city is performing, and not just for children but for all city dwellers”. Achieving this vision requires attention to not only the design of stimulating play environments to meet the needs of local children, but also ensuring safe and independent access (without an adult) to these environments and their neighbourhood. This requires an understanding of the diverse needs of the local children, with particular attention to ensuring equitable access and play provision.

Play space design

The Seven Cs criteria for outdoor play space design (character, context, connectivity, clarity, change, chance and challenge) indicate that the highest quality play environments are scaled to the child, sensitive to climate, and that they include living materials and elements that children can manipulate (e.g. loose parts such as water, sand, bricks) (Herrington, Brunelle and Brussoni, 2017^[58]; Herrington et al., 2007^[59]). The criteria provide guidance for the design of environments in ways that privilege children's experiences and needs. Developed in the context of early childhood education environments, the universality of these criteria has led to their application for children of different ages and in diverse international settings (Larcombe, 2010^[60]; Mountain, 2014^[61]; Sajadi and Khoshnevis, 2016^[62]).

The theory of affordances is helpful in considering the elements that are included in a play environment, particularly elements that children can manipulate (Gibson, 1979^[63]). Affordances available in an environment depend on the features of the environments and the characteristics of the users. For example, a tree may afford climbing for children with the physical ability and interest to do so, but not for others, such as those with mobility impairments. The richest play environments maximise the affordances and versatility of those environments so that they support play opportunities for children with diverse needs and interests (Herrington, 1997^[64]; Woolley and Lowe, 2013^[65]).

Loose parts, in being manipulatable by children in infinite configurations, are ideal additions to play environments to maximise affordances (Nicholson, 1972^[66]). In recent years, research on the benefits of play with loose parts has expanded with evidence indicating increases in the types of play, creativity and exploration, resilience and physical activity (Gibson, Cornell and Gill, 2017^[67]; Houser et al., 2019^[68]). The affordances available through loose parts and their ease of procurement have helped increase their popularity as an affordable option for enhancing the play opportunities in children's play spaces. A number of practical toolkits and guidelines for loose parts play have been developed in recent years to support their use in schools and childcare centres. Among the most comprehensive and user friendly is Scotland's Loose Parts Play Toolkit (Casey and Robertson, 2019^[69]).

Adventure Playgrounds are child-centred, child-directed staffed play spaces that provide children with abundant loose parts, raw materials, such as building supplies, tools, fire pits, water features, and other areas where children have the freedom to pursue their own interests, be creative, fail and succeed (Chilton, 2018^[70]). The staff are play workers, trained in supporting and facilitating the play process, removing the barriers to play and helping children realise their vision for play (Staempfli, 2009^[71]). Adventure Playgrounds can be permanent or temporary sites. The permanent sites can be an important opportunity for community building, particularly in underprivileged areas. The play workers offer ongoing relationships, creating a sense of continuity, the ability to shape the playground offers a sense of ownership and belonging; for many children these places represent a home away from home (Staempfli, 2009^[71]). Pop-Up Adventure Playgrounds are temporary installations, also staffed by play workers. They can exist for a few

hours or several weeks and can be provide an opportunity to engage the local community, test out processes, and mobilise public will for a more permanent site. Resources and toolkits are available via Pop-up Adventure Play (Law and Leichter-Saxby, 2020^[72]).

Safe access

High quality play space provision does not end with the space itself, but rather must consider how children of diverse ages and needs will access that space. Children must feel safe in getting to and playing in the space and caregivers must feel confident in letting children access those spaces.

According to the US National Association of City Transport Officials (NACTO), streets for children should be designed for improved mobility, support independent mobility (children’s movement independent of adults) and provide places to pause, sit and play (National Association of City Transport Officials, 2020^[73]). NACTO outlines design principles focused on making streets safe and healthy (e.g. speed limits, pedestrian infrastructure, illumination), comfortable and convenient (e.g. trees for shade, solitary and social seating, access to nature, rubbish bins), and inspirational and educational (e.g. artwork, varied texture in surfaces, possibilities for playful encounters).

Recognising these various priorities as key ingredients for “Space”, the Welsh Play Sufficiency Assessment (Welsh Government and Play Wales, 2015, p. 21^[46]) requires making spaces available for play, provision of “rich play environments”, staffed play provision by qualified play workers, and ensuring free access. It further requires Local Authorities to assess the extent to which children’s needs are inherent to public transport planning, the speed limits and pedestrian and cycling infrastructure available in the area, and that the play spaces are clear from hazards. The assessment further requires implementing the play streets initiative where streets are regularly closed to traffic to allow for children to play outside their homes (Bridges et al., 2019^[74]). Furthermore, Local Authorities are tasked with community engagement and ensuring cues in the community that support rather than discourage play (e.g. “Play Priority” versus “No Ball Games”) (Welsh Government and Play Wales, 2015^[46]).

Freedom

As children’s freedom to engage in the play of their choosing decreases, so does the quality of play provision. As outlined above, heightened safety fears have curtailed children’s freedom to play outside, as well as the behaviours they are allowed to engage in while playing outside. The limitations result from increasingly restrictive supervision, as well as playground safety standards imposing engineering approaches to risk management on children’s play (Ball et al., 2019^[75]; Brussoni et al., 2012^[31]; Wyver et al., 2009^[13]).

A societal shift in support for children’s outdoor risky play requires an integrated approach that addresses the policy and structural barriers, but also shifting the attitudes of parents and caregivers, community members, educators and policy makers. As an example, the Welsh Play Sufficiency Assessment requires examining policies for their role in curtailing children’s freedom. In particular, there is a requirement that the “Health and Safety policies explicitly recognise the value of children being able to experience risk and challenge” (Welsh Government and Play Wales, 2015, p. 47^[46]). Because these policies guide the approach to health and safety in the community, educational and work environments, they represent a powerful lever for change in Wales. Furthermore, the Assessment requires a community strategy that recognises the right to play and outlines how this provision will be accomplished. Understanding the need to address all levels and sectors of society, broad partnerships, and educational and informational initiatives that work with the media are encouraged (Welsh Government, 2014^[45]; Welsh Government and Play Wales, 2015^[46]).

Shifting attitudes towards risky play

A national survey of New Zealand parents of children 5-12 years old indicated that while most parents (78.6%) recognised the benefits of opportunities for risk and challenge, children had limited opportunities for risky play, particularly play where there is a chance of getting lost (e.g. walking to school alone or with a friend), with only 14.5% of children allowed to engage in this kind of play (Jelleyman et al., 2019^[38]). The results suggested a need to address parents' perceived barriers and fears to influence their support of risky play. While this survey reflects the attitudes of New Zealand parents, research in other nations also points to the parents' gatekeeper role in children's access to risky play and the importance of addressing their concerns to improve children's play opportunities (Marzi, Demetriou and Reimers, 2018^[76]).

Recognising the importance of widespread awareness of outdoor play and knowledge on how best to support it, the Welsh Play Sufficiency Assessment (Welsh Government and Play Wales, 2015^[46]) requires provision of training for volunteers, parents and professionals who work with children and decision makers whose work impacts children's opportunities to play. An important component of training is reframing of attitudes towards risk such that there is a recognition of the importance of risky play and how to support it.

Interventions to shift attitudes towards risky play have been developed and tested as in-person workshops and web-based activities. In the context of a loose parts intervention study in schools, Bundy and colleagues developed a risk reframing workshop for parents and teachers. The workshop takes participants through a series of reflection points designed to change their attitudes and behaviours (Bundy et al., 2011^[77]; Niehues et al., 2016^[78]; Niehues et al., 2013^[79]). Building on this work, Brussoni and colleagues (2018^[80]) designed an online risk reframing tool, www.outsideplay.ca, that uses behaviour change techniques to take users through a three-part process of guided reflection, decision support and planning for change. Its effectiveness at supporting parents' attitude and behaviour change was confirmed through a randomised controlled trial.

Playground safety standards

Playground safety standards are overarching guidelines that are specifically designed to harmonise approaches to playground design and play. Standards focus on risk elimination through engineering-style controls (Ball et al., 2019^[75]). The assumption that compliance with standards equates with no injuries or grants immunity from prosecution (Jost, Yost and Mikus, 2016^[81]) has resulted in the ubiquitous application of standards. This blanket approach combined with an engineering mind-set to play has resulted in problematic play space provision (Ball et al., 2019^[75]; Herrington and Nicholls, 2007^[82]) with play equipment designed "like for the babies" (10-year-old boy in (Brussoni et al., 2020, p. 6^[83])). Children's play behaviours and needs are not standard but influenced by local circumstances and the children using the play space. Furthermore, playground standards cannot cope with alternate forms of play and play spaces, such as play with loose parts or in natural settings. Trees do not come in standard shapes and loose parts do not stay in one place. The suggested approach is to employ standards for technical aspects of play equipment (e.g. structural integrity, foundations, mechanical parts), but use a risk benefit assessment (RBA) approach for value-based judgments (e.g. surfacing, height, affordances, challenge) (Ball, Gill and Spiegel, 2012^[84]). Furthermore, while assessing standards should remain in the hands of playground inspectors with proper training, the RBA is best handled by the play providers (e.g. educators, recreation providers) who are most familiar with the local culture and the children's potential and actual play behaviour (Ball et al., 2019^[75]).

Risk benefit assessment

RBA frameworks have been developed in the United Kingdom (Ball, Gill and Spiegel, 2012^[84]), Canada (Gill, Power and Brussoni, 2019^[85]) and incorporated into the most recent Australian playground safety standard (Standards Australia., 2017^[86]). The Canadian RBA framework provides guidance on how to conduct RBAs and includes sample tools, such as an informed consent form, standard of care checklist,

an RBA form, site risk assessment form and an incident report form (Gill, Power and Brussoni, 2019^[85]). In addition, it describes a dynamic RBA process for responding to the in-the-moment risk-taking characteristic of children’s play. The goal of dynamic RBA is to support children playing freely, learning from their efforts and mistakes, and learning how to keep themselves and their peers safe. Central to this process is building relationships with the children. When working with new groups of children, the play provider is encouraged to spend time in more familiar areas and activities and establish predictable routines. As a sense of each child and their needs is developed, these can be incorporated into the dynamic RBA process and a gradual-release model can increase children’s freedom to take risks.

For adult caregivers supporting children’s play, there are three levels of attention described in the dynamic RBA process (Gill, Power and Brussoni, 2019^[85]) (see Figure 4.1). The first, open observation, is the resting state. The caregiver is playing alongside the children in a non-intrusive, supportive, trusting and caring manner. If there are signs that risk is escalating, the play provider moves to focused attention, where they may get physically closer to the child and engage in dialogue that supports the child’s reflection on risk management (e.g. “Do you feel safe there?” “What is your next move?”). If the situation is managed, then the caregiver returns to open observation. If the risk escalates to unacceptable levels, then immediate steps are taken to reduce risk, with safety prompts that use empowering language (e.g. “Sticks need space. Do you have enough space to swing that big stick?”).

Figure 4.1. Dynamic risk benefit assessment



Source: (Gill, Power and Brussoni, 2019^[85])

The Welsh Play Sufficiency Assessment recognises the importance of an approach to health and safety in all spheres related to children’s play be underpinned by RBA, requiring that the “Health and Safety policies and procedures incorporate the risk benefit approach to health and safety assessments as recommended by the Health and Safety Executive” (Welsh Government and Play Wales, 2015, p. 47^[46]). Needless to say, implicit in this are mechanisms for training in RBA for local play providers. This requires integration into the post-secondary training environment for educators, in addition to professional learning opportunities for those already in service.

In sum

The evidence suggests the importance of regular and repeated exposure to high quality outdoor play opportunities, including the opportunity to engage with risk for fostering creativity, resilience, socio-emotional learning, cognitive development, mental health, physical health and risk negotiation skills. Scholars, public officials, educators and others have raised concerns that excessive risk aversion has resulted in unwarranted limitation of children’s risky play opportunities to the detriment of their health,

development and well-being (Council of Chief Medical Officers of Health, 2018^[87]; International School Ground Alliance, 2018^[88]; Play Safety Forum, 2008^[89]; Tremblay et al., 2015^[90]). The Welsh government was the first to enshrine the need for risk and a risk benefit approach within its health and safety policy in its declared duty for Local Authorities and provides a model for work in other jurisdictions. Many other countries are also undertaking ground-breaking work that helps outline a path forward, such as Scotland's push to making outdoor play the norm in early childhood education (Mathias, 2018^[91]) and Canada's Council of Chief Medical Officers of Health release of the Active Outdoor Play Statement supporting outdoor play, with its risks, in all settings (Council of Chief Medical Officers of Health, 2018^[87]). Furthermore, the International School Ground Alliance, a global network of organisations and professionals with a focus on improving school grounds to support children's learning and play, released the Risk in Play and Learning Declaration reinforcing the importance of risk taking for children's well-being and as a call to action for taking the benefits of risk into account on school grounds. It is available in multiple languages and has obtained broad international endorsement (International School Ground Alliance, 2018^[88]). Supporting the children of the 21st century, our future leaders, demands that children's right to play underpin all aspects of our society.

References

- Arup (2017), *Cities Alive: Designing for Urban Childhoods*, [53]
<https://www.arup.com/perspectives/publications/research/section/cities-alive-designing-for-urban-childhoods>.
- Aubert, S. et al. (2018), "Global matrix 3.0 physical activity report card grades for children and youth: Results and analysis from 49 countries", *Journal of Physical Activity and Health*, Vol. 15/s2, pp. S251-S273, <http://dx.doi.org/10.1123/jpah.2018-0472>. [37]
- Ball, D. et al. (2019), "Avoiding a dystopian future for children's play", *International Journal of Play*, Vol. 8/1, pp. 3-10, <http://dx.doi.org/10.1080/21594937.2019.1582844>. [75]
- Ball, D., T. Gill and B. Spiegel (2012), *Managing Risk in Play Provision: Implementation Guide*, Play Safety Forum, <http://www.playengland.org.uk/resources/managing-risk-in-play-provision-implementation-guide.aspx>. [84]
- Bishop, K. and L. Corkery (eds.) (2017), *Designing Cities with Children and Young People: Beyond Playgrounds and Skate Parks*, Routledge, <http://dx.doi.org/10.4324/9781315710044>. [54]
- Bradley-Geist, J. and J. Olson-Buchanan (2014), "Helicopter parents: An examination of the correlates of over-parenting of college students", *Education + Training*, Vol. 56/4, pp. 314-328, <http://dx.doi.org/10.1108/et-10-2012-0096>. [26]
- Bridges, C. et al. (2019), "Examining the Implementation of Play Streets", *Journal of Public Health Management and Practice*, Vol. 26/3, pp. E1-E10, <http://dx.doi.org/10.1097/phh.0000000000001015>. [74]
- Brunelle, S. et al. (2016), "Play Worth Remembering: Are Playgrounds Too Safe?", *Children, Youth and Environments*, Vol. 26/1, p. 17, <http://dx.doi.org/10.7721/chilyoutenvi.26.1.0017>. [6]
- Brussoni, S. et al. (2018), "Teens in public spaces and natural landscapes", in Lansford, J.E; Banati, P. (ed.), *Handbook of Adolescent Development Research and its Impact on Global Policy*, Oxford University Press, <https://doi.org/10.1093/oso/9780190847128.001.0001>. [56]

- Brussoni, M. (2019), "Why outdoor play?", in Tremblay, R. et al. (eds.), *Encyclopedia on Early Childhood Development*, <http://www.child-encyclopedia.com/outdoor-play>. [10]
- Brussoni, M. et al. (2015), "What is the relationship between risky outdoor play and health in children? A systematic review", *International Journal of Environmental Research and Public Health*, Vol. 12/6, pp. 6423-6454, <http://dx.doi.org/10.3390/ijerph120606423>. [24]
- Brussoni, M. et al. (2018), "Go Play Outside! Effects of a risk-reframing tool on mothers' tolerance for, and parenting practices associated with, children's risky play: study protocol for a randomized controlled trial", *Trials*, Vol. 19/1, <http://dx.doi.org/10.1186/s13063-018-2552-4>. [80]
- Brussoni, M. et al. (2020), "A qualitative investigation of unsupervised outdoor activities for 10- to 13-year-old children: "I like adventuring but I don't like adventuring without being careful"", *Journal of Environmental Psychology*, Vol. 70, p. 101460, <http://dx.doi.org/10.1016/j.jenvp.2020.101460>. [83]
- Brussoni, M. et al. (2012), "Risky play and children's safety: Balancing priorities for optimal child development", *International Journal of Environmental Research and Public Health*, Vol. 9/9, pp. 3134-3148, <http://dx.doi.org/10.3390/ijerph9093134>. [31]
- Bundy, A. et al. (2011), "The Sydney Playground Project: Popping the bubblewrap - unleashing the power of play: A cluster randomized controlled trial of a primary school playground-based intervention aiming to increase children's physical activity and social skills", *BMC Public Health*, Vol. 11/1, <http://dx.doi.org/10.1186/1471-2458-11-680>. [77]
- Caro, H. et al. (2016), "Dutch primary schoolchildren's perspectives of activity-friendly school playgrounds: A participatory study", *International Journal of Environmental Research and Public Health*, Vol. 13/6, p. 526, <http://dx.doi.org/10.3390/ijerph13060526>. [8]
- Casey, T. and J. Robertson (2019), *Loose Parts Play: A Toolkit*, Inspiring Scotland, <https://www.inspiringscotland.org.uk/publication/loose-parts-play-toolkit-2019-edition/>. [69]
- Chilton, T. (2018), "Adventure playgrounds: A brief history", in F. Brown & B. Hughes (ed.), *Aspects of Playwork: Play and Culture Studies*. [70]
- Council of Chief Medical Officers of Health (2018), *Active Outdoor Play Statement from the Council of Chief Medical Officers of Health*, <http://www.phn-rsp.ca/aop-position-jae/index-eng.php#fn1>. [87]
- Council on school health (2012), "The crucial role of recess in school", *PEDIATRICS*, Vol. 131/1, pp. 183-188, <http://dx.doi.org/10.1542/peds.2012-2993>. [52]
- Cox, A., J. Loebach and S. Little (2018), "Understanding the nature play milieu: Using behavior mapping to investigate children's activities in outdoor play spaces", *Children, Youth and Environments*, Vol. 28/2, p. 232, <http://dx.doi.org/10.7721/chilyoutenvi.28.2.0232>. [21]
- Dalley, M. and J. Rucoe (2003), "The abduction of children by strangers in Canada: Nature and scope", https://www.childjustice.org/index.php?option=com_edocman&view=document&id=176&Itemid=&lang=en. [39]
- Farber, M. et al. (2019), *Maternal Protection in Childhood is Associated with Amygdala Reactivity and Structural Connectivity in Adulthood*, *Developmental Cognitive Neuroscience*, <http://dx.doi.org/10.1101/535823>. [30]

- Gibson, J. (1979), *The Ecological Approach to Visual Perception*, Houghton-Mifflin, Boston. [63]
- Gibson, J., M. Cornell and T. Gill (2017), “A systematic review of research into the impact of loose parts play on children’s cognitive, social and emotional development”, *School Mental Health*, Vol. 9/4, pp. 295-309, <http://dx.doi.org/10.1007/s12310-017-9220-9>. [67]
- Gill, T., M. Power and M. Brussoni (2019), *Risk Benefit Assessment for Outdoor Play: A Canadian Toolkit*, <https://indd.adobe.com/view/44ed054b-917b-4e02-a1e3-e6c4cbfe0360>. [85]
- Global Recess Alliance (2020), *Statement on Recess*, <https://globalrecessalliance.org/recess-statement/>. [50]
- Goodwin, J. et al. (2018), “To play is to learn. Time to step back and let kids be kids.”, <https://www.weforum.org/agenda/2018/01/to-play-is-to-learn/>. [35]
- Gray, C. et al. (2015), “What is the relationship between outdoor time and physical activity, sedentary behaviour, and physical fitness in children? A systematic review”, *International Journal of Environmental Research and Public Health*, Vol. 12/6, pp. 6455-6474, <http://dx.doi.org/10.3390/ijerph120606455>. [23]
- Gray, P. (2011), “The decline of play and the rise of psychopathology in children and adolescents”, *American Journal of Play*, Vol. 3, pp. 443–463. [25]
- Greenfield, C. (2004), “Transcript: ‘Can run, play on bikes, jump the zoom slide, and play on the swings’: Exploring the value of outdoor play”, *Australasian Journal of Early Childhood*, Vol. 29/2, pp. 1-5, <http://dx.doi.org/10.1177/183693910402900202>. [9]
- Hart, R. (2002), “Containing children: Some lessons on planning for play from New York City”, *Environment and Urbanization*, Vol. 14/2, pp. 135-148, <http://dx.doi.org/10.1177/095624780201400211>. [55]
- Herrington, S. (1997), “The received view of play and the subculture of infants”, *Landscape Journal*, Vol. 16/2, pp. 149-160, <http://dx.doi.org/10.3368/lj.16.2.149>. [64]
- Herrington, S., S. Brunelle and M. Brussoni (2017), “Outdoor play spaces in Canada: As if children mattered.”, in Waller, T. et al. (eds.), *The SAGE handbook of outdoor play and learning*, SAGE, London. [58]
- Herrington, S. et al. (2007), *Seven C’s: An informational guide to young children’s outdoor play spaces*, Consortium for Health, Intervention, Learning and Development (CHILD), <http://www.wstcoast.org/playspaces/outsidecriteria/7Cs.pdf>. [59]
- Herrington, S. and J. Nicholls (2007), “Outdoor play spaces in Canada: The safety dance of standards as policy”, *Critical Social Policy*, Vol. 27/1, pp. 128-138, <http://dx.doi.org/10.1177/0261018307072210>. [82]
- Hofferth, S. (2009), “Changes in American children’s time - 1997 to 2003”, *Electronic International Journal of Time Use Research*, Vol. 6, pp. 26-47. [47]
- Holt, N. et al. (2016), “An intergenerational study of perceptions of changes in active free play among families from rural areas of Western Canada”, *BMC Public Health*, Vol. 16/1, <http://dx.doi.org/10.1186/s12889-016-3490-2>. [14]

- Houser, N. et al. (2019), “A loose parts randomized controlled trial to promote active outdoor play in preschool-aged children: Physical literacy in the early years (PLEY) project”, *Methods and Protocols*, Vol. 2/2, p. 27, <http://dx.doi.org/10.3390/mps2020027>. [68]
- Hyun, E. (1998), “Culture and development in children’s play”, in P. Lang. (ed.), *Making sense of developmentally and culturally appropriate practice (DCAP) in early childhood education*. [1]
- Inter IKEA Systems (2015), *The Play Report 2015*, IKEA, <https://preview.thenewsmarket.com/Previews/IKEA/DocumentAssets/437058.pdf>. [5]
- International School Ground Alliance (2018), *Risk in Play and Learning Declaration*, <https://www.internationalschoolgrounds.org/risk>. [88]
- Jelleyman, C. et al. (2019), “A cross-sectional description of parental perceptions and practices related to risky play and independent mobility in children: The New Zealand state of play survey”, *International Journal of Environmental Research and Public Health*, Vol. 16/2, p. 262, <http://dx.doi.org/10.3390/ijerph16020262>. [38]
- Jost, D., B. Yost and S. Mikus (2016), “Making room for risk in play environments and play standards”, *Landscape Research Record*, Vol. 5, pp. 245-250. [81]
- Karsten, L. (2005), “It all used to be better? Different generations on continuity and change in urban children’s daily use of space”, *Children’s Geographies*, Vol. 3, pp. 275-290. [43]
- Kleppe, R., E. Melhuish and E. Sandseter (2017), “Identifying and characterizing risky play in the age one-to-three years”, *European Early Childhood Education Research Journal*, Vol. 25/3, pp. 370-385, <http://dx.doi.org/10.1080/1350293x.2017.1308163>. [20]
- Larcombe, E. (2010), *The 7Cs of neighbourhood design: Neighbourhood design that supports child development*, <https://open.library.ubc.ca/cIRcle/collections/graduateresearch/310/items/1.0102512>. [60]
- Lavrysen, A. et al. (2015), “Risky-play at school. Facilitating risk perception and competence in young children”, *European Early Childhood Education Research Journal*, Vol. 25/1, pp. 89-105, <http://dx.doi.org/10.1080/1350293x.2015.1102412>. [32]
- Law, S. and M. Leichter-Saxby (2020), *Pop-up Adventure Play*, <https://www.popupadventureplay.org/>. [72]
- LeMoyne, T. and T. Buchanan (2011), “Does “hovering” matter? Helicopter parenting and its effect on well-being”, *Sociological Spectrum*, Vol. 31/4, pp. 399-418, <http://dx.doi.org/10.1080/02732173.2011.574038>. [27]
- Marzi, I., Y. Demetriou and A. Reimers (2018), “Social and physical environmental correlates of independent mobility in children: a systematic review taking sex/gender differences into account”, *International Journal of Health Geographics*, Vol. 17/1, <http://dx.doi.org/10.1186/s12942-018-0145-9>. [76]
- Mathias, H. (2018), *Seeing the Wood for the Trees. How the Regulation of Early Learning and Childcare Changed to Improve Children’s Experience of Outdoor Play in Scotland*, Care Inspectorate, https://www.careinspectorate.com/images/Seeing_the_wood_for_the_trees_journal_Henry_Mathias.pdf. [91]

- Michaelson, V. et al. (2020), “Electronic screen technology use and connection to nature in Canadian adolescents: a mixed methods study”, *Canadian Journal of Public Health*, <http://dx.doi.org/10.17269/s41997-019-00289-y>. [48]
- Mountain, J. (2014), “Clear thinking”, *Nursery World*, pp. 21-23. [61]
- Mullan, K. (2019), “A child’s day: Trends in time use in the UK from 1975 to 2015”, *The British Journal of Sociology*, Vol. 70/3, pp. 997-1024, <http://dx.doi.org/10.1111/1468-4446.12369>. [15]
- National Association of City Transport Officials (2020), *Designing Streets for Kids Guide*, <https://globaldesigningcities.org/publication/designing-streets-for-kids/>. [73]
- Nicholson, S. (1972), “The theory of loose parts: An important principle for design methodology”, *Studies in Design Education Craft & Technology*, Vol. 4/2, pp. 5-14. [66]
- Niehues, A. et al. (2016), “Reframing healthy risk taking: Parents’ dilemmas and strategies to promote children’s well-being”, *Journal of Occupational Science*, Vol. 23/4, pp. 449-463, <http://dx.doi.org/10.1080/14427591.2016.1209424>. [78]
- Niehues, A. et al. (2013), “Everyday uncertainties: reframing perceptions of risk in outdoor free play”, *Journal of Adventure Education & Outdoor Learning*, Vol. 13/3, pp. 223-237, <http://dx.doi.org/10.1080/14729679.2013.798588>. [79]
- Office of the United Nations High Commissioner for Human Rights (1989), *Convention on the Rights of the Child*, Pub. L. No. General Assembly Resolution 44/25. [3]
- Outdoor Play Canada (2019), *Outdoor Play Glossary of Terms*, https://www.outdoorplaycanada.ca/portfolio_page/outdoor-play-glossary-of-terms/. [11]
- Peden, M. et al. (2008), *World Report on Child Injury Prevention*, World Health Organization Press. [40]
- Pellegrini, A. (2009), “Play: What is it?”, in *The Role of Play in Human Development*, Oxford University Press. [2]
- Piccininni, C. et al. (2018), “Outdoor play and nature connectedness as potential correlates of internalized mental health symptoms among Canadian adolescents”, *Preventive Medicine*, Vol. 112, pp. 168-175, <http://dx.doi.org/10.1016/j.ypmed.2018.04.020>. [49]
- Play Safety Forum (2008), *Managing Risk in Play Provision: A Position Statement*, <http://www.playengland.org.uk/resources/managing-risk-in-play-provision-a-position-statement.aspx>. [89]
- Raymund, J. (1995), “From barnyards to backyards: An exploration through adult memories and children’s narratives in search of an ideal playscape.”, *Children’s Environments*, Vol. 12/3, pp. 362–380. [4]
- Real Play Coalition (2018), *Value of Play Report*, <https://www.realplaycoalition.com/value-of-play-report/>. [36]
- Richmond, S. et al. (2016), “Trends in unintentional injury mortality in Canadian children 1950–2009 and association with selected population-level interventions”, *Canadian Journal of Public Health*, Vol. 107/4-5, pp. e431-e437, <http://dx.doi.org/10.17269/cjph.107.5315>. [41]

- Sajadi, S. and A. Khoshnevis (2016), "Studying seven criteria of designing outdoor play spaces in some kindergartens of Tehran", *International Journal of Biology, Pharmacy and Allied Sciences*, Vol. 5/1, pp. 306-318. [62]
- Sandseter, E. (2010), *Scaryfunny: A Qualitative Study of Risky Play Among Preschool Children*, Norwegian University of Science and Technology, <https://ntnuopen.ntnu.no/ntnu-xmlui/handle/11250/270413>. [17]
- Sandseter, E. (2009), "Characteristics of risky play", *Journal of Adventure Education & Outdoor Learning*, Vol. 9/1, pp. 3-21, <http://dx.doi.org/10.1080/14729670802702762>. [18]
- Sandseter, E. (2009), "Children's expressions of exhilaration and fear in risky play", *Contemporary Issues in Early Childhood*, Vol. 10, pp. 92-106. [19]
- Sandseter, E. and L. Kennair (2011), "Children's risky play from an evolutionary perspective: The anti-phobic effects of thrilling experiences.", *Evolutionary Psychology*, Vol. 9/2, pp. 257-284. [22]
- Schiffrin, H. et al. (2013), "Helping or hovering? The effects of helicopter parenting on college students' well-being", *Journal of Child and Family Studies*, Vol. 23/3, pp. 548-557, <http://dx.doi.org/10.1007/s10826-013-9716-3>. [28]
- Sethi, D. et al. (2008), *European Report on Child Injury*, World Health Organization, Rome. [42]
- Shaw, B. et al. (2015), *Children's Independent Mobility: An International Comparison*, Policies Studies Institute. [12]
- Singer, D. et al. (2008), "Children's pastimes and play in sixteen nations: Is free-play declining?", *American Journal of Play*, Vol. 1/3. [7]
- Staempfli, M. (2009), "Reintroducing adventure into children's outdoor play environments", *Environment and Behavior*, Vol. 41, pp. 268-280. [71]
- Standards Australia. (2017), *Playground Equipment and Surfacing Development Installation, Inspection, Maintenance and Operation*, https://infostore.saiglobal.com/en-us/Standards/AS-4685-0-2017-99355_SAIG_AS_AS_208890/. [86]
- Statistics Canada (2017), *Deaths, by Cause, Chapter XX: External Causes of Morbidity and Mortality (V01 to Y89), Age Group and Sex, Canada, Annual*, Government of Canada. [44]
- Thirlwall, K. and C. Creswell (2010), "The impact of maternal control on children's anxious cognitions, behaviours and affect: An experimental study", *Behaviour Research and Therapy*, Vol. 48/10, pp. 1041-1046, <http://dx.doi.org/10.1016/j.brat.2010.05.030>. [29]
- Tremblay, M. et al. (2015), "Position statement on active outdoor play", *International Journal of Environmental Research and Public Health*, Vol. 12/6, pp. 6475-6505, <http://dx.doi.org/10.3390/ijerph120606475>. [90]
- UNICEF (2018), *Shaping Urbanization for Children: A Handbook on Child-Responsive Urban Planning*, UNICEF, New York. [57]
- US Play Coalition, A. (2019), *A research based case for recess: Position paper (2019)*, <https://usplaycoalition.org/wp-content/uploads/2019/08/Need-for-Recess-2019-FINAL-for-web.pdf>. [51]

- VanSkiver, A. (2019), *Parents' Tolerance of Risk in Play and Parents' Country of Birth Predict Children's Abilities to Assess Risk: A Pilot Study with Implications for Occupational Therapists*, Colorado State, University Libraries, <https://mountainscholar.org/handle/10217/197323>. [33]
- Watchman, T. and N. Spencer-Cavaliere (2017), "Times have changed: Parent perspectives on children's free play and sport", *Psychology of Sport and Exercise*, Vol. 32, pp. 102-112, <http://dx.doi.org/10.1016/j.psychsport.2017.06.008>. [16]
- Welsh Government (2014), *Wales - a Play Friendly Country*. [45]
- Welsh Government and Play Wales (2015), *Play Sufficiency Assessment Toolkit: Part One: How to use the Play Sufficiency Toolkit and prepare for the Assessment*. [46]
- Woolley, H. and A. Lowe (2013), "Exploring the Relationship between Design Approach and Play Value of Outdoor Play Spaces", *Landscape Research*, Vol. 38/1, pp. 53-74, <http://dx.doi.org/10.1080/01426397.2011.640432>. [65]
- World Economic Forum (2016), "The future of jobs", <https://www.weforum.org/reports/the-future-of-jobs>. [34]
- Wyver, S. et al. (2009), "Ten ways to restrict children's freedom to play: The problem of surplus safety.", *Contemporary Issues in Early Childhood*. [13]

5 Digital media and cognitive development

Benoit Bediou, Faculty of Psychology and Education Science, Department of Psychology,
University of Geneva, Switzerland

Michael Rich, Boston Children's Hospital/Harvard Medical School, United States

Daphne Bavelier, Faculty of Psychology and Education Science, Department of Psychology, and Campus
Biotech University of Geneva, Switzerland

Contradictory statements are often heard about the effects of digital technology use on health or cognition, posing practical dilemmas to parents, educators, health professionals and policy makers. We argue that one source of inconsistencies lies in an oversimplistic concept of "screen time", which fails to capture the complexity of digital media practices. For example, research shows that action video game play and media "multitasking," two activities that count as screen time, have opposite effects on attention. We urge adoption of standardised definitions and propose guiding principles to achieve greater granularity, accuracy and consistency in conceptualising and addressing media effects.

The dilemma: implications of the increase in digital technology consumption

The continuous rise in digital technology consumption has raised issues in multiple domains, including health (physical inactivity, problematic use), development (isolation, anxiety) and education (21st century skills), but also ethics (data access, privacy, cybersecurity, artificial intelligence), equity (inclusion, digital divide) and law (individual rights). Parents, educators and health professionals, as well as governments, organisations and authorities are constantly confronted with contradictory messages and in need of evidence-based recommendations.

Two views are frequently opposed. One side, mostly represented by health organisations, warns against the negative consequences of excessive digital media use, underscoring, for example, that the physical inactivity associated with screens is known to increase numerous health risks (Stiglic and Viner, 2019^[1]). The other side emphasises the importance of information technology (IT) skills for successful personal, social and professional development in a digital world. Innovation industries advocate for digital media proficiency, not without potential conflict of interest (Selwyn, 2010^[2]). Overall, concerns have been raised regarding sleep (LeBourgeois et al., 2017^[3]), obesity (Robinson et al., 2017^[4]), anxiety/depression (Hoge, Bickham and Cantor, 2017^[5]) and cognitive development (Anderson, Subrahmanyam and Workgroup, 2017^[6]), while at the same time the potential benefits for learning and social communication have been recognised (Council on Communications and Media, 2016^[7]).

Conflicting views about the effects of technology use have important implications for policy making and economics. Where should we invest? Should governments and authorities develop guidelines and regulations to restrict screen use for public health reasons? Or should we instead provide paediatricians, parents and educators the training and resources to better support individuals and families in developing digital practices that are in their best interest?

Which evidence-based recommendations?

Studies investigating the effects of digital technology tend to focus either on harmful effects of using digital media or on strategies for leveraging digital technologies to empower users, with little discourse or consensus-building between these lines of research. Strongly polarised positions hinder reaching agreement on questions as important as the nature of and criteria defining media-related disorders, such as dysfunctional, uncontrolled use of interactive digital media.

Findings from the line of research investigating harmful effects often motivate a call for restrictions, such as limiting access to and time using screen media. When high durations of television viewing were found to be associated with increased risk for obesity, the American Academy of Pediatrics recommended limiting television watching among children and adolescents (American Academy of Pediatrics, 2001^[8]). However, it has often proven difficult to translate such advice into practical action (Houghton et al., 2015^[9]) due to the proliferation of screens in nearly every environment and their integration in every activity from learning to communication to social life. Conversely, results from research exploring digital potential often call for new technological development and adaptation. Therapeutic applications of video games to slow memory loss in the elderly or to improve focus in children with attention-deficit hyperactivity disorder (ADHD) encourage innovation of digital technologies for health care (Bavelier and Davidson, 2013^[10]; Mishra, Anguera and Gazzaley, 2016^[11]; Primack et al., 2012^[12]). While each of these lines of research is valid and useful, they can give rise to apparently contradictory recommendations being published by the same entity. The Australian government's 24-hour Movement Guidelines for the Early Years recommends limitations in screen use (Okely et al., 2017^[13]), while their Early Years Learning Framework promotes digital technology uses in early childhood education (Fox and Diezmann, 2017^[14]; Sumsion, 2019^[15]; White and Fleer, 2019^[16]).

The situation is similarly complex when it comes to the effects of digital technology consumption on health. Scientific studies have provided inconsistent evidence leading to divergent conclusions, sometimes despite analysing the same datasets (Przybylski and Weinstein, 2017^[17]; Twenge et al., 2018^[18]; Twenge and Campbell, 2019^[19]). Using data from 120 115 15-year-olds in the United Kingdom, Przybylski and Weinstein (2017^[17]) found that screen time over two hours per week explained 1.0% or less of the observed variability in the mental well-being of the young people in the sample. The authors highlighted that such an effect is three times smaller than the positive associations between well-being and eating breakfast regularly or getting regular sleep, and concluded that "the possible deleterious relation between media use and well-being may not be as practically significant as some researchers have argued". Twenge and Campbell (2019^[19]) in contrast argued that the "percent variance is not a good measure of practical impact". These authors emphasised that "those who spent seven or more hours a day on computers (vs. a half-hour) were also twice as likely to be low in well-being" and that "the percentage of adolescents low in well-being increased by 14% with each additional hour of smartphone use". These authors underline that the effect size of excess media use is comparable to other psychological phenomena such as gender differences, and that even smaller effects have led to practical action, as in the case of smoking tobacco.

Such conflicting evidence-based recommendations pose dilemmas for practice and policy making (Straker et al., 2018^[20]). Messages can shift from restriction to promotion of the same activity, as was seen with some governments and health agencies recently promoting video gaming and the use of social media to maintain communication and social contact during the COVID-19 confinement (Przybylski and Etchells, 2020^[21]). We argue here that scientific research has remained poorly informative concerning best use of digital media, in great part because it has relied on the simplistic construct of "screen time". Although apparently contradictory, these views can be reconciled by deconstructing monolithic "screen time" and recognising the heterogeneity of how screens are used.

How to advance the scientific debate around digital media effects

The notion of "screen time" encompasses an increasingly diverse set of activities in terms of the cognitive, emotional or social experiences screens can provide. Historically, the concept of screen time tracked technological development, starting with the first electronic screens, cathode ray tubes or CRTs, back in the 1920s. With the introduction of liquid crystal displays (LCDs) in the early 2000s, screens were no longer bulky televisions and desktop computer monitors, becoming an essential part of entertainment, advertising, and information technologies. With LCD miniaturisation, screens could be pocketed, even worn, making screens accessible 24/7 and expanding their functions to communication and human connection. As technology has evolved, the duration of screen use has exploded and the variety of experiences that screen time can afford has become more heterogeneous in content, in contexts of use, and in interactivity and immersion.

Asking about the effect of hours of screen time consumption on health or behaviour is akin to asking about the effect of kilograms of food consumption on health or behaviour. Can valid conclusions be drawn when asking about quantity in such an undifferentiated way? Some studies indicate that small amounts of screen use may be beneficial, whereas larger amounts may have negative effects (Twenge et al., 2018^[18]; Kushlev and Leita, 2020^[22]; Orben and Przybylski, 2019^[23]; Przybylski and Weinstein, 2017^[17]; Radesky, Schumacher and Zuckerman, 2015^[24]). A similar contrast between positive and negative impact as function of dose was recently documented when considering only video game play (Pujol et al., 2016^[25]). Meta-analytic work examining the relationship between screen time and depression also indicates effects dependent on dose in a non-linear way, with a greater risk for depression for no screen time as compared to one hour per day of screen time and a continuously increasing risk for depression beyond one hour per day (Liu, Wu and Yao, 2015^[26]). Twenge reported a similar J-shaped correlation curve between social media use and depression in adolescents (ages 13 to 18); one to two hours per day of use was associated

with lower levels of anxiety/depression than either longer durations of use or no use (Twenge et al., 2018^[18]).

The best-powered (N = 355 358) study addressing the impact of screen time on adolescent well-being documents an effect of less than 0.5% of the variance in well-being (between 0.1% and 0.4% depending on the dataset and analysis), similar in size to regular consumption of potatoes in one's diet (Orben and Przybylski, 2019^[23]). Are we to conclude that screen use has little impact on behaviour? Of course not. We argue here that using screen time as the independent variable in media effects research is vague and misdirected, as would be asking about kilograms of food consumed on health – without asking what types of food were consumed.

It is crucial to recognise that screen time is now anything but a unitary experience. As illustrated by neuroscience research on experience-dependent brain plasticity (Holtmaat and Svoboda, 2009^[27]), different effects are to be expected from different types of screen uses. Passively viewing a cooking show on YouTube should not be expected to have the same impact on brain and behaviour as playing a video game, even though both qualify as screen time. The type of screen content and the social context of consumption (at home vs. in school, alone vs. with friends) have been reported to influence behavioural outcomes (Orben and Przybylski, 2020^[28]; Twenge et al., 2020^[29]).

To complicate the situation, individual personality, motivation, preferences and vulnerabilities have also been documented to matter, both at the level of media consumption pattern (e.g. gender differences in social media vs. gaming) and of its impact (Piotrowski and Valkenburg, 2015^[30]; Nesi and Prinstein, 2015^[31]). The media that are used and how they are used, rather than total screen time, are crucial determinants of the effects. Accordingly, they should be taken into account when providing guidelines (Ashton and Beattie, 2019^[32]; Canadian Paediatric Society, Digital Health Task Force, Ottawa, Ontario, 2019^[33]). Two recent lines of research provide useful insight into why investigating the duration of screen time affects cognitive development can lead to confusion.

Cognitive effects of action video game play and media multitasking

Research on the relationships between video game play and cognitive abilities shed light on a more nuanced understanding of media effects. Recent meta-analyses of these studies could be perceived as reaching conflicting conclusions (Bediou et al., 2018^[34]; Sala, Tatlidil and Gobet, 2018^[35]). A closer look, however, suggests that the source of these divergent findings lies in the level of granularity with which video game play was examined. When all video games are considered together, the cognitive impact of gaming appears mixed (Sala, Tatlidil and Gobet, 2018^[35]). Yet, when only action (first- and third-person shooter) video games are considered, better cognitive abilities have been reported, both in regular players and in interventions with naïve players (Bediou et al., 2018^[34]; Wang et al., 2017^[36]). In particular, action video game play enhances attentional abilities. Thus, not all video games affect cognition equally or similarly. The effects are specific enough to call for careful consideration of game genre when studying the impact of video game play on cognition and beyond (Dale et al., 2020^[37]).

To add to the complexity of capturing screen use, recent studies indicate that approximately one third of the time youth use two or more screen media concurrently, such as texting while watching television (Common Sense Media, 2016^[38]). This practice, termed media multitasking (MMT), refers to the simultaneous consumption of multiple media at the same time. MMT has increased with the development of touch screens and smartphones providing flexible, nearly constant access to digital media. This practice is starting to raise concerns as studies suggest it may be associated with lower attentional and executive functions, such as difficulty suppressing irrelevant information (Ophir, Nass and Wagner, 2009^[39]). Real-world MMT has been linked with robust effects on subjective or self-reported measures of attentional performance, findings corroborated by some, albeit not all, laboratory-based measures (Uncapher, Thieu

and Wagner, 2015^[40]; van der Schuur et al., 2015^[41]; Wiradhany and Koerts, 2019^[42]; Wiradhany and Nieuwenstein, 2017^[43]).

Box 5.1. What are action video games?

From Multiplayer Online Battle Arena games to social-simulation games, video games present a very diverse array of experiences. In our research, action video games have been mostly studied in the context of first- or third-person shooter video games, and are defined according to particular game mechanics. These games combine pacing, or the demand to answer under time pressure, with the need for distributed attention, and at the same time the capacity to swiftly shift from distributed to focused attention, as well as between different goals and sub-goals (Cardoso-Leite, Joessel and Bavelier, 2020^[44]).

The positive impact of action video games on attentional control has been established first by comparing players of action video games with non-video game players on objective, laboratory-based attentional tasks. Critically, intervention studies whereby naïve participants were asked to play action video games provided evidence that action video game play also causally enhances attentional skills.

Interestingly, participants asked to play action video games showed greater attentional benefit than those asked to play other genres of commercially available video games, establishing that action video game play enhances attentional control and other aspects of cognition to a greater extent than other video games (Bavelier and Green, 2016^[45]). This finding also holds for popular “brain-training games”, which, while similar, do not appear to deliver the same attentional benefits.

Here are two media uses, action video game play and MMT, that affect attention in opposite directions, yet, if quantified as screen time, these two media uses would be grouped together. As it becomes recognised that different uses of screens can have different, even opposite effects, research needs to study more granular variables than screen time, quantifying different types of screen use separately, as well as their interaction. This calls for a number of advances in the field of media effects research, from standardising accurate classification of media types, a complex challenge given the fast-evolving nature of the digital media ecosystem, to better measures of consumption that document not only how long media are consumed, but what media are used, when, where and with whom they are used.

Another limitation of studies investigating the effects of screen time is that most evidence is correlational, with researchers documenting how durations of everyday screen usage are *correlated* with cognitive or health outcomes. Correlations are notoriously difficult to interpret. The fact that individuals who go to the hospital more often are more frequently sick than those who do not go to the hospital does not mean that it is the hospital that causes diseases. Similarly, when finding a correlation between social media use and depression, should we conclude that social media use increases risk for depression or that adolescents at risk for depression consume more social media, possibly as a source of distraction or coping?

Although intervention studies are essential to establishing causality, they raise ethical issues when negative cognitive or health effects are hypothesised. To date, the few interventions designed to reduce screen time have yielded encouraging results on screen time (Maniccia et al., 2011^[46]) and increasing sleep (Martin, Bednarz and Aromataris, 2020^[47]), but their impact on health-related outcomes or cognition remains unknown (Guinness, Beaulieu and MacDonald, 2018^[48]; Parry and le Roux, 2019^[49]; Tassone et al., 2020^[50]). One exception is the systematic randomised control trials comparing the cognitive effects of playing commercially available action video games vs. control games from different genres that uniquely demonstrated that not all video games have the same cognitive impact (Bavelier and Green, 2016^[45]). Similar rigorous studies are essential to advancing our understanding of the relative risks and benefits of any media-related activity.

The need for balanced research and standardised definitions

Another challenge to rigorous study of the effects of media use and to effectively responding to the findings has been the “balkanization” of the media effects field. Researchers from diverse disciplines from communication to paediatrics, psychology to education have pursued independent inquiries of often narrow questions about how screen media use affects us. Insufficient, frequently indirect, research funding has led to many “one-off” projects without follow-through, continuity of inquiry, or translation of findings into interventions and strategies for prevention of harm. Findings have remained largely within their discipline-specific academic literature, with few cross-disciplinary reviews or interdisciplinary studies, so useful evidence has remained sequestered in academic silos. Thus far, we have largely failed to reach across disciplines to compare, contrast, challenge and synergise findings into a “big picture” understanding of how the media we use and how we use them influence the well-being of individuals and society at large.

Media innovators have extended the capabilities of digital technology with the goal of increasing user engagement, but with little or no consideration of the short- and long-term effects on users and society. From the earliest days of television, concerns about the impact of screen media have been framed as values-based, “good vs. bad”, “right vs. wrong”. As a result, effects on human behaviour and development have been set in opposition to freedom of expression as if the concepts of well-being and free speech were mutually exclusive. The technology and entertainment industries, to avoid restrictions, have traditionally ignored or argued against media effects concerns as “moral panic”. Instead of moving forward on a comprehensive, balanced evidence base showing how we are changed, in positive and negative ways, by our use of screen media, we have remained in a values-based stalemate.

Dysfunctional use of interactive screen media illustrates how the fragmentation of research and the values-based polarisation around media use has slowed or stalled solutions. The term “Internet addiction” was originally coined by a psychiatrist in a parody of the language used by the Diagnostic and Statistical Manual of Mental Disorders (DSM) published by the American Psychiatric Association. The response he received to his satirical description was, to his surprise, recognised by clinicians as behaviour exhibited by their patients and, in some cases, themselves. Led by Kimberly Young, PhD, research and clinical care for this growing phenomenon began in the mid-1990s. In 2008, China recognised “Internet Addiction Disorder (IAD)” as a diagnosis (Huang, Li and Tao, 2010^[51]) and developed “boot camps”, clinics and inpatient hospitals dedicated to treating it. Korea treated 140 000 young people for IAD in 2018 (BBC, 2019^[52]) and estimated that 20% of the population was at risk for it (Sullivan, 2019^[53]). The fifth edition of the once-parodied Diagnostic and Statistical Manual of Mental Disorders (DSM-5) lists Internet Gaming Disorder not as a diagnosis, but as a *Condition for Further Study* (American Psychiatric Association, 2013^[54]) and, while the World Health Organization also does not designate it as a diagnosis, they have included “Gaming Disorder” in their International Classification of Diseases (ICD-11) (WHO, 2018^[55]). In the research literature, diagnostic criteria, characterisation and even nomenclature for uncontrolled interactive media use varies widely. Including the aforementioned three names, there are more than 70 descriptions of this problem, ranging from *Binge Watching Behaviours* to *Compulsive Use of Sexually Explicit Internet Material* to *Smartphone Overuse* to *Social Media Dependence* to *Problematic Internet Use*. Although each of these names describes the behaviours studied, they contribute to fragmentation, rather than furtherance of knowledge, by focusing narrowly on the device, platform or application involved instead of investigating the behaviour in context. More than two decades have passed and we are still debating what is occurring and how to describe it.

Meanwhile, with the proliferation of interactive screen media and increasingly sophisticated algorithms of variable reward designed into games, social media and streaming services, a subset of users, predominantly young users, have developed uncontrolled interactive media use behaviours that impair their physical, mental and social health. Evidence-informed therapeutic intervention was needed. Clinical experience has revealed that, despite the plethora of conditions researched, there is more commonality than differences among these dysfunctional behaviours. The problem is not caused by specific

technological devices, platforms or applications – it occurs with gaming, but also with social media, pornography and video/information bingeing. It is not a true addiction, with measurable physiologic changes when using or withdrawing as is seen with addiction to substances. It is the interactivity, with its designed-in variable rewards, that children and adolescents, with their still-maturing executive functions, are unable to self-regulate. To be accurate, comprehensive, and to prevent the care-avoiding stigma of “addiction”, the consensus nomenclature of Problematic Interactive Media Use (PIMU) (Rich, Tsappis and Kavanaugh, 2017^[56]) was developed. PIMU is defined as a syndrome of behaviours characterised by compulsive use of, increasing tolerance to, and negative reactions to being removed from interactive screen media use (gaming, social media, pornography, information- or video-bingeing) which impair the individual’s physical, psychological, cognitive and/or social function.

In addition, efforts to determine and describe PIMU as a diagnosis may be misguided. Medical evaluations of patients presenting with PIMU have revealed underlying conditions such as ADHD, learning disabilities, anxiety or mood disorders, either known or subclinical, that manifest themselves in the interactive media environment. For example, a young person with ADHD, who is distracted and out of touch in the classroom, thrives in a first-person shooter video game that does not punish distractibility; rather, gaming is a self-soothing behaviour because it provides an environment in which this young person can perform as well or better than neurotypical peers. What had been narrowly investigated as a potential diagnosis caused by technology appears, on deeper, more comprehensive study, to be a syndrome, a group of symptoms that manifests itself in the interactive media environment. When the underlying diagnosis is determined and treated, PIMU becomes controllable (Pluhar et al., 2019^[57]).

Conclusion and future directions

Over the past few decades, studies examining the impact of digital technology on various aspects of human cognition and health have accumulated, bringing some consensus and some disagreement regarding how beneficial or harmful digital technology could be. Recent work suggests that an important source of inconsistencies lies in the failure to take into account the heterogeneous nature of digital media practices. This has led to mixed messages which pose a practical dilemma at many levels, whether parents, educators, health professionals or policy makers.

Using research on the cognitive effects of action video game play and media multitasking and clinical experience with PIMU, we argue that part of the inconsistencies and conflict arise from a lack of granularity in conceptualising both media use (e.g. screen time) and their effects (diversity of outcomes and measures). A few important principles are emerging that will require significant research effort as we move forward:

1. The type of media matters: Using social media will not produce the same effects as playing video games.
2. Content matters: An educational video game focused on reading will not have the same impact as a social simulation video game.
3. Context matters: Using screen media for shared activities promoting collaboration and co-operation does not have the same impact as watching videos alone (Mayer and Mayer, 2005^[58]).
4. Delivery interface matters: Although virtual reality-based devices may promote engagement over screen-based devices for teaching, the device can distract from or contribute to achieving learning objectives (Makransky et al., 2020^[59]; Parong and Mayer, 2018^[60]).
5. Interactivity matters: The cognitive effects of action video games have been largely attributed to game play mechanics. The interactivity of action video game play loads attentional processes in a very different manner than puzzle or social simulation games (Cardoso-Leite, Joessel and Bavelier, 2020^[44]).

6. Last but not least, users matter: Users with different characteristics and at different stages of neurodevelopment have differential susceptibilities to positive and negative effects from using media (Piotrowski and Valkenburg, 2015^[30]).

To advance further our understanding of how screen use impacts human development and behaviour, it is crucial to recognise the heterogeneity of screen time, and properly qualify the multiple dimensions of media usage. We thus need to study each and every media use in earnest according to these six principles.

References

- American Academy of Pediatrics (2001), “Children, adolescents, and television”, *Pediatrics*, Committee on Public Education, pp. 423-426, <http://dx.doi.org/10.1542/peds.107.2.423>. [8]
- American Psychiatric Association (2013), *Internet gaming disorder*. [54]
- Anderson, D., K. Subrahmanyam and C. Workgroup (2017), “Digital screen media and cognitive development”, *Pediatrics*, Vol. 140/Supplement 2, pp. S57-S61, <http://dx.doi.org/10.1542/peds.2016-1758c>. [6]
- Ashton, J. and R. Beattie (2019), “Screen time in children and adolescents: Is there evidence to guide parents and policy?”, *The Lancet Child & Adolescent Health*, Vol. 3/5, pp. 292-294, [http://dx.doi.org/10.1016/s2352-4642\(19\)30062-8](http://dx.doi.org/10.1016/s2352-4642(19)30062-8). [32]
- Bavelier, D. and R. Davidson (2013), “Games to do you good”, *Nature*, Vol. 494/7438, pp. 425-426, <http://dx.doi.org/10.1038/494425a>. [10]
- Bavelier, D. and C. Green (2016), “The brain-boosting power of video games”, *Scientific American*, Vol. 315/1, pp. 26-31, <http://dx.doi.org/10.1038/scientificamerican0716-26>. [45]
- BBC (2019), *South Korean internet addiction camp: What is life like there?*, <https://www.bbc.co.uk/newsround/48855182>. [52]
- Bediou, B. et al. (2018), “Meta-analysis of action video game impact on perceptual, attentional, and cognitive skills.”, *Psychological Bulletin*, Vol. 144/1, pp. 77-110, <http://dx.doi.org/10.1037/bul0000130>. [34]
- Canadian Paediatric Society, Digital Health Task Force, Ottawa, Ontario (2019), “Digital media: Promoting healthy screen use in school-aged children and adolescents”, *Paediatrics & Child Health*, Vol. 24/6, pp. 402-408, <http://dx.doi.org/10.1093/pch/pxz095>. [33]
- Cardoso-Leite, P., A. Joessel and D. Bavelier (2020), “Games for enhancing cognitive abilities”, in *MIT Handbook of Game-based Learning*, MIT Press, Boston. [44]
- Common Sense Media (2016), *Common Sense Media Research Brief. Technology Addiction: Concern, Controversy, and Finding Balance*. [38]
- Council on Communications and Media (2016), “Children and adolescents and digital media”, *Pediatrics*, Vol. 138/5, p. e20162593, <http://dx.doi.org/10.1542/peds.2016-2593>. [7]
- Dale, G. et al. (2020), “A new look at the cognitive neuroscience of video game play”, *Annals of the New York Academy of Sciences*, Vol. 1464/1, pp. 192-203, <http://dx.doi.org/10.1111/nyas.14295>. [37]

- Fox, J. and C. Diezmann (2017), "The Australian early years learning framework and ICT: A part of life or apart from life?", in *New Frontiers of Educational Research, Contemporary Issues and Challenge in Early Childhood Education in the Asia-Pacific Region*, Springer Singapore, Singapore, http://dx.doi.org/10.1007/978-981-10-2207-4_9. [14]
- Guinness, K., L. Beaulieu and J. MacDonald (2018), "Effects of technology breaks on media multitasking with college students", *Behavioral Interventions*, Vol. 33/4, pp. 427-439, <http://dx.doi.org/10.1002/bin.1529>. [48]
- Hoge, E., D. Bickham and J. Cantor (2017), "Digital media, anxiety, and depression in children", *Pediatrics*, Vol. 140/Supplement 2, pp. S76-S80, <http://dx.doi.org/10.1542/peds.2016-1758g>. [5]
- Holtmaat, A. and K. Svoboda (2009), "Experience-dependent structural synaptic plasticity in the mammalian brain", *Nature Reviews Neuroscience*, Vol. 10/9, pp. 647-658, <http://dx.doi.org/10.1038/nrn2699>. [27]
- Houghton, S. et al. (2015), "Virtually impossible: Limiting Australian children and adolescents daily screen based media use", *BMC Public Health*, Vol. 15/1, <http://dx.doi.org/10.1186/1471-2458-15-5>. [9]
- Huang, X., M. Li and R. Tao (2010), "Treatment of internet addiction", *Current Psychiatry Reports*, Vol. 12/5, pp. 462-470, <http://dx.doi.org/10.1007/s11920-010-0147-1>. [51]
- Kushlev, K. and M. Leitao (2020), "The effects of smartphones on well-being: Theoretical integration and research agenda", *Current Opinion in Psychology*, Vol. 36, pp. 77-82, <http://dx.doi.org/10.1016/j.copsyc.2020.05.001>. [22]
- LeBourgeois, M. et al. (2017), "Digital media and sleep in childhood and adolescence", *Pediatrics*, Vol. 140/Supplement 2, pp. S92-S96, <http://dx.doi.org/10.1542/peds.2016-1758j>. [3]
- Liu, M., L. Wu and S. Yao (2015), "Dose–response association of screen time-based sedentary behaviour in children and adolescents and depression: a meta-analysis of observational studies", *British Journal of Sports Medicine*, Vol. 50/20, pp. 1252-1258, <http://dx.doi.org/10.1136/bjsports-2015-095084>. [26]
- Makransky, G. et al. (2020), "Immersive virtual reality increases liking but not learning with a science simulation and generative learning strategies promote learning in immersive virtual reality.", *Journal of Educational Psychology*, <http://dx.doi.org/10.1037/edu0000473>. [59]
- Maniccia, D. et al. (2011), "A meta-analysis of interventions that target children's screen time for reduction", *Pediatrics*, Vol. 128/1, pp. e193-e210, <http://dx.doi.org/10.1542/peds.2010-2353>. [46]
- Martin, K., J. Bednarz and E. Aromataris (2020), "Interventions to control children's screen use and their effect on sleep: A systematic review and meta-analysis", *Journal of Sleep Research*, <http://dx.doi.org/10.1111/jsr.13130>. [47]
- Mayer, R. and R. Mayer (2005), *The Cambridge Handbook of Multimedia Learning*, Cambridge University Press. [58]
- Mishra, J., J. Anguera and A. Gazzaley (2016), "Video games for neuro-cognitive optimization", *Neuron*, Vol. 90/2, pp. 214-218, <http://dx.doi.org/10.1016/j.neuron.2016.04.010>. [11]

- Nesi, J. and M. Prinstein (2015), "Using social media for social comparison and feedback-seeking: Gender and popularity moderate associations with depressive symptoms", *Journal of Abnormal Child Psychology*, Vol. 43/8, pp. 1427-1438, <http://dx.doi.org/10.1007/s10802-015-0020-0>. [31]
- Okely, A. et al. (2017), "A collaborative approach to adopting/adapting guidelines - The Australian 24-Hour Movement Guidelines for the early years (Birth to 5 years): an integration of physical activity, sedentary behavior, and sleep", *BMC Public Health*, Vol. 17/S5, <http://dx.doi.org/10.1186/s12889-017-4867-6>. [13]
- Ophir, E., C. Nass and A. Wagner (2009), "Cognitive control in media multitaskers", *Proceedings of the National Academy of Sciences*, Vol. 106/37, pp. 15583-15587, <http://dx.doi.org/10.1073/pnas.0903620106>. [39]
- Orben, A. and A. Przybylski (2020), "Reply to: Underestimating digital media harm", *Nature Human Behaviour*, Vol. 4/4, pp. 349-351, <http://dx.doi.org/10.1038/s41562-020-0840-y>. [28]
- Orben, A. and A. Przybylski (2019), "The association between adolescent well-being and digital technology use", *Nature Human Behaviour*, Vol. 3/2, pp. 173-182, <http://dx.doi.org/10.1038/s41562-018-0506-1>. [23]
- Parong, J. and R. Mayer (2018), "Learning science in immersive virtual reality.", *Journal of Educational Psychology*, Vol. 110/6, pp. 785-797, <http://dx.doi.org/10.1037/edu0000241>. [60]
- Parry, D. and D. le Roux (2019), "Media multitasking and cognitive control: A systematic review of interventions", *Computers in Human Behavior*, Vol. 92, pp. 316-327, <http://dx.doi.org/10.1016/j.chb.2018.11.031>. [49]
- Piotrowski, J. and P. Valkenburg (2015), "Finding orchids in a field of dandelions", *American Behavioral Scientist*, Vol. 59/14, pp. 1776-1789, <http://dx.doi.org/10.1177/0002764215596552>. [30]
- Pluhar, E. et al. (2019), "Problematic interactive media use in teens: Comorbidities, assessment, and treatment", *Psychology Research and Behavior Management*, Vol. Volume 12, pp. 447-455, <http://dx.doi.org/10.2147/prbm.s208968>. [57]
- Primack, B. et al. (2012), "Role of video games in improving health-related outcomes", *American Journal of Preventive Medicine*, Vol. 42/6, pp. 630-638, <http://dx.doi.org/10.1016/j.amepre.2012.02.023>. [12]
- Przybylski, A. and P. Etchells (2020), *Don't Freak Out About Quarantine Screen Time*, <https://www.nytimes.com/2020/04/06/opinion/screen-time-kids-covid.html>. [21]
- Przybylski, A. and N. Weinstein (2017), "A large-scale test of the Goldilocks hypothesis", *Psychological Science*, Vol. 28/2, pp. 204-215, <http://dx.doi.org/10.1177/0956797616678438>. [17]
- Pujol, J. et al. (2016), "Video gaming in school children: How much is enough?", *Annals of Neurology*, Vol. 80/3, pp. 424-433, <http://dx.doi.org/10.1002/ana.24745>. [25]
- Radesky, J., J. Schumacher and B. Zuckerman (2015), "Mobile and interactive media use by young children: The good, the bad, and the unknown", *Pediatrics*, Vol. 135/1, pp. 1-3, <http://dx.doi.org/10.1542/peds.2014-2251>. [24]

- Robinson, T. et al. (2017), "Screen media exposure and obesity in children and adolescents", *Pediatrics*, Vol. 140/Supplement 2, pp. S97-S101, <http://dx.doi.org/10.1542/peds.2016-1758k>. [4]
- Sala, G., K. Tatlidil and F. Gobet (2018), "Video game training does not enhance cognitive ability: A comprehensive meta-analytic investigation.", *Psychological Bulletin*, Vol. 144/2, pp. 111-139, <http://dx.doi.org/10.1037/bul0000139>. [35]
- Selwyn, N. (2010), *Schools and Schooling in the Digital Age*, Routledge, <http://dx.doi.org/10.4324/9780203840795>. [2]
- Stiglic, N. and R. Viner (2019), "Effects of screentime on the health and well-being of children and adolescents: A systematic review of reviews", *BMJ Open*, Vol. 9/1, p. e023191, <http://dx.doi.org/10.1136/bmjopen-2018-023191>. [1]
- Straker, L. et al. (2018), "Conflicting guidelines on young children's screen time and use of digital technology create policy and practice dilemmas", *The Journal of Pediatrics*, Vol. 202, pp. 300-303, <http://dx.doi.org/10.1016/j.jpeds.2018.07.019>. [20]
- Sullivan, M. (2019), *South Korea Says About 20% Of Its Population Is At Risk For Internet Addiction*, <https://www.npr.org/2019/07/30/746687204/south-korea-says-about-20-percent-of-its-population-is-at-risk-for-internet-addi/>. [53]
- Sumsion, J. (2019), "The Australian early years learning framework: Becoming and children in their first 1000 days", in *The First 1000 Days of Early Childhood, Policy and Pedagogy with Under-three Year Olds: Cross-disciplinary Insights and Innovations*, Springer Singapore, Singapore, http://dx.doi.org/10.1007/978-981-32-9656-5_5. [15]
- Tassone, A. et al. (2020), "Multitasking in the classroom: Testing an educational intervention as a method of reducing multitasking", *Active Learning in Higher Education*, Vol. 21/2, pp. 128-141, <http://dx.doi.org/10.1177/1469787417740772>. [50]
- Twenge, J. and W. Campbell (2019), "Media use is linked to lower psychological well-being: Evidence from three datasets", *Psychiatric Quarterly*, Vol. 90/2, pp. 311-331, <http://dx.doi.org/10.1007/s1126-019-09630-7>. [19]
- Twenge, J. et al. (2020), "Underestimating digital media harm", *Nature Human Behaviour*, Vol. 4/4, pp. 346-348, <http://dx.doi.org/10.1038/s41562-020-0839-4>. [29]
- Twenge, J. et al. (2018), "Increases in depressive symptoms, suicide-related outcomes, and suicide rates among U.S. adolescents after 2010 and links to increased new media screen time", *Clinical Psychological Science*, Vol. 6/1, pp. 3-17, <http://dx.doi.org/10.1177/2167702617723376>. [18]
- Uncapher, M., M. Thieu and A. Wagner (2015), "Media multitasking and memory: Differences in working memory and long-term memory", *Psychonomic Bulletin & Review*, Vol. 23/2, pp. 483-490, <http://dx.doi.org/10.3758/s13423-015-0907-3>. [40]
- van der Schuur, W. et al. (2015), "The consequences of media multitasking for youth: A review", *Computers in Human Behavior*, Vol. 53, pp. 204-215, <http://dx.doi.org/10.1016/j.chb.2015.06.035>. [41]
- Wang, P. et al. (2017), "Action video game training for healthy adults: A meta-analytic study", *Frontiers in Psychology*, Vol. 7, <http://dx.doi.org/10.3389/fpsyg.2016.00907>. [36]

- White, A. and M. Fleer (2019), "Early childhood educators' perceptions of the Australian Early Years Learning Framework (EYLF): Engaged professional learners", *Australasian Journal of Early Childhood*, Vol. 44/2, pp. 124-138, <http://dx.doi.org/10.1177/1836939119832083>. [16]
- WHO (2018), *Gaming Disorder*, <https://www.who.int/news-room/q-a-detail/gaming-disorder>. [55]
- Wiradhany, W. and J. Koerts (2019), "Everyday functioning-related cognitive correlates of media multitasking: A mini meta-analysis", *Media Psychology*, pp. 1-28, <http://dx.doi.org/10.1080/15213269.2019.1685393>. [42]
- Wiradhany, W. and M. Nieuwenstein (2017), "Cognitive control in media multitaskers: Two replication studies and a meta-Analysis", *Attention, Perception, & Psychophysics*, Vol. 79/8, pp. 2620-2641, <http://dx.doi.org/10.3758/s13414-017-1408-4>. [43]
- Young KS, N. (ed.) (2017), *Problematic Interactive Media Use Among Children and Adolescents: Addiction, Compulsion, or Syndrome?*, Springer Publishing Company. [56]

6 Play and learning in the digital age

Julian Sefton-Green

Research for Educational Impact (REDI), School of Education, Deakin University, Australia

This chapter examines the cultural history and discursive construction of play and learning, drawing attention to the way that both human activities have been differentiated but are now becoming ever more blurred. This is analysed in the context of changes brought about both by the technical affordances of digital technologies and the political economy of digital culture which has focused on turning learning into a commodity purchased and used in the home as much as in the school. The existential open-ended nature of play itself has been significantly influenced by video gaming and the turn to playfulness in public culture more generally. The chapter argues that it is important not to subordinate play as an instrumental developmental function of learning and that learning itself should not be conflated with the outcomes of the formal education system.

Introduction

“Play” and “Learning” are probably the two most common words used to describe the purposes, activities and nature of what it is to be a child. From Maria Montessori’s dictum, that “play is the work of the child” through to controversies over assessments of the “learning readiness” of two-year-olds in some countries, both play and learning are simultaneously conceptualised as being in a crucial dynamic, even binary, relationship with each other; as much as together (along with “growth”) they describe what children do and what we want from them.

For all their common-sense use, both terms actually express a range of meanings and we frequently conflate substantive (noun), descriptive (adjectival) and active (verb) modes of both terms. Scholars of childhood (Ariès, 1962^[1]; Lancy, 2014^[2]) suggest that contemporary childhood as we know it is a relatively recent cultural phenomenon that became universally recognised and commodified in the 19th century and that therefore both play and learning predate childhood as existential human activities. Frequently variants of both terms expand our use of the repertoire. A play can take place in a theatre, and games and gaming can both stand for or be part of the term’s definition; being playful is not always the same thing as “play” or playing (Sicart, 2014^[3]). In contemporary societies learning has been organised, even industrialised some might say (Hamilton and Zufiaurre, 2013^[4]) so that the term is conflated with education and schooling even though philosophers of education are keen to disentangle how learning describes what individuals do as opposed to the broader social and cultural investments in education systems and forms of institutional schooling (Biesta, 2012^[5]; Biesta, 2011^[6]).

The digital age, taken in this instance to mean the ever-evolving integration of personal, social, political, civic and economic life mediated and structured by digital technologies in virtually every aspect of everyday experience, thus inherited a series of contested and changing conceptual definitions. Play and learning in the digital age therefore re-contextualises existing cultural practices:

- to accommodate the possibilities afforded by the digital technology itself,
- and, in response to the particular forms of social and economic life maintained through digital means.

This chapter is built in several layers. First of all is an effort to explore the conceptual matrix of both terms – play and learning – in and of themselves and in relationship to each other. This level is focused on questions of definition as well as an historical overview of society and childhood. Second, is an attention to the changing uses of both terms and the ways that both terms have been used for particular political and social purposes because they suggest normative programs and policy. Although both terms describe human activity in general (Rogoff, 2003^[7]) they are now are peculiarly oriented towards the young and education. This leads into the contemporary moment – the third layer – exploring how the digital age is redefining both concepts due to a series of social and economic pressures.

Whereas much popular use of both terms and both concepts emphasises the differences between them – the central argument of this chapter is that we are now living through a particular moment of redefinition. Both the political economy of digital media use and the political logic of the education systems in many countries have transformed practices leading to:

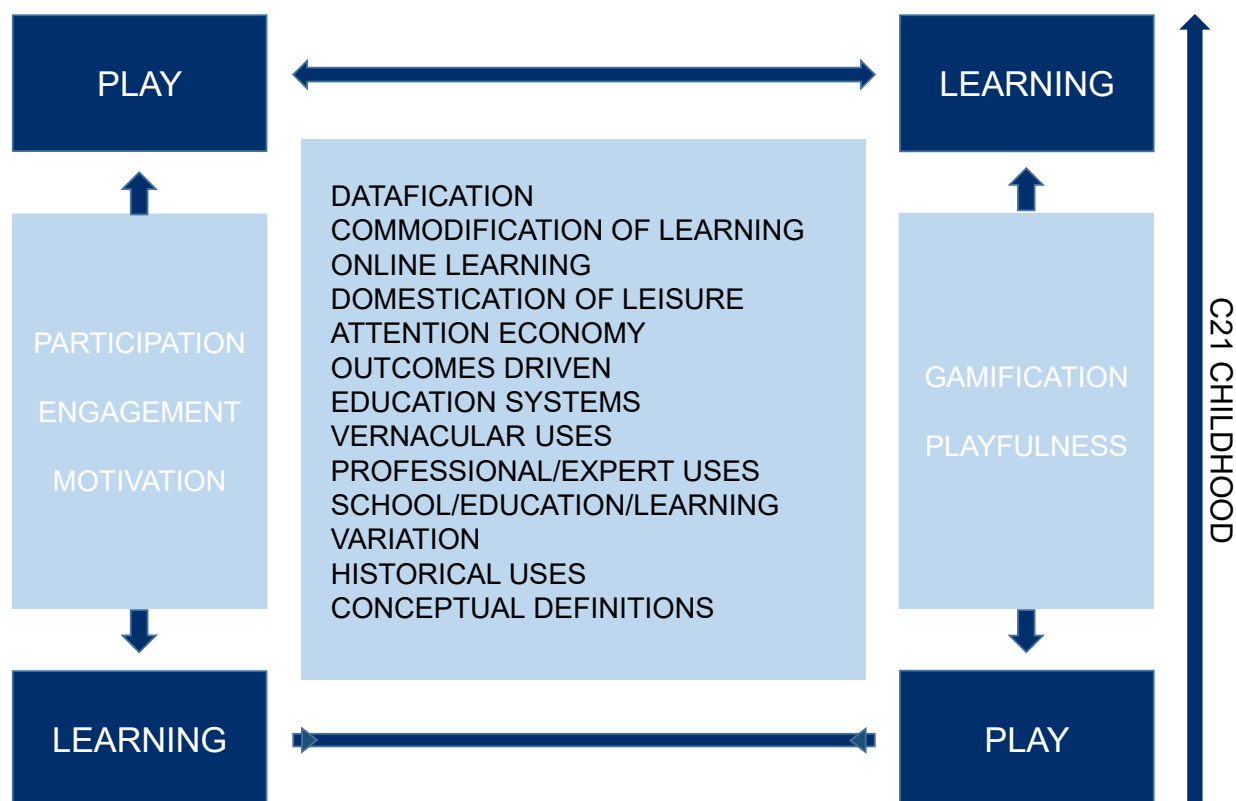
- the playification of learning,
- and, the learningification (or more strictly, the educationalisation) of play.

This is an ongoing process that challenges long-held and cherished boundaries between both domains. The slightly uncomfortable coining of these words, playification, learningification and educationalisation are intended to capture an ongoing process of redefinition. The awkwardness in phrasing can suggest that this is not necessarily an easy or comfortable evolution but rather the result of sociocultural “forces” at work. The coinage thus captures and describes historical and material changes in discourse but also, in using these terms analytically I want to draw attention to struggles for meaning and value and especially

the colonisation of one domain and ‘life-form’ by another (Habermas, 1989^[8]) through contemporary digitally mediated modes of social and political organisation.

The argument is that play has become more colonised by the need to promote educational values and make its learning explicit at the same time as many kinds of learning activities both in and out of school have become explicitly more playful and game-like. This argument is summed up in Figure 6.1 below.

Figure 6.1. Schematic outline of changes in the uses of the concepts “play” and “learning” in the 21st Century



Philosophically and conceptually, play and learning have been explained both in terms of overlapping and distinctive domains (at the bottom of the diagramme). Different national and cultural traditions about child development, growth and education have tended to emphasise different aspects of where both play and learning should be kept separate or converge. As the diagramme moves upwards, it shows how the global pressures influencing 21st century childhood (including changes to national education systems and the growth of outcomes driven standardised testing (Luke, 2018^[9])) as much as those driven by the expansion of digital technologies into the home (Livingstone, 2002^[10]) are recalibrating definitions as well as activities for children at home and at school.

Philosophical and practical definitions, uses and activities

To most people, much play looks like learning and much learning looks like play to the point where any distinction between them might seem academic. Watching four-year-olds in a sandpit engaging in pretend play, 11-year-olds strenuously trying to practice football skills, an 18-month-old playing with her mother’s mobile phone, groups of 14-year-old students puzzling out circuitry in a mechanics class, it is often very difficult to work out whether children and young people are learning or playing or both. We will return to

the question of whether such distinctions matter, to whom and in what contexts later in the chapter. This section reviews conceptual definitions to help us organise key principles, which we can then use to make sense of how things might have changed in the digital era.

From nearly all disciplinary perspectives – evolutionary psychology, cognitive psychology, learning science, sociocultural theory, cultural anthropology etc. – play and learning are understood as activities fundamental to being human (Vygotsky, 1978^[11]; Olson and Torrance, 1996^[12]). It is actually more difficult to think of a state of not learning or not playing as if this is or could be something people didn't do (not to be confused with situations when they are not allowed or forbidden to do either). Debate thus tends to focus on differences between the practices and ways that people learn to play and play to learn, and the purposes that either activity serves within whatever theory of development pertains to each culture. Here the question of the end or purpose of play and learning becomes far more problematic.

Theorists of play are keen to make the case that the purpose of play is play itself; that it has an ontological integrity. We will return to the challenges inherent in this position, but we need to understand first that this is the central argument used to rebut any claims to instrumentalise play, to understand it as serving other social, cultural or cognitive functions. One common belief in the instrumental tradition is that play performs a fundamentally educative role in allowing the young ways of experimenting, trying out and learning about key social frames involving boundaries, limits, rules as well as acting as a form of practice for adult life. This "folk theory" of mind (Bruner, 1996^[13]) is well entrenched in popular discourse.

However, scholars of play point towards the fact that play is common through the life course and does not simply serve a developmental function. This was most explicitly argued by Huizinga who offered a historical review of forms of play underpinning a range of cultural activities (Huizinga, 1970^[14]). Brian Sutton-Smith further refined the distinction between play from education by approaching play as a series of rhetorics (Sutton-Smith, 2001^[15]). Rather than seeking an intrinsic formal definition of play, he pointed to its essentially ambiguous nature showing how the concept is best approached through a series of discrete perspectives, "progress, fate, power/community, identity, imaginary, self and frivolity". Sutton-Smith does acknowledge play's adaptive function but suggests that the term primarily performs a heuristic function in making sense of a basic human activity. Play activities often fulfil more than one of these rhetorics or perspectives and can be present at all sorts of levels and all sorts of ways, in contemporary social life. Just picture an everyday scene in so many households; a game show is on television, children are engaging with toys or running around, other children playing either collaboratively or individually on or through devices, all surrounded by jokes, innuendo, wordplay and often reliant on, devices and so forth. Thomas Malaby further argues that "we cannot simultaneously use [play] reliably as a label for a kind or form of distinct human activity [as] something that allows us to differentiate between activities that "are play" and those that 'are not' (Malaby, 2007, p. 100^[16]).

This deconstructive approach does more than simply relativise play – making it all things to all people. First, we need to recognise that historical meanings are constantly present even when they are changed through reuse: and secondly to acknowledge that the idea of play cannot be reduced to a single simple purpose (Malaby, 2007^[16]). This is particularly important in respect of the concept of play in relationship with learning and education.

To some extent, there is a conceptual parallel with arguments around learning. From a cultural and historical psychological approach, learning too seems to be an innate human activity whose purpose might be interpreted in respect of evolutionary and social adaptation in terms of activities that lead "to permanent capacity change" (Illeris, 2007, p. 3^[17]). However, whereas the social history of play is frequently preoccupied by stories of containment (for example around the role of Carnival), it is almost as if the opposite is true in respect of learning. Indeed, it is impossible to examine the history or organisation of any society without noting that the ways that certain forms of learning are organised, codified, and valued are always central to how power is authorised in that society. The growth and development of the examination to become a bureaucrat or mandarin in ancient China, the development of the "Public" school system in

Imperial Britain in the 19th century (Williams, 1961^[18]), the expansion of opportunity and the growth of the technological driven industrial markets of North America (Goldin and Katz, 2008^[19]) are all examples of the ways that the organisation of learning in schooling have dramatically shaped contemporary nations (Meyer et al., 1997^[20]).

Understanding the distinction between a theory of learning (either from sociocultural perspective or as a psychological process) and the ways that learning has become categorised and organised as a set of measurable skills and knowledge transmitted through the disciplinary structure of school is central to the argument here. Schools, or more accurately schooling, offer a way of structuring collectively valued forms of learning in accord with a series of social and cultural norms. So, how people learn – sitting in rows, being tested by recall, reading in silence (all that might add up to the appearance or performance of a traditional academic kind of learning) cannot be disentangled from what they are learning or what their learning might mean. This is, furthermore, mixed up with how schools discipline children both individually and in groups, and how it validates or assesses their learning. A good example, and one that is especially relevant for us is the difference between the age at which certain countries think children should be taught to read and write and whether schools should be playful or structured in their social interactions and organisation. Scandinavian countries, especially Finland, are often held up as contrary or counterintuitive examples to say the United States or the United Kingdom, where children start organised curriculum at a later age and where the emphasis on valuing learning taking place through organised play is preferred to that of direct instruction.

How children demonstrate that they are learning and what they have learnt is something akin to a cultural difference between and within different nations rather than an abstract universal human phenomenon (Alexander, 2001^[21]). This problematic has been summed up in the phrase "what learning counts and what counts as learning" (Green and Luke, 2006^[22]). Cross-cultural comparisons always highlight these differences. What it means to be an "educated person" is not easy to compare and frequently describes the outcomes of being schooled in a particular society at a particular time rather than abstract measures of what people can and have learnt (Levinson, Foley and Holland, 1996^[23]). Different traditions of schooling often measure different capabilities and value different demonstrations of what it is to be educated and what people have learnt. In other words, at an abstract philosophical level it is difficult to define learning:

- outside of different cultural and national definitions of what schooling counts as learning
- except with reference to what is not – namely play.

All of these distinctions are slippery and inconsistent. The biblical phrase "to put away childish things" frequently underpins our injunctions to children to stop playing and do some schoolwork even if in practice, that might mean being involved in an organised game or that the work itself might be playful. More controversially and more problematically are those situations where children and young people are engaged in forms of learning that do not usually count in school; the inverse formation of the same problem. This has been most explicitly researched by the "Connected Learning Research Network" which tried to find ways to build on engagement, interest and motivation in learning domains that are not usually defined as such (from playing computer games to after school video clubs for example), in order to explore how such drive can then be used by the formal academic fields at school (Ito et al., 2020^[24]; Ito et al., 2013^[25]). These kinds of initiatives are important in making the case that if society exclusively focuses on narrow definitions of what counts as learning, many young people's interest and engagement in learning risks being marginalised. Furthermore, politicians frequently conflate measurable outcomes of learning with statements of value or effect. Indeed, the OECD and other International tests have been drawn into political debate about the value of comparative testing such as when PISA or TIMSS 'results' are as taken as proxy measures of changes in the nature, meaning and purpose of learning by diverse populations (Simola et al., 2017^[26]).

Finally, and as a way of seeking some balance here, it should be noted that just because traditions of schooling and education have acculturated us to particular definitions of what counts as learning, this does

not mean that such definitions are intrinsically misplaced. It is true that popular and political assumptions about education often proceed from a generation when such views were formed – i.e. in the past. This can often explain anxiety about innovation, especially in relationship to technology (Buckingham, 2007^[27]). However, learning as a concept, like play, is profoundly abstract in essence and can only find its form through expression and in a language that we recognise. Digital technologies entered into the home and the school at the same time as concern about the purpose and nature of schools in our society reached an important political shift. Although international comparative studies are often taken as emblematic of this shift, it should be noted that promulgation of various educational reforms such as *No Child left Behind*, (Berliner and Biddle, 1999^[28]) or the English National Curriculum (Ball, 2008^[29]), which describe reforms dating from the 1980s and 1990s, set the foundations for such changes. Together, it has been suggested that the last 30 years of educational reform have added up to a sea-change in what learning counts (Glass, 2008^[30]). It was in this context that digital technologies began to create and develop new and different kinds of learning and play activities. This in turn has led to an extraordinary period of reflection and reconceptualisation of what play and learning might mean in the first place.

The gamification of play

In 2014, Eric Zimmerman published a manifesto for a ludic century (Zimmerman, 2014^[31]). He argued that games (primarily referring to videogames, those played in digital forms on consoles, computers or mobile devices including phones) have become the new dominant cultural form of the 21st century. This was building on an argument that saw film occupy that spot for the 20th century and the novel for the previous one and that playful interactions characterise the meaningful use of leisure time. In this paean of praise, playfulness, gaming literacy and game design become the defining hallmark of contemporary global culture. This may be an extreme expression – it is after all a manifesto propounded by an exponent of play – but it contains a number of elements which benchmark many of the ways that computer games and digital-related play have transformed the landscape of play. Key here are the notions of playfulness and games (or gaming). Both of these concepts are key aspects of play itself, but both have gained slightly different prominence in the current moment.

Games and gaming

The last century saw a burgeoning interest in game theory both from a Mathematical Logic and Economics perspective. In all disciplines games and gaming are serious matters relating to the development of rule-bound systems thinking and analysis. Indeed, sociologists of play became increasingly interested in translating insights derived from the formal study of rules in games to make sense of tensions within the nature of play itself. The philosopher, Caillois attempted to distinguish the idea of open play such as children's' pretend play (paedia) from rule-bound play (ludus) especially paying attention to the meaning of chance and competition (Gane, 2019^[32]) within human activities framed in terms of games (Caillois, 1961^[33]). The growth of cybernetics and systems thinking further legitimated attention to this way of making sense of human actions. Indeed, the whole field of computational thinking owes some of its lineage to mid-20th century interest in game theory deriving from a concern with the interpretation of rules within bounded systems.

At the same time as this more obscure and theoretical field of study was developing and even gaining some more popular traction through discussion of economics, the emergence of the videogame industry placed game playing and an interest in the culture of games at the heart of mainstream popular culture (Wolf, 2002^[34]). The videogame and indeed its further development on mobile devices was as much a driver as it was a product of the computerisation and digitalisation of work, leisure and everyday life. Many home computers were initially purchased for gameplaying and the whole console market emerged alongside the videogame itself (Beck and Wade, 2004^[35]). Gameplaying on mobiles seems to be virtually

ubiquitous. While the videogame as a cultural form remains, in combination with all sorts of mini games frequently accessed through web browsers or as part of platforms like Facebook, digital game play is a global activity in terms of time spent and near-universal reach.

It is thus impossible to talk about play without taking into account the way that play has become gamified. Usually the term "gamification" describes the application of game form or game-like behaviours to typically non-game activities of which there are indeed many examples in education, such as [Kahoot](#). Here, it is as if the activities of play themselves have become significantly gamified both by the fact that much play now takes place via a screen and indeed is formally organised as a game. This has generated significant interest and debate from scholars of play and childhood and those concerned with its commercialisation in everyday life (as well as scholars of education, see below).

We are still trying to determine the impact of the turn to digitalised gamification on play and specifically on play in the lives of children and young people. There are no clear-cut findings and, as should be clear by now, trying to disentangle the effect of one complex variable on a cultural norm is an impossible challenge when framed from a social science perspective. This book's sister volume and the other chapters collected here offer more detailed complementary perspectives on how this new kind of play might affect emotional and social well-being, physical health and development, and social relationships. Broadly speaking, discussion is mainly framed in two ways:

- First, in a conceptual language of causality that is expressed as cost benefits and externalities (Cartwright, 2007^[36]): how can we look at the advantages and disadvantages of screen-based gameplay as opposed to others kinds of play, like physical play outdoors; how do we measure or calculate such impacts; what do differences in play activities mean for other kinds of ways in which children are growing up?
- Second, there is a moral-historical dimension framing the question of effects in terms of existential changes to the nature of childhood itself. This is a tradition that began with the investigation of the effects of mass media, originally television, on childhood (Meyrowitz, 1985^[37]) arguing that children are now exposed to the adult world. It subsequently evolved to examine the way that children and the family became exploited by a variety of market-driven commercial interests (including education and educational toys) (Kline, Dyer-Witford and Peuter, 2003^[38]) to become a source of moral and political concern about what society wants for and from its children (Buckingham, 2007^[27]).

A good example of the ways that these threads come together might be discussion of the reception of the game [Fortnite](#). Concern, anxiety and moral panics over violent competition are weighed up against arguments in favour of teamwork and collaboration (the game popularised the spread of the phenomenon of dancing "the floss") all encompassed in discussion about potentially unhealthy kinds of individualised addiction. How time is spent, how financial expenditure is authorised within the [political economy of the family](#), how achievement and loss is valued (Carter et al., 2020^[39]) are all contrasted with other kinds of traditional play (as well as seemingly less controversial and more 'educational' activities on-screen such as have been researched in respect of the phenomenon of 'Minecraft' (Dezuanni, 2020^[40]) see below). Frequently, screen-based games, especially those which have generated controversy, stand as substitutes for all kinds of play in the digital area. Research, policy and public debate need to pay attention to the accuracy of both reducing all kinds of play at this time to these kinds of gamified experiences; and being able to understand the balance of such activities within the broader ecology of children's play.

Playfulness and serious games

The second dimension of Zimmerman's manifesto described in the introduction to this subsection, concerns what he called "playfulness". In addition to the gamification of play, the argument is that our culture generally has become more playful across a huge range of social and digitally mediated interactions, especially Zimmerman noted, in respect of data.

Playfulness needs to be distinguished from play. It is better understood as part of an attitude or as a modality reflecting the desire to act or speak or engage in a certain kind of playful manner: it is applied to something else as opposed to play itself which has its own integrity (Sicart, 2014^[3]). Whereas it is not quite clear what the opposite of play might be (notwithstanding this chapter's attempts to situate learning as its binary other (Malaby, 2007^[16]) cites discussion in (Stevens, 1980^[41]) to advance this argument)), the opposite of playfulness is seriousness, underscoring an attitudinal dimension. While it is difficult to measure such a change, we might cautiously advance the claim that public discourse has broadly speaking, become more informal over the last 40 years. The news is now regarded as a form of entertainment (as defined by broadcasters and the media industries rather than through the behaviours of individual politicians (Davies, 2009^[42]) and humour is now far more evident in situations that used to be more formal – such as in schools, civil society and in personal social interactions. The workplace and the nature of work has been studied as an example of ways where until recently formal hierarchical interpersonal transactions have been softened and become more explicitly pleasurable and enjoyable driven in part by humour and fun (Boltanski and Chiapello, 2007^[43]). It has become particularly acceptable for forms of public information, advertisements and other forms of public address to seek out engaging and playful ways to get messages across.

We shall explore more of this public turn to playfulness below in the section on transformations in the discourses of learning. Here we want to register how much our playful culture obviously affects the meaning and scope of play itself. Nowhere is this paradox more evident than in the seeming counterfactual of "serious games". There has always been a tradition within play that acknowledges its fundamentally serious nature (Wassermann, 1992^[44]): it may sound paradoxical but play does not always need to be playful. The game theory behind explanations of *ludus* in so many aspects of social activity is not necessarily interested in frivolity or fun. The development and growth of serious games as curriculum acknowledges the very wide range of gaming experiences that have both serious intent, serious effect and are perhaps only playful in the formal sense of deconstructing conventions rather than in the commonly used way of suggesting a lack of seriousness, and fun for the sake of it (Beavis, Dezuanni and O'Mara, 2017^[45]). Serious games is our deliberate segue into the ways that learning has become playified and that learning can be understood in terms of the systems thinking underpinning game theory. However, before we move into that section more fully, it is worth noting how the very concept of serious games rests on an assumption about social expectations. Being playful and knowing how to understand playful interactions now form part of the assumptions about the ways that we interact with each other, are governed, find out about the world and of course, learn.

What is at stake in the playification of learning?

The argument in this section of the chapter is that playful and playified learning (that is the organisation of learning modelled on new genres and forms of play):

- characterises a contemporary discourse about the nature of learning
- can explain how learning has become an entertainment commodity for families
- and can thus provide legitimisation for the spread of digital technologies into the home and school.

As noted above, there are no simple ways to define learning, even when we have separated it from schooling. We can however isolate different traditions that conceptualise how learning takes place (for example, cognitive psychology, behaviourism, sociocultural interaction) and we can collate and reflect upon the ways that learning is theorised and embedded in school curriculum, popular understanding and policy mandate. A collection like *Contemporary Theories of Learning: Learning theorists in their own words* (Illeris, 2009^[46]) captures some of this diversity from theory over the preceding 30 years and eloquently describes the dimensions, types, sites and organisation of learning. Many of the contributors to that volume developed their theories prior to the spread of digital technologies into the home and at school and the

essays in the book do not emphasise play or playfulness that much - except in respect of classic discussions about the developmental function of play. However, it is difficult to imagine that a collection of learning theorists practising now would not make forms of play and playful learning far more prominent.

Although it is virtually impossible to measure, this chapter contends that learning (or more accurately what people understand by the term, “learning”) as an activity, at this time in the digital era has become a practice suffused with interactions associated with leisure and entertainment connotations. This is not to suggest that it is necessarily valued as a playful practice, or that playful learning has intrinsic value but that playfulness has been adopted as a ‘sweetener’ to make what counts as learning more palatable.

This is not just a question of the ways that the formal curriculum has taken on so many behaviours and interactions associated with play but also how forms of entertainment purchased by parents and consumed in the home take forms of learning (usually related to school-based attainment) as their subject matter. Minecraft is a good example of this changing trend.

Minecraft

Minecraft is a now perhaps more like a platform than an individual game (Helmond, 2015^[47]), but it originated as a form of open-world survival play. Released in 2011, it achieved unanticipated success leading to its acquisition by Microsoft for USD 2.5 billion in 2014 (Simon and Wershler, 2018^[48]). The game is now available across a range of different devices (mobile, consoles, computer and tablet) and is one of the most widely played bestselling games of all time with perhaps [120 million players a month](#). Its durability and its range and reach are inseparable from the way that playing the game is perceived to be broadly speaking, educational. The game blends elements of immersion, collaboration with others (in design, making and building) along with gameplay generated by the survival threat. Coupled with distinctive and perhaps child-like aesthetics (Simon and Wershler, 2018^[48]) it also works as a platform, enrolling players in a host of activities that range from providing [access to global libraries](#) to the ability to programme/modify features of the game world and gameplay.

Marketed originally simply as a game for consumption by individuals in the home – that is, as “entertainment” - Minecraft has been taken up and adapted by informal educators and even school curriculum, by no less an authority than the World Economic Forum as a [way of developing technology skills](#) to offer more organised, consistent and measured educational experiences. From its [place in home-schooling](#) to its use in different countries in [summer camps](#) and [out-of-school learning](#), the game (or platform) can be found across schools and homes in ways that absolutely embody the shifting boundaries between play and learning in the digital era. Academic scholars of education have looked at its social and interpersonal dimensions (Dezuanni, O'Mara and Beavis, 2015^[49]); scholars interested in coding and computational thinking have looked at it again from that perspective (Baek, Min and Yun, 2020^[50]); scholars interested in teaching about technology and digital skills (Dezuanni, 2020^[40]) have explored the game. The list is ever-growing and now there is concern about the ways that engagement on the platform exposes children, families and indeed educational establishments to the threats of [datafication](#).

Originally designed as straightforward entertainment, the game can now be found in many homes, endorsed by children, parents and teachers as an inherently engaging, demanding, innovative and future-oriented skills focused way of learning in a fashion that did not exist 20 years ago. James Gee's study of literacy and video games proposed that a good game engages forms of learning well beyond the kinds of measures and metrics used by the school system to describe what learning means (Gee, 2004^[51]). *Minecraft* absolutely seems to prove that argument. The playfulness of Minecraft supports principles of learning to learn and of learning as a habituation in certain kind of ways of thinking and socially interacting rather than solely defining learning in terms of curriculum or content - driven outcomes. It is this valuing of the process nature of learning as a habit that counts. And at the heart of the process of playified learning are qualities of engagement, of motivation and of interest of being swept up in the experience rather than being externally required or disciplined to participate.

Fun and games are serious business

The interest in modes of attention, participation and engagement is inseparable from the ways that being online, using digital devices has now been characterised as an "[attention economy](#)". While *Minecraft* might have begun as a product in the entertainment industry aimed at children and young people, its take-up and use by the non-formal education sector and schools as well as its purchase by parents for broad educational purposes exemplifies how the home and domestic market need learning to be packaged as commodity products. The title of this subsection is taken from a study produced in 1998 (Nixon, 1998^[52]) examining how computers themselves, the hardware, were marketed into the home as educational products and that the premise for the spread of digital devices depended upon the ways that learning could be sold as fun and fun can be sold as learning; (Buckingham and Scanlon, 2002^[53]). *Minecraft* exemplifies a next stage in this process as learning moves from being a justification to validate the purchase of equipment to becoming a commodity in itself. Much learning software of course requires participation on a platform, which in turn enrolls users' activities as data in secondary markets (Zuboff, 2019^[54]) thus furthering the process of marketisation.

From this point of view gamified learning or learning marketed as fun via apps and other mobile devices has become part of the larger framing through which many kinds of human interests and activities have been transformed as they have become digitalised and datafied (Couldry and Mejias, 2018^[55]) with a particular focus on the role that the business of education plays in this process (Williamson, 2017^[56]). Playified learning it seems has become the push to open up the home and indeed the school to these emerging markets. The implications of this move are beyond the scope of this chapter and indeed it is important not to conflate the datafication of education with its interests in control and governance (see, for example, (Bradbury, 2018^[57])), with the commodification of learning in the domestic market via its playification.

We need therefore analyses to understand the significance of how learning has been framed through play as a mixture of entertainment and investment in children's learning especially from the perspective of the home rather than thinking of this in terms of simply a school or education market. The blurring of a market for digital educational products is indeed a hallmark of the definitional imprecision analysed throughout this chapter and is exemplified by the ways that certain kinds of software from *Minecraft* through to *DoodleMaths* can be found equally in homes and schools.

Studies of the overall market in "educational" software and/or games are hard to come by. This is partly a question of aggregating commercially sensitive information and partly a question of [defining genres and types of software across different platforms](#). Game-based learning as defined by the educational software industry can be described in terms of overall turnover such as a relatively recent industry report suggesting it is currently valued at [USD 2.4 billion](#) but may be worth USD 17 billion as a global industry by [2023](#). Not only do the headline figures disguise variations between and within usage by platform, software and other technical features they also don't necessarily help us understand nation by nation comparisons or intra-national variations. We can see how popular leisure-oriented distribution platforms like [Steam](#) promote games and apps that they consider to be educational but like download figures from Apple or Google's mobile application stores, statistics can only paint a very broad brush about popular genres and types. It would be useful to have country by country analysis of educational software purchase and use – useful significantly because education systems are still subject to national or sub-national control – and this would also help us understand how global companies both market themselves towards different national or regional markets and of course create transnational educational experiences. Following [the investment by Disney in the Norwegian-based Kahoot](#) for example and examining the use and marketing of new products, and business models is instructive.

There is also a gap in knowledge from the consumers' perspective. Many national agencies carry out studies of family purchasing and time use of digital technologies (e.g. [in the United Kingdom](#)) but this is rarely granular enough for us to disentangle time spent on educational software even though there are

often many studies about popular anxieties in many countries around the world. There are trusted large-scale studies of family and child use of technology in the home (e.g. [Global](#) and [EU Kids Online](#)) and now large-scale collaborative research projects investigating some of these questions (e.g. [CO:RE](#) and [ARC Digital Child](#)) but to a great extent we are reliant on insights from qualitative research to conceptualise how children within families spend their time, on which types of software and within what kinds of learning and/or play frameworks (Livingstone and Blum-Ross, 2020^[58]). These kinds of studies are inevitably country specific, and it is difficult to extrapolate varying patterns across national use. There is a strong tradition of research exploring the impact of access to computers in the home on educational outcomes but such measures typically are defined according to the prevailing metric of what counts in the relevant school system (for example, (Bulman and Fairlie, 2016^[59])) so it is very difficult to get an insight into the ways in which the widespread adoption of digital technologies in the home have changed what it means to play or to learn.

Coda: From a political economy of play and learning to the everyday

We have mainly explored conceptual and discursive definitions of play and learning and how these have been mediated by the political economy of the digital. However, it is worthwhile outlining the state of knowledge in our research. What is the empirical evidence about what children and young people are actually doing when they play and learn? Do we know if their activities, their playing and learning have changed in the last 30 years and how? We all have our anecdotes and our own experiences but is there research that can describe and measure the current state of play and learning?

This is obviously a difficult question to answer and certainly such answers do not exist at scale and at cross-country comparison level. There are most obviously a huge number of qualitative studies that give some insight into the experience of play and learning as opposed to studies of outcome or proxy measures. Hopefully, other research can frame and meta-review these studies: a project requiring at least its own chapter. Here it may be worthwhile pointing to the fact that this tradition is broadly sociocultural or social psychological in orientation – for example the study of how games and gaming might influence learning to learn in the home (Stevens, Satwicz and McCarthy, 2008^[60]), or the study of the influence of the digital on changes to play in terms of content and behaviour in school playgrounds (Willet et al., 2013^[61]). These studies are the tip of the iceberg but exemplify an interest and attention to children's agency, social interactions and the constraints/performances of the social context. By paying attention to the actual activities of children's learning and playing, qualitative research helps us reconsider play and learning as a contemporary cultural phenomenon as well as pointing to interventions in the home or school. There is no suggestion that certain disciplines or research methods are inherently more worthwhile; indeed, there is a deficit in the research literature in establishing useful and policy-oriented benchmarks.

It is furthermore striking that such quantitative research that does exist is oriented towards proxy measures. We have quite a lot of evidence about children and young people's use of time (either spent playing games (Hamari, Koivisto and Sarsa, 2014^[62]) or at school or doing schoolwork or digitally oriented leisure activities in the home) and space. Projects like [EU Kids Online](#) were highly influential in showing changing sites of play and learning as different kind of domestic spaces have become colonised through digital devices. Finally, there is significant international data about purchasing of play/learning commodities and regulation of children's activities by parents – both in and out of the home. All three of these modes of description (time, space and regulation) are enormously helpful in capturing significant changes in children's agency – to move about and meet socially as well as questions of risk and opportunity. Yet, to some extent this tradition of research approaches the activities of both play and learning through inference and extrapolation. As has been emphasised in this chapter, using the measures of performance outcomes from schools cannot be taken to equate with the nature of learning itself. The value and meaning of play has even fewer accepted measures. There are clearly gaps in the international scope of such research with some countries being more intensively researched than others and standing for assumed universal norms.

Any discussion about play and learning in the digital age needs to acknowledge these kinds of biases in the research literature and to understand that accounts of children's actual play and learning tend to be expensive to commission and difficult to scale.

Summary and implications

This chapter has argued that while both the concepts of play and learning predate their expression and use in modern society, each separately and both together have become affected by changes in digital culture. Forms of play have been significantly influenced by the increasing place of the digital, especially through games, gaming and gamification in children and young people's lives and have legitimated the transformation of learning into a commodity sold back as play in the home and at school. In a parallel move, learning has become much more valued as a play-like experience and therefore the qualities of that experience, especially key elements of attention and engagement and participation, now frequently define its intrinsic worth. These are emphases significantly different from earlier uses of the terms in many countries around the world, but global transnational digital culture has to some extent evened out national variation. The current state of research has important gaps especially when it comes to understanding the commercial reach and use of both learning and play-focused apps and software. The politics of education has to some extent been reluctant to engage with the ways that learning and play have been transformed in their rather exclusive focus on narrowly defined outcomes of education.

Learning is not the binary opposite of play and this chapter has also argued that making learning not serious, or strengthening its intrinsically playful nature, has helped the commodification of learning and thus its marketability into the home and consequential datafication of learners, teachers and families. In that sense the chapter has suggested that rather than simply being a natural process of conceptual progress, the specific cultural values that now pertain to both play and learning have been part of the political economy of digital culture. It serves a particular set of interests and therefore the chapter will end with a series of questions challenging the ways that current definitions of play and learning could or should be addressed by policy, families, young people and schools.

1. What is lost and gained, if:
 - a. play is interpreted as being in the service of learning?
 - b. what schooling counts as learning is not constantly challenged?
2. Whose interests might be served by:
 - a. conflating play with learning?
 - b. broadening the reach and range of digital play as a proportion of all play?
3. How can we evaluate:
 - a. the relationship between the quality of the playified learning experience and school outcomes?
 - b. what counts as "good" play or "better" learning?
4. Given that the option of de-digitalising social life is not available, what can or should other institutions (schools, families, childcare, early childhood centres, kindergarten, and museums and galleries) do to ensure that the global trend to playify learning or learnify play remains varied and diverse?
5. How important is understanding the changing relationship between play and learning to the future purposes of education systems?

Acknowledgements

Many thanks to the editors and the OECD editorial team and to Allan Luke, and Robbie Fordyce for their challenges, advice and support.

References

- Alexander, R. (2001), *Culture and Pedagogy*, Blackwell Publishers, Oxford. [21]
- Ariès, P. (1962), *Centuries of Childhood*. [1]
- Baek, Y., E. Min and S. Yun (2020), "Mining educational implications of minecraft", *Computers in the Schools*, Vol. 37/1, pp. 1-16, <http://dx.doi.org/10.1080/07380569.2020.1719802>. [50]
- Ball, S. (2008), *The Education Debate: Policy and Politics in the Twenty-First Century (Policy and Politics in the Twenty-first Century Series)*, Bristol: Policy Press. [29]
- Beavis, C., M. Dezuanni and J. O'Mara (2017), *Serious Play: Literacy, Learning and Digital Games (Digital Games and Learning)*, Routledge. [45]
- Beck, J. and M. Wade (2004), *Got Game: How the Gamer Generation Is Reshaping Business Forever.*, Harvard Business School Press; Cambridge MA. [35]
- Berliner, D. and B. Biddle (1999), *Manufactured Crisis: Myths, Fraud, and the Attack on America's Public Schools*, Perseus Books, U.S. [28]
- Biesta, G. (2012), "Giving teaching back to education: Responding to the disappearance of the teacher", *Phenomenology & Practice*, Vol. 6/2, pp. 35-49, <http://dx.doi.org/10.29173/pandpr19860>. [5]
- Biesta, G. (2011), *Good Education in an Age of Measurement: Ethics, Politics, Democracy*, Routledge. [6]
- Boltanski, L. and E. Chiapello (2007), *The New Spirit of Capitalism*, Verso, London. [43]
- Bradbury, A. (2018), "Datafied at four: The role of data in the 'schoolification' of early childhood education in England", *Learning, Media and Technology*, Vol. 44/1, pp. 7-21, <http://dx.doi.org/10.1080/17439884.2018.1511577>. [57]
- Bruner, J. (1996), *The Culture of Education*, Harvard University Press, Cambridge MA. [13]
- Buckingham, D. (2007), *Beyond Technology: Children's Learning in the Age of Digital Culture*, Cambridge: Polity Press. [27]
- Buckingham, D. and M. Scanlon (2002), *Education, Entertainment and Learning in the Home.*, Milton Keynes: Open University Press. [53]
- Bulman, G. and R. Fairlie (2016), "Technology and education: Computers, software, and the internet", in *Handbook of the Economics of Education*, Elsevier. [59]
- Caillouis, R. (1961), *Man, play, and games*, Free Press of Glencoe, New York. [33]
- Carter, M. et al. (2020), "Children's perspectives and attitudes towards Fortnite 'addiction'", *Media International Australia*, Vol. 176/1, pp. 138-151, <http://dx.doi.org/10.1177/1329878x20921568>. [39]
- Cartwright, N. (2007), *Hunting Causes and Using Them : Approaches in Philosophy and Economics*, Cambridge University Press, Cambridge, New York. [36]

- Couldry, N. and U. Mejias (2018), "Data colonialism: Rethinking big data's relation to the contemporary subject", *Television & New Media*, Vol. 20/4, pp. 336-349, <http://dx.doi.org/10.1177/1527476418796632>. [55]
- Davies, N. (2009), *Flat Earth News: An Award-winning Reporter Exposes Falsehood, Distortion and Propaganda in the Global Media*, Random House UK. [42]
- Dezuanni, M. (2020), *Peer Pedagogies on Digital Platforms: Learning with Minecraft Let's Play Videos.*, MIT Press, Cambridge MA. [40]
- Dezuanni, M., J. O'Mara and C. Beavis (2015), "'Redstone is like electricity': Children's performative representations in and around Minecraft", *E-Learning and Digital Media*, Vol. 12/2, pp. 147-163, <http://dx.doi.org/10.1177/2042753014568176>. [49]
- Gane, N. (2019), "Competition: A critical history of a concept", *Theory, Culture & Society*, Vol. 37/2, pp. 31-59, <http://dx.doi.org/10.1177/0263276419878247>. [32]
- Gee, J. (2004), *What Video Games Have to Teach Us About Learning and Literacy.*, Palgrave Macmillan, London. [51]
- Glass, G. (2008), *Fertilizers, Pills, and Magnetic Strips: The Fate of Public Education in America*, Information Age Publishing, Charlotte, North Carolina. [30]
- Goldin, C. and L. Katz (2008), *Race between Education and Technology.*, Harvard University Press, Cambridge, MA. [19]
- Green, J. and A. Luke (2006), "Introduction: Rethinking learning: What counts as learning and what learning counts", *Review of Research in Education*, Vol. 30/1, pp. xi-xvi, <http://dx.doi.org/10.3102/0091732x030001011>. [22]
- Habermas, J. (1989), *The Structural Transformation of the Public Sphere*, Polity Press. [8]
- Hamari, J., J. Koivisto and H. Sarsa (2014), *Does Gamification Work? -- A Literature Review of Empirical Studies on Gamification*. [62]
- Hamilton, D. and B. Zufiaurre (2013), *Blackboards and Bootstraps: Revisioning Education and Schooling.*, Sense Publishers. [4]
- Helmond, A. (2015), "The platformization of the web: Making web data platform ready", *Social Media + Society*, Vol. 1/2, p. 205630511560308, <http://dx.doi.org/10.1177/2056305115603080>. [47]
- Huizinga, J. (1970), *Homo Ludens: A Study of the Play Element in Culture*, Paladin, London. [14]
- Illeris, K. (2009), *Contemporary Theories of Learning: Learning Theorists in their own words*, Routledge, Abingdon. [46]
- Illeris, K. (2007), *How We Learn : Learning and Non-Learning in School and Beyond*, Routledge, New York. [17]
- Ito, M. et al. (2020), *the Connected research network: reflections on a decade of engaged scholarship*, <http://creativecommons.org/licenses/by/3.0/>. [24]
- Ito, M. et al. (2013), *Connected Learning: an agenda for research and design.*, Cambridge Mass: MIT. [25]

- K. Salen (ed.) (2008), *In-Game, In-Room, In-World: Reconnecting Video Game Play to the Rest of Kids' Lives.*, MIT Press. [60]
- Kline, S., N. Dyer-Witthford and G. Peuter (2003), *Digital Play: The Interaction of Technology, Culture and Marketing.*, McGill-Queen's University Press, Montreal. [38]
- Lancy, D. (2014), *The Anthropology of Childhood: Cherubs, Chattel, Changelings*, Cambridge University Press. [2]
- Levinson, B., D. Foley and D. Holland (1996), *Cultural Production of the Educated Person: Critical Ethnographies of Schooling and Local Practice*, State University of New York Press., New York. [23]
- Livingstone, S. (2002), *Young People and New Media.*, SAGE Publications Ltd, London. [10]
- Livingstone, S. and A. Blum-Ross (2020), *Parenting for a Digital Future How Hopes and Fears about Technology Shape Children's Lives*, Oxford University Press. [58]
- Luke, A. (2018), *Critical Literacy, Schooling, and Social Justice: The Selected Works of Allan Luke.*, New York: Routledge. [9]
- Malaby, T. (2007), "Beyond Play: A New Approach to Games", *Games & Culture*, Vol. 2/2. [16]
- Meyer, J. et al. (1997), "World society and the nation-state", *American Journal of Sociology*, Vol. 103/1, pp. 144-181, <http://dx.doi.org/10.1086/231174>. [20]
- Meyrowitz, J. (1985), *No Sense of Place : The Impact of Electronic Media on Social Behavior*, New York: Oxford University Press. [37]
- Nixon, H. (1998), "Fun and games are serious business.", in Julian Sefton-Green (ed.), *Digital Diversions: Youth Culture in the Age of Multimedia*, London: Routledge. [52]
- Olson, D. and N. Torrance (1996), *The Handbook of Education and Human Development: New Models of Learning, Teaching and Schooling*, Oxford: Blackwell. [12]
- Rogoff, B. (2003), *The Cultural Nature of Human Development.*, Oxford University Press. [7]
- Sicart, M. (2014), *Play Matters.*, MIT Press. [3]
- Simola, H. et al. (2017), *Dynamics in Education Politics: Understanding and explaining the Finnish case*, Routledge, London. [26]
- Simon, B. and D. Wershler (2018), "Childhood's end (or, we have never been modern, except in minecraft)", *Cultural Politics*, Vol. 14/3, pp. 289-303, <http://dx.doi.org/10.1215/17432197-7093310>. [48]
- Stevens, P. (1980), "Play and work: A false dichotomy?", in H. B. Schwartzman (ed.), *Play and culture*. [41]
- Sutton-Smith, B. (2001), *The Ambiguity of Play*, Harvard University Press. [15]
- Vygotsky, L. (1978), *Mind in Society: Development of Higher Psychological Processes*, Harvard University Press. [11]

- Wassermann, S. (1992), "Serious play in the classroom: How messing around can win you the nobel prize", *Childhood Education*, Vol. 68/3, pp. 133-139, <http://dx.doi.org/10.1080/00094056.1992.10522562>. [44]
- Willet, R. et al. (2013), *Children, Media and Playground Cultures: Ethnographic Studies of School Playtimes.*, Palgrave Macmillan, London. [61]
- Williamson, B. (2017), "Educating Silicon Valley: Corporate education reform and the reproduction of the techno-economic revolution", *Review of Education, Pedagogy, and Cultural Studies*, Vol. 39/3, pp. 265-288, <http://dx.doi.org/10.1080/10714413.2017.1326274>. [56]
- Williams, R. (1961), *The Long Revolution*, Chatto and Windus, London. [18]
- Wolf, M. (2002), *The Medium of the Video Game*, University of Texas Press. [34]
- Zimmerman, E. (2014), "Manifesto for a ludic century", in S. P. Walz & S. Deterding (ed.), *The Gameful World: Approaches, Issues, Applications*, MIT Press. [31]
- Zuboff, S. (2019), *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power.*, Profile Books, New York. [54]

Part III The pursuit of perfection

7 Media and body image in children and adolescents

Rachel F Rodgers

Department of Applied Psychology, Northeastern University, United States

Department of Psychiatric Emergency & Acute Care, Lapeyronie Hospital, CHRU, France

Media use in children and adolescents has increased significantly over the past decades, particularly screen and social media, raising concerns as emerging research has suggested that media use among youth can be harmful to body image. This chapter provides an overview of the theoretical frameworks that account for such an association as well as the empirical work on the topic. Media use in children and adolescents may be related to poorer body image both through the promotion of unrealistic and unattainable appearance ideals as well as the sexualisation and objectification of individuals in media. In addition, individual characteristics, and the nature and format of media, may modulate these relationships.

Body image among children and adolescents

Media use in children and adolescents has increased significantly over the past decades, particularly screen media and more recently social media use. This has raised concerns as emerging research has suggested that, while low to moderate levels of media use may have positive outcomes for youth, high levels of media use for entertainment purposes (i.e. non-educational content) are broadly associated with reduced psychological functioning in children and adolescents. Among the indicators considered, body image, or youth's own appraisal of their physical appearance, has been an aspect thought to be negatively impacted by media use, although some evidence exists for this being a bidirectional relationship. This chapter provides an overview of the theoretical frameworks that account for such an association as well as the empirical work that has examined the associations between media use and body image among children and adolescents.

Body image: A multidimensional construct

Body image refers to the thoughts, feelings, perceptions, and behaviours related to one's body and embodiment, that is the experience of inhabiting one's body, and is a multidimensional concept (Keeton, Cash and Brown, 1990^[1]). Although most generally conceptualised as negative thoughts and feelings about one's external appearance in the empirical literature, problematic body image more broadly encompasses a number of additional elements including the centrality of appearance to self-worth and identity while holding unrealistic appearance standards (Table 7.1).

Table 7.1. Characteristics of positive and problematic body image

	Positive body image	Problematic body image
Thoughts and feelings towards the body	Positive, accepting, compassionate	Negative, evaluative
Focus of body-related evaluations	All body domains e.g. appearance, functionality, etc.	Appearance
Body perspectives	Internal and embodied	External and objectifying
Body-related behaviours	Focused on self-care and embracing appetites	Rigid and impairing, aiming to control and/or modify physical appearance
Centrality of body image	Neutral to identity and self-worth	Central to identity and self-worth
Conceptualisations of physical beauty	Broad and diverse. All bodies can be beautiful, but beauty is not a main pursuit	Narrow and unattainable, defined by unrealistic social expectations
Body-image related distress	Overall low, flexible and tolerant of fluctuations that are transitory	High and unyielding
Regulation of distress	Fluctuations are experienced without avoidance and with no behavioural reactivity	Focused on changing the body

As illustrated in the table above, elements that are characteristic of problematic body image include:

- The extent to which negative thoughts and feelings regarding appearance are preoccupying, take up mental and emotional space, and affect behaviours and daily life. Poor body image often includes intrusive thoughts regarding the body that are difficult to get rid of, and lead individuals to spend a large amount of time being preoccupied by their appearance.
- A strong focus on appearance when evaluating aspects of the body rather than including additional aspects beyond the way the body looks.
- An external and objectifying body perspective. In other words, individuals with poor body image tend to imagine how their body is appearing to other people, and to consider it as separate from "themselves" the individual (McKinley and Hyde, 1996^[2]; Piran, 2017^[3]).
- Rigid behaviours focused on changing appearance, or minimising the negative impact of appearance concerns (for example by avoiding situations in which the body is visible to others).
- Appearance occupying a central role in identity, and contributing a large amount to self-worth.

- Narrow conceptualisations of beauty that are anchored to appearance ideals. In other words, beauty only lies in the thin and toned/muscular ideal.
- Negative thoughts and feelings related to the body are experienced as steady and unyielding versus transitory.
- Relatedly, efforts to reduce or regulate body-related distress mainly focus on changing the body, rather than changing the ways one feels towards one's body, or the magnitude of and reactivity to those feelings.

In contrast, positive body image is characterised by:

- Predominantly positive thoughts and feelings towards the body.
- These thoughts and feelings are related to the body as a whole, including appearance but also functionality, in other words what the body can do, rather than how it looks, and other domains.
- The tendency to view one's body from within it, in other words an inner embodied perspective (Piran, 2017^[3]).
- Behaviours that are directed towards self-care and the honouring of needs and appetites (Tylka and Wood-Barcalow, 2015^[4]).
- While positive appreciations of the body exist, they do not affect overall self-worth. Appearance does not occupy an important place in an individual's identity.
- Positive body image results from realistic appearance standards or evaluations and acceptance of the ways in which the body is unique and different to the flawless appearance ideal.
- Positive body image is flexible, and appearance-related distress is fluctuating and tolerable.
- When negative body-related thoughts or feelings occur, they are experienced without reactivity and body-related behaviours continue to be directed towards self-care rather than changing appearance.

Body image: Development and characteristics among children and adolescents

As described above, the appearance-focus in highly technological Western-style society has led to a disproportionate focus on understanding body image in terms of appreciations of physical appearance, particularly weight and shape. Body image concerns may differ between girls and boys, with girls tending to be most preoccupied with thinness, while muscularity concerns are an equal preoccupation for boys, in line with gendered appearance ideals (Paxton and Damiano, 2017^[5]). Relatedly, dimensions related to physical competence and athleticism may also be important among boys.

Children as young as three or four have been shown to be able to understand and express social standards and stereotypes related to weight and appearance (Damiano et al., 2015^[6]; Spiel, Paxton and Yager, 2012^[7]). Body image concerns tend to appear and increase throughout childhood (Damiano et al., 2015^[6]), and by age six a clear desire to be thinner has been shown to emerge among girls (Dohnt and Tiggemann, 2006^[8]), with converging evidence that approximately half of seven year-old girls express a wish to be thinner (Clark and Tiggemann, 2006^[9]).

Fewer data are available among boys and assessment in very young boys is further complicated by the need to parse out weight and muscularity when referring to body size. Nevertheless, 27% to 47% of preadolescent boys have been reported to express a desire to be thinner, although perhaps not always smaller (Ricciardelli et al., 2009^[10]). In a more recent study, both muscularity and thinness related dissatisfaction were reported by six year-old boys, with a third of boys reporting a wish to be more muscular (McLean, Wertheim and Paxton, 2018^[11]). Body image concerns may further increase during adolescence, a time of important physical changes that tend to move girls further away from ideals anchored to thinness, while boys may move closer to muscular ideals. For example, among children and adolescents aged 9-14

years, 50% of girls wanted a thinner shape compared with 36% of boys, while in contrast 21% of boys wanted a larger shape compared with 7% girls (Dion et al., 2016^[12]). By late adolescence both rates and gender differences have increased (McCabe and Ricciardelli, 2001^[13]).

Body image is an important dimension of mental health in its own right as the emphasis placed upon appearance results in negative appreciations of appearance being associated with high levels of distress for some individuals. In addition, poor body image has been shown to be a strong predictor of other mental health problems and harmful behaviours such as low self-esteem, depressive symptoms, unhealthy dieting and muscle building behaviours as well as eating disorders (Neumark-Sztainer et al., 2006^[14]; Stice et al., 2017^[15]).

Theoretical frameworks

Several different theoretical frameworks have been employed to ground the research examining the relationship between media use and body image in children and adolescents. The most frequently used include biopsychosocial theories and objectification theory.

Biopsychosocial theories build upon sociocultural theories that have been extensively used to examine the role of media in body image concerns. Sociocultural theories posit that attitudes and behaviours are transmitted to children and adolescents through the environment, including the media (Rodgers, Paxton and McLean, 2013^[16]; McCabe and Ricciardelli, 2003^[17]). Media images tend to provide a skewed and unrealistic view of appearance, weight, and shape by disproportionately depicting individuals that are attractive and extremely thin and muscular (Groesz, Levine and Murnen, 2001^[18]). This media environment communicates to children and adolescents which appearances are valued and the centrality of appearance to self-worth and identity. Biopsychosocial theories build upon this by highlighting how personal characteristics, both biological or psychological, modulate the way in which pressures from the media environment are experienced by children and adolescents (Rodgers, Paxton and McLean, 2013^[16]).

Objectification theory describes how in the mass media, individuals are reduced to objects through sexualisation and being dispossessed of their subjectivity. Objectification theory holds that the viewpoint offered by media in which individuals are considered only as bodies without individuality is gradually adopted by individuals who come to see themselves in this way, a process termed self-objectification. Self-objectification is then proposed to be associated with a range of negative psychological outcomes including depression but also body image and eating concerns (Fredrickson and Roberts, 1997^[19]). Indeed, self-objectification leads to habitually considering one's body from an external observer's perspective, thereby monitoring and surveilling its appearance, and experiences of body shame when one's appearance fails to meet social standards.

Media content

Media images and appearance ideals

The bodies represented in the media are, in the vast majority, very lean and toned, with an emphasis on extreme thinness for women, and hypermuscularity for men. These bodies represent a very small proportion of the range of appearances, shapes and sizes found among the general population. The construction of appearance ideals through the presentation of a narrow range of body types as desirable starts from an early age, with the presence of thin and muscular characters in media targeted to children and adolescents. This includes both television content (Hayes and Tantleff-Dunn, 2010^[20]; Herbozo et al., 2004^[21]) and digital content (Slater et al., 2017^[22]; Tiggemann and Miller, 2010^[23]), in addition to children's toys such as dolls and action figures (Boyd and Murnen, 2017^[24]). Furthermore, those images are almost

without exception digitally manipulated in ways that render such appearances even more unattainable. Thus, media content for children and adolescents portrays highly unrealistic appearances.

The weight and shape of individuals portrayed in children's media is an important aspect of the way in which media is thought to impact body image. However, a second important way in which media images may adversely affect body image is through the sexualisation of individuals, including children and adolescents, and their objectification, that is their reduction to objects and deprivation of their subjectivity image, as described in the context of objectification theory above (Fredrickson and Roberts, 1997^[19]). Content analysis of tween and adolescent media has found high rates of sexualisation and objectification of characters in television content targeting these age groups (Malacane and Martins, 2016^[25]; Ward, Moorman and Grower, 2018^[26]).

Media messages: The glorification of sexualised thinness and the presence of weight bias

In addition to the images themselves, media content constructs a number of strong messages related to the importance of and positive expectations associated with pursuing appearance ideals, as well as the negative consequences of failing. In this way, media content serves to reinforce the idea that appearance is a core dimension of self-worth and emphasises the ways in which it should be prioritised. A recent analysis of ten popular children's television series found that attractiveness was associated only with thin characters (Tzoutzou, Bathrellou and Matalas, 2020^[27]). Furthermore, a content analysis of children's animated films released between 2004 and 2016 revealed a high presence of appearance-related content, and an increase in messages regarding the importance of muscularity for men (Harriger et al., 2018^[28]).

In addition, in the narratives of digital content, individuals whose appearance is close to appearance ideals are attributed positive characteristics, while those whose appearance diverges from social ideals are attributed negative ones, a phenomenon referred to as the "beautiful is good" stereotype (Rodgers, Campagna and Attawala, 2019^[29]). For example, a content analysis of popular children's videos revealed that, in the vast majority of them (84%), female physical attractiveness was associated with sociability, kindness, happiness, or success (Herbozo et al., 2004^[21]). These findings also highlight the gendered nature of appearance messages in children's media content. Similarly, findings from a content analysis of children's advertisements found that depictions of girls were more likely to be appearance-related and sexualised (Kim, Ahn and Lee, 2016^[30]). Thus, the media constructs gendered appearance ideals that are most constraining for girls and young women and disproportionately tied to self-worth starting from childhood.

In contrast, individuals who do not conform to appearance ideals tend to be associated with negative traits and characteristics in media portrayals (Ata and Thompson, 2010^[31]). In this way, for example, heavier characters are depicted as evil, unattractive, unfriendly and cruel (Herbozo et al., 2004^[21]). In addition, weight stigmatisation has been shown to occur in high percentages of television programs targeting youth, even more so than programming directed towards the general population (Eisenberg et al., 2014^[32]). In this way, the media increases the desirability of unrealistic body shapes and sizes by creating the expectation that achieving such an appearance will result in social rewards and prevent social exclusion or stigma.

Empirical evidence for the relationship between media and body image among children and adolescents

Children

Despite increasing media consumption among children, to date, comparatively little research has focused on the impact of exposure to media on body image among children specifically. Among girls, an emerging body of literature supports a relationship between media exposure and poorer body image. Correlationally, media exposure was related to body dissatisfaction among six year-old girls (Dohnt and Tiggemann, 2006^[8]). Similarly, exposure to sexualised media content including television and magazines has been shown to be related to self-sexualisation through preferences for sexualised clothing among girls aged six to nine years, which was in turn associated with body dissatisfaction (Slater and Tiggemann, 2016^[33]). In addition, evidence from experimental studies using exposure to images of toys has suggested that appearance-ideal promoting dolls may have negative effects on body image among girls (Dittmar, Halliwell and Ive, 2006^[34]). Furthermore, among girls aged eight to nine years, playing a digital appearance-focused game for ten minutes was associated with greater body dissatisfaction as compared to playing a non-appearance focused game (Slater et al., 2017^[22]). Thus, among young girls a relationship between media use and exposure and poorer body images seems to exist. Data on media consumption and body image among very young boys are overall lacking. However, some longitudinal evidence exists of exposure to video gaming magazines and later preoccupation with muscularity among boys aged eight years on average (Harrison and Bond, 2007^[35]).

Adolescents

A larger body of correlational empirical work has focused on clarifying the relationship between media and body image among younger and older female adolescents and supported greater media use being associated with poorer body image (Levine and Murnen, 2009^[36]). In addition, however, some longitudinal and experimental research has further confirmed these relationships and supported the role of media exposure as a risk factor for poorer body image. Among adolescent girls, media use, including social media, has been found to predict increases in body dissatisfaction and concerns over time (Schooler, 2008^[37]; Tiggemann and Slater, 2016^[38]), as well as disordered eating that is often a behavioural consequence of body image concerns (Harrison and Hefner, 2006^[39]). These findings have not always been confirmed, however, with some prospective studies failing to reveal a relationship between media use and exposure and body image (Clark and Tiggemann, 2008^[40]; Presnell, Bearman and Stice, 2004^[41]). In addition to these findings regarding relationships across time, a previous meta-analysis identified a significant effect of exposure to thin-ideal images in experimental studies on body dissatisfaction among female adolescents, that was stronger than the effects identified in young adult women (Groesz, Levine and Murnen, 2001^[18]).

Among adolescent boys, research has lagged behind that examining these effects among girls. Nevertheless, correlational research has supported the presence of a cross-sectional relationship between media use and exposure and body image concerns among adolescent boys (Rousseau and Eggermont, 2017^[42]), including social media use (Rousseau, Eggermont and Frison, 2017^[43]), and sexualising behaviours (Trekels et al., 2018^[44]). In addition, although sparse, some longitudinal research has shown evidence that media use and exposure predicted poorer body image over time among adolescent boys. Thus, perceived pressure from the media, particularly as related to muscularity, predicted increases in disordered eating, dysfunctional exercise behaviours, and unhealthy body change behaviours (McCabe and Ricciardelli, 2005^[45]). In a large mixed gender sample of adolescents, self-reported consumption of tween media was associated with increases in attributing benefits to attractiveness, in the internalisation of the thin-ideal, and through that, to increases in dysfunctional beliefs related to appearance (Trekels and

Eggermont, 2016^[46]). Furthermore, these relationships were found to be present among both girls and boys separately.

Despite most of this literature being correlational, and therefore not informing directionality or causality in these relationships, a small number of longitudinal studies, as well as an increasing number of experimental studies in adolescents, and emerging adults, and qualitative studies describing individuals' perceptions of the role that media plays in body image provide strong evidence for media use as a risk factor, if not formal evidence for causality (Levine and Murnen, 2009^[36]).

Moderators of the relationship between media use and body image

The variation in findings across studies examining the relationships between media use and body image among children and adolescents, in conjunction with predictions from biopsychosocial theories, have suggested that a number of factors might moderate this relationship. Among these factors, media format, media content, and individual characteristics have been the most frequently considered.

Media format: The rise of social media

Although most media consumed by contemporary children and adolescents is screen media, it has been suggested that differences may exist across different forms of screen media based in particular on their level of interactivity, as well as the level of perceived proximity and relatability of the individuals depicted. Social media is a highly interactive form of media that includes both user and commercially generated content. Accordingly, it has been proposed that social media might be in some ways more potent in terms of its effects on body image as children and adolescents may be more engaged with it, and experience more difficulty in critically evaluating the content presented as curated and created with intent, even when posted by their peers (Rodgers, 2015^[47]). Indeed, although unlike celebrities and influencers, most children and adolescents do not directly benefit from individuals viewing or "liking" the content they post to social media, this content is still posted with some motivation, generally a social one of increasing one's popularity.

Social media has been shown to contain a high proportion of appearance-related content, including images that might promote appearance comparisons, and are selected and edited with the goal of presenting appearance ideals (McLean, Jarman and Rodgers, 2019^[48]). These images are likely to promote appearance comparisons as they may be perceived as portraying appropriate targets for comparison (i.e. individuals who are considered to be part of someone's "group") and often make appearance the central focus of the image. In addition, social media encourages children and adolescents to create and share their own self-images. Doing so may engage youth in a process of increasingly evaluating their own appearance against that of their peers, social standards of attractiveness, and even their own unrealistic online self-presentation following the extensive editing of self-images, and thereby increase and sustain body image concerns. In addition, receiving appearance-related feedback and engaging in interactions with others on social media that centre on appearance may contribute to reinforcing the centrality of appearance to identity and self-worth.

Consistent with this, research has shown an association between social media use and body image outcomes among children and adolescents (Holland and Tiggemann, 2016^[49]; Saiphoo and Vahedi, 2019^[50]). To date, the majority of this research has been cross-sectional, however, a small number of studies have highlighted the likely bidirectional relationships over time between social media use and body image concerns among youth (Tiggemann and Slater, 2016^[38]; Rousseau, Eggermont and Frison, 2017^[43]). In addition, engagement with social media through the viewing and taking of self-images (selfies) has been shown to be associated with greater body image concerns in youth (See (McLean et al., 2019) for a review).

Media content

Media content has also been explored as a moderator of the relationship between media use and body image among children and adolescents that is whether the strength and direction of the relationships with body image might vary depending on the type of content seen, with particular attention paid to appearance-focused media content. Given the omnipresence of appearance ideals in the media, parsing this out in a way that is ecologically valid is challenging. However, correlational studies have approached this question by specifically inquiring about exposure to certain types of media (e.g. magazines, or certain television shows), or engagement with certain social media platforms or activities, and experimental studies have selectively exposed youth to appearance-focus content versus other types of images (e.g. travel images).

Overall, the findings from these studies have supported the idea that appearance-focused media content is most harmful to body image (Holland and Tiggemann, 2016^[49]; Levine and Murnen, 2009^[36]; Saiphoo and Vahedi, 2019^[50]), in particular, for example, active engagement with photo-based activities on social media (e.g. (Mingoia et al., 2019^[51])). In addition, the interactive nature of online media includes algorithms that identify user interests with the goal of presenting personalised content (mainly to generate profit). Such processes are likely to expose children and adolescents who engage with appearance-focused content to even more appearance-focused content, thereby further reinforcing existing preoccupations.

Individual characteristics

As predicted by biopsychosocial theories (Rodgers, Paxton and McLean, 2013^[16]), a number of individual characteristics such as gender and age have emerged as moderators of the association between media use and body image. As described above, appearance ideals are gendered with a greater emphasis on thinness for girls and muscularity for boys, with greater pressure upon girls to invest in their appearance. Consistent with this, some work has found stronger relationships among media use and exposure and body image outcomes among girls as compared to boys (Hargreaves and Tiggemann, 2004^[52]; Rodgers, Paxton and Chabrol, 2009^[53]; McCabe and Ricciardelli, 2003^[17]). However, other work, particularly more recent research, has suggested more similarities than differences (e.g. (Trekels and Eggermont, 2017^[54]; Vandenbosch and Eggermont, 2016^[55])).

Age and developmental period may also be important dimensions to consider as modulators of the relationships between media use and body image. Both of these may affect the relationship between media use and body image, firstly by impacting the perceived pressure from media as well as capacity to critically resist media messages, as well as through physical changes throughout childhood and adolescence that may move individuals closer or further away from appearance ideals. Consistent with this, it has been found for example that younger individuals, such as children and preadolescents, may be most susceptible to the effects of social media on body image (Saiphoo and Vahedi, 2019^[50]). Further research into critical developmental periods in terms of media influence on body image is warranted.

In addition, a number of psychological variables such as individuals' beliefs around appearance and its importance and pre-existing levels of body image concerns have been supported as moderators of the effects of media on body image, such that those with higher existing concerns may be most vulnerable (Want, 2009^[56]). While further research is needed, it is likely that the ways in which youth attend to and process media stimuli is also an important vulnerability factor (Rodgers and DuBois, 2016^[57]).

Media literacy

While the individual characteristics above are mainly factors that increase susceptibility to media influences, characteristics that may be protective have also been investigated. One that has received particular attention is media literacy, or social media literacy when related specifically to social media (McLean, Paxton and Wertheim, 2016^[58]). Media literacy, and social media literacy, refer to the capacity

to critically appraise media content in terms of the images themselves, and the messages that they send, bearing in mind who may profit and benefit from the influence of media messages. Although there is not always consistency in the research to date regarding the relationships between different facets of media and social media literacy and body image in youth (McLean, Paxton and Wertheim, 2016^[58]; Rodgers, McLean and Paxton, 2018^[59]), intervention programs that aim to increase media literacy (McLean, Paxton and Wertheim, 2016^[58]) and social media literacy have been developed and show initial promise (Gordon et al., 2020^[60]; McLean et al., 2017^[61]).

Explanatory mechanisms

The conceptual frameworks used to guide the investigation of the effects of media use on body image among children and adolescents describe theoretical pathways and mechanisms for these effects. These mechanisms have been empirically explored and received support to some extent, thus increasing our understanding of how and why media use impacts body image.

Sociocultural theory

Briefly, sociocultural theory describes how the appearance ideals and associated positive expectations set up by media images and messages lead individuals to adopt them as their own personal standards (appearance ideal internalisation), and engage in appearance comparisons that, due to being largely unfavourable, result in body dissatisfaction (Keery, Van den Berg and Thompson, 2004^[62]). The roles of appearance ideal internalisation and appearance comparisons as mediators of the relationships among media use and exposure and body image among children and adolescents have been supported in cross-sectional research (Keery, Van den Berg and Thompson, 2004^[62]; Knauss, Paxton and Alsaker, 2008^[63]), but also increasingly in longitudinal and experimental research (Hargreaves and Tiggemann, 2004^[52]; Rodgers, McLean and Paxton, 2015^[64]).

Importantly, media influences exist within a broader sociocultural context that includes the interpersonal environment of children and adolescents. Peers and parents have been described as capable of relaying and amplifying media messages, or, in contrast, buffering them (Nathanson and Botta, 2003^[65]). In this way, for example, peer conversations and internalisation of media messages have been shown to mutually reinforce each other over time, and serve as mediators of the relationship between exposure to tween television and body image outcomes (Rousseau and Eggermont, 2017^[42]). Similarly, among adolescent boys the effects of tween television exposure on body image related variables has been found to be strongest among those whose parents most strongly reinforced stereotypical gender norms (Rousseau, Rodgers and Eggermont, 2018^[66]).

Objectification theory

Objectification theory holds that exposure to sexualised and objectified bodies in the media leads individuals to adopt an externalised evaluative viewpoint of their bodies, termed self-objectification, that in turn is associated with body image concerns (Fredrickson and Roberts, 1997^[19]). Consistent with this, research has found support for the association between media exposure and self-objectification both cross-sectionally (Vandenbosch et al., 2015^[67]), and over time (Vandenbosch and Eggermont, 2016^[55]). Therefore, the harmful nature of sexualised image on body image among children and adolescents is supported, and objectification is a useful framework for additional future work.

Conclusions

In conclusion, media use in children may be related to body image both through exposure to unrealistic appearance ideals with associated expectations, as well as the sexualisation of individuals in media. Social media is increasingly used by youth, and has been shown to be linked to body image through similar pathways, although other ones may exist that are less well described due to the unique features of social media such as its interactivity. Importantly, these relationships may be qualified by the individual characteristics of children, the media content and format. Given these documented relationships, the dissemination of programmes that have been shown to help protect youth from the effects of media is important (Richardson and Paxton, 2009^[68]), at the same time as advocating for change in media content, particularly content targeted to youth (Bell, Rodgers and Paxton, 2017^[69]).

References

- Ata, R. and J. Thompson (2010), "Weight bias in the media: A review of recent research", *Obesity Facts*, Vol. 3/1, pp. 41-46, <http://dx.doi.org/10.1159/000276547>. [31]
- Bell, M., R. Rodgers and S. Paxton (2017), "Towards successful evidence-based universal eating disorders prevention: The importance of zooming out", *Eating Behaviors*, Vol. 25, pp. 89-92, <http://dx.doi.org/10.1016/j.eatbeh.2016.10.012>. [69]
- Boyd, H. and S. Murnen (2017), "Thin and sexy vs. muscular and dominant: Prevalence of gendered body ideals in popular dolls and action figures", *Body Image*, Vol. 21, pp. 90-96, <http://dx.doi.org/10.1016/j.bodyim.2017.03.003>. [24]
- Clark, L. and M. Tiggemann (2008), "Sociocultural and individual psychological predictors of body image in young girls: A prospective study", *Developmental Psychology*, Vol. 44/4, pp. 1124-1134, <http://dx.doi.org/10.1037/0012-1649.44.4.1124>. [40]
- Clark, L. and M. Tiggemann (2006), "Appearance Culture in Nine- to 12-Year-Old Girls: Media and Peer Influences on Body Dissatisfaction", *Social Development*, Vol. 15/4, pp. 628-643, <http://dx.doi.org/10.1111/j.1467-9507.2006.00361.x>. [9]
- Damiano, S. et al. (2015), "Dietary restraint of 5-year-old girls: Associations with internalization of the thin ideal and maternal, media, and peer influences", *International Journal of Eating Disorders*, Vol. 48/8, pp. 1166-1169, <http://dx.doi.org/10.1002/eat.22432>. [6]
- Dion, J. et al. (2016), "Correlates of body dissatisfaction in children", *The Journal of Pediatrics*, Vol. 171, pp. 202-207, <http://dx.doi.org/10.1016/j.jpeds.2015.12.045>. [12]
- Dittmar, H., E. Halliwell and S. Ive (2006), "Does barbie make girls want to be thin? The effect of experimental exposure to images of dolls on the body image of 5- to 8-year-old girls", *Developmental Psychology*, Vol. 42/2, pp. 283-292, <http://dx.doi.org/10.1037/0012-1649.42.2.283>. [34]
- Dohnt, H. and M. Tiggemann (2006), "The contribution of peer and media influences to the development of body satisfaction and self-esteem in young girls: A prospective study.", *Developmental Psychology*, Vol. 42/5, pp. 929-936, <http://dx.doi.org/10.1037/0012-1649.42.5.929>. [8]

- Eisenberg, M. et al. (2014), "A content analysis of weight stigmatization in popular television programming for adolescents", *International Journal of Eating Disorders*, Vol. 48/6, pp. 759-766, <http://dx.doi.org/10.1002/eat.22348>. [32]
- Fredrickson, B. and T. Roberts (1997), "Objectification theory: Toward understanding women's lived experiences and mental health risks", *Psychology of Women Quarterly*, Vol. 21/2, pp. 173-206, <http://dx.doi.org/10.1111/j.1471-6402.1997.tb00108.x>. [19]
- Gordon, C. et al. (2020), "A cluster randomized controlled trial of the SoMe social media literacy body image and wellbeing program for adolescent boys and girls: Study protocol", *Body Image*, Vol. 33, pp. 27-37, <http://dx.doi.org/10.1016/j.bodyim.2020.02.003>. [60]
- Groesz, L., M. Levine and S. Murnen (2001), "The effect of experimental presentation of thin media images on body satisfaction: A meta-analytic review", *International Journal of Eating Disorders*, Vol. 31/1, pp. 1-16, <http://dx.doi.org/10.1002/eat.10005>. [18]
- Hargreaves, D. and M. Tiggemann (2004), "Idealized media images and adolescent body image: 'comparing' boys and girls", *Body Image*, Vol. 1/4, pp. 351-361, <http://dx.doi.org/10.1016/j.bodyim.2004.10.002>. [52]
- Harriger, J. et al. (2018), "Appearance-related themes in children's animated movies released between 2004 and 2016: A content analysis", *Body Image*, Vol. 26, pp. 78-82, <http://dx.doi.org/10.1016/j.bodyim.2018.06.004>. [28]
- Harrison, K. and B. Bond (2007), "Gaming magazines and the drive for muscularity in preadolescent boys: A longitudinal examination", *Body Image*, Vol. 4/3, pp. 269-277, <http://dx.doi.org/10.1016/j.bodyim.2007.03.003>. [35]
- Harrison, K. and V. Hefner (2006), "Media Exposure, current and future body ideals, and disordered eating among preadolescent girls: A longitudinal panel study", *Journal of Youth and Adolescence*, Vol. 35/2, pp. 146-156, <http://dx.doi.org/10.1007/s10964-005-9008-3>. [39]
- Hayes, S. and S. Tantleff-Dunn (2010), "Am I too fat to be a princess? Examining the effects of popular children's media on young girls' body image", *British Journal of Developmental Psychology*, Vol. 28/2, pp. 413-426, <http://dx.doi.org/10.1348/026151009x424240>. [20]
- Herbozo, S. et al. (2004), "Beauty and thinness messages in children's media: A content analysis", *Eating Disorders*, Vol. 12/1, pp. 21-34, <http://dx.doi.org/10.1080/10640260490267742>. [21]
- Holland, G. and M. Tiggemann (2016), "A systematic review of the impact of the use of social networking sites on body image and disordered eating outcomes", *Body Image*, Vol. 17, pp. 100-110, <http://dx.doi.org/10.1016/j.bodyim.2016.02.008>. [49]
- Keery, H., P. Van den Berg and J. Thompson (2004), "An evaluation of the Tripartite Influence Model of body dissatisfaction and eating disturbance with adolescent girls", *Body Image*, Vol. 1/3, pp. 237-251, <http://dx.doi.org/10.1016/j.bodyim.2004.03.001>. [62]
- Keeton, W., T. Cash and T. Brown (1990), "Body image or body images?: Comparative, multidimensional assessment among college students", *Journal of personality assessment*, 54(1-2), pp. 213-230. [1]
- Kim, H., J. Ahn and D. Lee (2016), "Thin female characters in children's television commercials: A content analysis of gender stereotype", *American Communication Journal*, 18(2). [30]

- Knauss, C., S. Paxton and F. Alsaker (2008), "Body dissatisfaction in adolescent boys and girls: Objectified body consciousness, internalization of the media body ideal and perceived pressure from media", *Sex Roles*, Vol. 59/9-10, pp. 633-643, <http://dx.doi.org/10.1007/s11199-008-9474-7>. [63]
- Levine, M. and S. Murnen (2009), "“Everybody knows that mass media are/are not [pick one] a cause of eating disorders”: A critical review of evidence for a causal link between media, negative body image, and disordered eating in females", *Journal of Social and Clinical Psychology*, Vol. 28/1, pp. 9-42, <http://dx.doi.org/10.1521/jscp.2009.28.1.9>. [36]
- Malacane, M. and N. Martins (2016), "Sexual socialization messages in television programming produced for adolescents", *Mass Communication and Society*, Vol. 20/1, pp. 23-46, <http://dx.doi.org/10.1080/15205436.2016.1203436>. [25]
- McCabe, M. and L. Ricciardelli (2005), "A prospective study of pressures from parents, peers, and the media on extreme weight change behaviors among adolescent boys and girls", *Behaviour Research and Therapy*, Vol. 43/5, pp. 653-668, <http://dx.doi.org/10.1016/j.brat.2004.05.004>. [45]
- McCabe, M. and L. Ricciardelli (2003), "Sociocultural influences on body image and body changes among adolescent boys and girls", *The Journal of Social Psychology*, Vol. 143/1, pp. 5-26, <http://dx.doi.org/10.1080/00224540309598428>. [17]
- McCabe, M. and L. Ricciardelli (2001), "The structure of the perceived sociocultural influences on body image and body change questionnaire", *International Journal of Behavioral Medicine*, Vol. 8/1, pp. 19-41, http://dx.doi.org/10.1207/s15327558ijbm0801_02. [13]
- McKinley, N. and J. Hyde (1996), "The objectified body consciousness scale", *Psychology of Women Quarterly*, Vol. 20/2, pp. 181-215, <http://dx.doi.org/10.1111/j.1471-6402.1996.tb00467.x>. [2]
- McLean, S., H. Jarman and R. Rodgers (2019), "How do “selfies” impact adolescents’ well-being and body confidence? A narrative review", *Psychology Research and Behavior Management*, Vol. Volume 12, pp. 513-521, <http://dx.doi.org/10.2147/prbm.s177834>. [48]
- McLean, S., S. Paxton and E. Wertheim (2016), "The role of media literacy in body dissatisfaction and disordered eating: A systematic review", *Body Image*, Vol. 19, pp. 9-23, <http://dx.doi.org/10.1016/j.bodyim.2016.08.002>. [58]
- McLean, S. et al. (2017), "A pilot evaluation of a social media literacy intervention to reduce risk factors for eating disorders", *International Journal of Eating Disorders*, Vol. 50/7, pp. 847-851, <http://dx.doi.org/10.1002/eat.22708>. [61]
- McLean, S., E. Wertheim and S. Paxton (2018), "Preferences for being muscular and thin in 6-year-old boys", *Body Image*, Vol. 26, pp. 98-102, <http://dx.doi.org/10.1016/j.bodyim.2018.07.003>. [11]
- Mingoia, J. et al. (2019), "The relationship between posting and photo manipulation activities on social networking sites and internalization of a tanned ideal among Australian adolescents and young adults", *Social Media + Society*, Vol. 5/1, p. 205630511882041, <http://dx.doi.org/10.1177/2056305118820419>. [51]

- Nathanson, A. and R. Botta (2003), "Shaping the effects of television on adolescents' body image disturbance", *Communication Research*, Vol. 30/3, pp. 304-331, <http://dx.doi.org/10.1177/0093650203030003003>. [65]
- Neumark-Sztainer, D. et al. (2006), "Does body satisfaction matter? Five-year longitudinal associations between body satisfaction and health behaviors in adolescent females and males", *Journal of Adolescent Health*, Vol. 39/2, pp. 244-251, <http://dx.doi.org/10.1016/j.jadohealth.2005.12.001>. [14]
- Paxton, S. and S. Damiano (2017), "The development of body image and weight bias in childhood", in *Advances in Child Development and Behavior*, Elsevier, <http://dx.doi.org/10.1016/bs.acdb.2016.10.006>. [5]
- Piran, N. (2017), *Journeys of embodiment at the intersection of body and culture: The developmental theory of embodiment*, Academic Press. [3]
- Presnell, K., S. Bearman and E. Stice (2004), "Risk factors for body dissatisfaction in adolescent boys and girls: A prospective study", *International Journal of Eating Disorders*, Vol. 36/4, pp. 389-401, <http://dx.doi.org/10.1002/eat.20045>. [41]
- Ricciardelli, L. et al. (2009), "Body image in preadolescent boys.", in *Body image, eating disorders, and obesity in youth: Assessment, prevention, and treatment*. [10]
- Richardson, S. and S. Paxton (2009), "An evaluation of a body image intervention based on risk factors for body dissatisfaction: A controlled study with adolescent girls", *International Journal of Eating Disorders*, pp. NA-NA, <http://dx.doi.org/10.1002/eat.20682>. [68]
- Rodgers, R. (2015), "The relationship between body image concerns, eating disorders and internet use, part II: An integrated theoretical model", *Adolescent Research Review*, Vol. 1/2, pp. 121-137, <http://dx.doi.org/10.1007/s40894-015-0017-5>. [47]
- Rodgers, R., J. Campagna and R. Attawala (2019), "Stereotypes of physical attractiveness and social influences: The heritage and vision of Dr. Thomas Cash", *Body Image*, Vol. 31, pp. 273-279, <http://dx.doi.org/10.1016/j.bodyim.2019.01.010>. [29]
- Rodgers, R. and R. DuBois (2016), "Cognitive biases to appearance-related stimuli in body dissatisfaction: A systematic review", *Clinical Psychology Review*, Vol. 46, pp. 1-11, <http://dx.doi.org/10.1016/j.cpr.2016.04.006>. [57]
- Rodgers, R., S. McLean and S. Paxton (2018), "When seeing is not believing: An examination of the mechanisms accounting for the protective effect of media literacy on body image", *Sex Roles*, Vol. 81/1-2, pp. 87-96, <http://dx.doi.org/10.1007/s11199-018-0973-x>. [59]
- Rodgers, R., S. McLean and S. Paxton (2015), "Longitudinal relationships among internalization of the media ideal, peer social comparison, and body dissatisfaction: Implications for the tripartite influence model", *Developmental Psychology*, Vol. 51/5, pp. 706-713, <http://dx.doi.org/10.1037/dev0000013>. [64]
- Rodgers, R., S. Paxton and H. Chabrol (2009), "Depression as a moderator of sociocultural influences on eating disorder symptoms in adolescent females and males", *Journal of Youth and Adolescence*, Vol. 39/4, pp. 393-402, <http://dx.doi.org/10.1007/s10964-009-9431-y>. [53]

- Rodgers, R., S. Paxton and S. McLean (2013), "A Biopsychosocial model of body image concerns and disordered eating in early adolescent girls", *Journal of Youth and Adolescence*, Vol. 43/5, pp. 814-823, <http://dx.doi.org/10.1007/s10964-013-0013-7>. [16]
- Rousseau, A. and S. Eggermont (2017), "Tween television and peers: Reinforcing social agents in early adolescents' body surveillance and self-objectification", *Journal of Research on Adolescence*, Vol. 28/4, pp. 807-823, <http://dx.doi.org/10.1111/jora.12367>. [42]
- Rousseau, A., S. Eggermont and E. Frison (2017), "The reciprocal and indirect relationships between passive Facebook use, comparison on Facebook, and adolescents' body dissatisfaction", *Computers in Human Behavior*, Vol. 73, pp. 336-344, <http://dx.doi.org/10.1016/j.chb.2017.03.056>. [43]
- Rousseau, A., R. Rodgers and S. Eggermont (2018), "A short-term longitudinal exploration of the impact of TV exposure on objectifying attitudes toward women in early adolescent boys", *Sex Roles*, Vol. 80/3-4, pp. 186-199, <http://dx.doi.org/10.1007/s11199-018-0925-5>. [66]
- Saiphoo, A. and Z. Vahedi (2019), "A meta-analytic review of the relationship between social media use and body image disturbance", *Computers in Human Behavior*, Vol. 101, pp. 259-275, <http://dx.doi.org/10.1016/j.chb.2019.07.028>. [50]
- Schooler, D. (2008), "Real women have curves", *Journal of Adolescent Research*, Vol. 23/2, pp. 132-153, <http://dx.doi.org/10.1177/0743558407310712>. [37]
- Slater, A. et al. (2017), "More than just child's play?: An experimental investigation of the impact of an appearance-focused internet game on body image and career aspirations of young girls", *Journal of Youth and Adolescence*, Vol. 46/9, pp. 2047-2059, <http://dx.doi.org/10.1007/s10964-017-0659-7>. [22]
- Slater, A. and M. Tiggemann (2016), "Little girls in a grown up world: Exposure to sexualized media, internalization of sexualization messages, and body image in 6–9 year-old girls", *Body Image*, Vol. 18, pp. 19-22, <http://dx.doi.org/10.1016/j.bodyim.2016.04.004>. [33]
- Spiel, E., S. Paxton and Z. Yager (2012), "Weight attitudes in 3- to 5-year-old children: Age differences and cross-sectional predictors", *Body Image*, Vol. 9/4, pp. 524-527, <http://dx.doi.org/10.1016/j.bodyim.2012.07.006>. [7]
- Stice, E. et al. (2017), "Risk factors that predict future onset of each DSM–5 eating disorder: Predictive specificity in high-risk adolescent females.", *Journal of Abnormal Psychology*, Vol. 126/1, pp. 38-51, <http://dx.doi.org/10.1037/abn0000219>. [15]
- Tiggemann, M. and J. Miller (2010), "The internet and adolescent girls' Weight satisfaction and drive for thinness", *Sex Roles*, Vol. 63/1-2, pp. 79-90, <http://dx.doi.org/10.1007/s11199-010-9789-z>. [23]
- Tiggemann, M. and A. Slater (2016), "Facebook and body image concern in adolescent girls: A prospective study", *International Journal of Eating Disorders*, Vol. 50/1, pp. 80-83, <http://dx.doi.org/10.1002/eat.22640>. [38]
- Trekels, J. and S. Eggermont (2017), "'I can/should look like a media figure': The association between direct and indirect media exposure and teens' sexualizing appearance behaviors", *The Journal of Sex Research*, Vol. 55/3, pp. 320-333, <http://dx.doi.org/10.1080/00224499.2017.1387754>. [54]

- Trekels, J. and S. Eggermont (2016), "Beauty is good: the appearance culture, the internalization of appearance ideals, and dysfunctional appearance beliefs among tweens", *Human Communication Research*, Vol. 43/2, pp. 173-192, <http://dx.doi.org/10.1111/hcre.12100>. [46]
- Trekels, J. et al. (2018), "How social and mass media relate to youth's self-sexualization: Taking a cross-national perspective on rewarded appearance ideals", *Journal of Youth and Adolescence*, Vol. 47/7, pp. 1440-1455, <http://dx.doi.org/10.1007/s10964-018-0844-3>. [44]
- Tylka, T. and N. Wood-Barcalow (2015), "What is and what is not positive body image? Conceptual foundations and construct definition", *Body Image*, Vol. 14, pp. 118-129, <http://dx.doi.org/10.1016/j.bodyim.2015.04.001>. [4]
- Tzoutzou, M., E. Bathrellou and A. Matalas (2020), "Body weight of cartoon characters in children series is associated to food consumption, attractiveness, and physical activity engagement", *International Journal of Behavioral Medicine*, <http://dx.doi.org/10.1007/s12529-020-09911-7>. [27]
- Vandenbosch, L. and S. Eggermont (2016), "The interrelated roles of mass media and social media in adolescents' development of an objectified self-concept", *Communication Research*, Vol. 43/8, pp. 1116-1140, <http://dx.doi.org/10.1177/0093650215600488>. [55]
- Vandenbosch, L. et al. (2015), "Sexualizing reality television: Associations with trait and state self-objectification", *Body Image*, Vol. 13, pp. 62-66, <http://dx.doi.org/10.1016/j.bodyim.2015.01.003>. [67]
- Want, S. (2009), "Meta-analytic moderators of experimental exposure to media portrayals of women on female appearance satisfaction: Social comparisons as automatic processes", *Body Image*, Vol. 6/4, pp. 257-269, <http://dx.doi.org/10.1016/j.bodyim.2009.07.008>. [56]
- Ward, L., J. Moorman and P. Grower (2018), "Entertainment media's role in the sexual socialization of western youth", in *The Cambridge Handbook of Sexual Development*, Cambridge University Press, <http://dx.doi.org/10.1017/9781108116121.021>. [26]

8

Cognitive enhancement in children by using prescription drugs

Sebastian Sattler

Institute of Sociology and Social Psychology, University of Cologne, Germany

Pragmatic Health Ethics Research Unit, Institut de recherches cliniques de Montréal, Canada

This chapter explores the use of prescription drugs with the aim of enhancing the cognitive performance in children in the absence of any medical need. This so-called pharmaceutical cognitive enhancement provokes ethical and social concerns. Although not an epidemic, a non-negligible number of children are put at risk of side effects, while other children and parents may feel pressured to take or administer such drugs. After defining this behaviour and discussing its effects, this chapter describes arguments in the ethics debate favouring or opposing this behaviour. It then gives insights into how common this phenomenon is, what parents and children think about it and what affects their decisions to use such drugs. The chapter ends with strategies to prevent risky use and important research gaps.

Introduction

Imagine the parents of a ten-year-old. Unsatisfied with their child's school grades, they approach a doctor to check if a medical condition causes this poor school performance. The doctor confirms that their child is in perfect health. Unsatisfied, the parents search the Internet and find other parents talking about medicating their healthy kids with the intention of boosting their performance at school. They then decide to find a doctor with a reputation for prescribing drugs that are not medically necessary, and request this for their child. This short narrative describes the phenomenon of "pharmaceutical cognitive enhancement" (PCE) or more colloquially, the use of "study aids," "smart drugs" or "homework drugs". This chapter on PCE in children will cover: 1) what PCE is, 2) how it is discussed ethically, 3) what we currently know about its prevalence, 4) factors driving and mitigating its use, 5) strategies to prevent risky use, and 6) what future research should target. By "children", this chapter refers to individuals aged up to 18, however in the absence of data for some sub-topics, some data on older individuals are used.

What is pharmaceutical cognitive enhancement and does it work?

Cognitive enhancement, in general, describes a set of practices that aim to increase cognitive functions such as short and long-term memory, concentration, the capacity for decision-making and wakefulness (Bostrom and Sandberg, 2009^[1]; Greely et al., 2008^[2]; Sahakian et al., 2015^[3]; Sattler, 2016^[4]). This is often referred to as augmentation beyond "normal", "natural" or "average" functioning of "healthy" individuals, i.e. an intervention "beyond what is necessary to sustain or restore good health" (Juengst, 1998, p. 29^[5]). However, due to changing norms about what is "normal", "natural", "average", "good health" or "healthy", there are shifting boundaries and grey zones especially in terms of cognitive processes such as attention or learning ability, for example. Such boundaries might also be intentionally shifted by the pharmaceutical industry to extend the circle of users.

Very broadly defined, cognitive enhancement includes practices such as substance use, physical exercise, meditation, genetic modification, mnemonics or brain stimulation (Coates McCall et al., 2019^[6]; Dresler et al., 2013^[7]). Taking prescription drugs is currently the most frequently discussed form of enhancement (Nagel, 2019^[8]; O'Connor and Nagel, 2017^[9]; Sahakian et al., 2015^[3]; Schelle et al., 2014^[10]) and the focus of this chapter. Such PCE includes off-label prescription drug use of mainly modafinil (e.g. Provigil®), methylphenidate (e.g. Ritalin®) and amphetamine-dextroamphetamine (e.g. Adderall®), as well as donepezil (e.g. Aricept®) and beta-blockers (e.g. Inderal®). These drugs have been developed and approved to treat conditions like attention-deficit hyperactivity-disorder (ADHD), sleep disorders, dementia or high blood pressure, and not intended specifically for PCE. For example, the use of these drugs in children diagnosed with ADHD is intended to calm them down and help improve concentration.

Due to ethical reasons, studies of the impact of these drugs on "healthy" children do not exist (as far as we know). Studies and subsequent meta-analyses with older populations reveal that such drugs can increase cognitive performance in "healthy" individuals (Battleday and Brem, 2015^[11]; Caviola and Faber, 2015^[12]; Repantis, Laisney and Heuser, 2010^[13]; Smith and Farah, 2011^[14]). The strength of the effect is low to moderate and depends on the type of drug, its dosage, characteristics of the user (e.g. responsiveness to the drug), the situation of use (including the task at hand) and the targeted cognitive function. Effects sometimes seem to be only subjectively perceived rather than objectively verifiable, suggesting that placebo effects exist. Thus, user expectations may partially exceed the actual effect. Preliminary research with healthy college students suggests some improvements (e.g. on attention), but also impairments (on working memory) after Adderall® was administered (Weyandt et al., 2018^[15]).

What is the controversy about pharmaceutical cognitive enhancement?

Is PCE morally acceptable? How does it affect personhood? Is PCE different from private tutoring or drinking coffee? Who may benefit legitimately or illegitimately and who may be harmed from this practice? These and other questions are challenging and the use of PCE across the life-cycle offers material for intense ethical discussions. While some arguments favouring or dismissing PCE as acceptable or non-acceptable are very general, others apply to children in particular. These arguments can be grouped into those focusing on a) how PCE relates to traits or motivations of (non-)users (i.e. the agents), b) whether PCE can be judged as a “right” or “wrong” deed to conduct, and c) whether PCE has “good” or “bad” consequences for (non-)users or others (Dubljević, Sattler and Racine, 2018^[16]; Racine, Sattler and Boehlen, Under review^[17]). Some arguments relate to more than one of these three groups. This chapter highlights six common arguments for and against the use of PCE in children (see Table 8.1).

Table 8.1. Common arguments for and against PCE in children

	Agent-related	Deed-related	Consequence-related
For PCE	PCE can boost self-confidence; PCE helps reach the next level of humankind.	PCE is equal to other augmentation means and should thus be allowed; The autonomy to decide about PCE should be granted to mature adolescents.	Gains in cognitive functioning; Reduction of social inequality.
Against PCE	PCE interferes with valued personality traits (such as authenticity); PCE reduces the development of meta-skills (such as coping or learning strategies).	PCE is unfair and cheating; PCE is legally prohibited for good reasons.	Poor cost-benefit ratio due to unknown efficacy and risk of adverse side effects; Pressure and coercion to use PCE.

Note: This is the author’s summary of a much larger literature; see, for example, (Graf et al., 2013^[18]) for a fuller review.

Agent-related arguments

PCE has been seen as a means to help humans become “better” and overcome currently believed limitations concerning what we are able to memorise, how long we can concentrate, or how efficiently we can make decisions and adapt to challenging environments (Bostrom and Sandberg, 2009^[11]). For example, having a good memory might be generally valued and thus positive for users. And indeed, key features of humankind have been changing over the centuries due to better health-care, vaccination or food. One hope is that PCE can amplify human capacities for more autonomous agency and complex judgments and that its intake may even result in changes of character traits that could be beneficial for users, such as improved self-confidence (Flanigan, 2013^[19]).

However critics argue that PCE can undermine authenticity and thereby a child’s personality, because for individuals who use PCE, the attribution of what contributed to successes or failures – the pill or the person – might become blurred (Graf et al., 2013^[18]). One related argument against PCE is that it will negatively change other elements of a child’s character, since drug using children will be less trained in meta-skills such as overcoming crises. As a result, their self-confidence, sense of agency and autonomy might be reduced, and this can be detrimental for further achievement and development (Racine, Sattler and Boehlen, Under review^[17]; Sattler, 2016^[4]; Walcher-Andris, 2006^[20]).

Deed-related arguments

Some scholars claim that PCE increases cognitive functioning similar to other means such as tutoring or drinking coffee and thus should be allowed (Flanigan, 2013^[19]). However, due to the negative consequences related to its use (see below) and more acceptable non-pharmaceutical options, it cannot be considered legally and ethically similar to private tutoring or coffee (Gaucher, Payot and Racine,

2013^[21]). This is also why prescription drugs can only be legally obtained with a prescription (although there is variation across countries about what constitutes a prescription drug).

Proponents of PCE argue that with increasing maturity, adolescents should be granted the right to decide for themselves and be considered medically autonomous (Flanigan, 2013^[19]). The ability to understand risks and benefits increases with age and maturity, therefore adolescents should be able to decide which risks are acceptable even if they are prone to engaging in risky behaviours. However, while physicians have a duty to acknowledge the autonomy of their patients, they must also intervene if health decisions fall below established thresholds (Forlini, Gauthier and Racine, 2013^[22]; Gaucher, Payot and Racine, 2013^[21]).

Given the potential of performance improvements with PCE, scholars have critically discussed PCE as being unfair and cheating (Schermer, 2008^[23]). Achievements with PCE are seen as different from those involving purely hard work. Additionally, a fair performance assessment might be difficult if some individuals use PCE and others do not, although it has to be acknowledged that children already vary in starting conditions, e.g. due to the human and social capital of their parents (Bostrom and Sandberg, 2009^[11]). In this sense “cheating” must be clearly defined. For example, because of concerned students, Duke University in the United States lists “the unauthorised use of prescription medication to enhance academic performance” as one form of academic dishonesty in their university policy (Duke University, 2019, p. 16^[24]). Proponents, however, argue that if everybody had legal access to PCE (as some schools offer computers to all students), it can be considered equivalent to other means of performance enhancement (Greely et al., 2008^[2]; Kayser, Mauron and Miah, 2005^[25]). Some scholars even suggest subsidised access for disadvantaged groups (Bostrom and Sandberg, 2009^[11]) but who would pay for this and how this would be organised for PCE is not clear.

Consequence-related arguments

Proponents of PCE in children hope for positive gains in cognitive functioning, enjoyment of work and better well-being, even if only due to placebo effects (Flanigan, 2013^[19]). Such improvements might also be societally relevant since “smarter, wiser or more creative” individuals may help solve pressing societal and economic problems (Bostrom and Sandberg, 2009, p. 328^[11]; Beddington et al., 2008^[26]). They also argue that disadvantaged healthy children should be given PCE to counter potential inadequate schooling and teaching – especially if society seems unwilling to pursue other required policy changes (Bostrom and Sandberg, 2009^[11]; Flanigan, 2013^[19]; Ray, 2016^[27]). However, turning social inequality into a medical problem, for which the hoped remedy is probably ineffective (see next point) causes further problems such as stigmatisation (Ketchum and Repantis, 2016^[28]; Sattler and Singh, 2016^[29]; Warren, 2016^[30]).

Critics of PCE in children highlight its poor cost-benefit ratio (Graf et al., 2013^[18]; Sattler and Singh, 2016^[29]). While clinical evidence for positive effects in young healthy people is very limited, PCE can have negative short- and long-term health consequences. Adverse side effects include headaches, insomnia, abnormal heartbeat, high blood pressure or psychosis (Storebø et al., 2015^[31]; Volkow et al., 2009^[32]; Winder-Rhodes et al., 2010^[33]). Such negative effects might be more likely or more severe without medical oversight, e.g. due to overdosing, intranasal administration (which is related to increased risks of abuse), or when use is inadvisable because of other medical conditions (e.g. heart failure or an oversupply of thyroid hormones) (Weyandt et al., 2018^[15]). While risking such side effects might be acceptable to treat a disease, the acceptability for PCE in otherwise healthy individuals has been questioned.

Moreover, PCE in children warrants special attention as their developing bodies and brains might be more vulnerable (d'Angelo, Savulich and Sahakian, 2017^[34]). Exposure to side effects can impose costs on health systems that society has to shoulder. Due to these negative consequences, physicians' obligation to refuse inquiries of inappropriate drug use has been highlighted, as have legal sanctions for untrained parents administering PCE drugs to children without supervision. Prevention and monitoring have been suggested (Gaucher, Payot and Racine, 2013^[21]; Graf et al., 2013^[18]; Maslen et al., 2014^[35]).

In this debate, the potential for negative social consequences of individual PCE engagement has been emphasised, namely that other parents and children may experience diminished freedom of choice due to increasing competition (e.g. in schools) as well as indirect coercion and pressures to also engage in PCE in order not to fall behind (Graf et al., 2013^[18]; Sattler and Singh, 2016^[29]). Such pressures may rise with growing prevalence rates of PCE, and increasing pressure on parents and children to use medication to “keep up”. This can be especially problematic because children’s decision-making capacity is still developing and they are particularly vulnerable to direct and indirect coercion by both parents and peers. Additionally, young people’s assessment of the (health) consequences of PCE might be constrained (Gaucher, Payot and Racine, 2013^[21]). Additionally, if everybody starts using enhancement to improve academic performance, no one will have a relative advantage, but everyone has to bear the negative consequences (Jane and Vincent, 2017^[36]).

What is known about the prevalence of pharmaceutical cognitive enhancement?

Researchers warn that the misuse and abuse of prescription drugs “is one of the fastest growing drug epidemics in the United States, particularly among adolescents” (Conn and Marks, 2014, p. 257^[37]). While this warning did not specifically target PCE, scholars believe the prevalence of PCE in children to also be on the rise (O’Connor and Nagel, 2017^[9]; Singh and Kelleher, 2010^[38]). This section outlines some research examining the prevalence of PCE in children.

These trends are not limited to the United States, but it is difficult to compare prevalence rates across countries in part due to the lack of shared definitions and assessment approaches. In addition, different types of data can be used to estimate how common PCE is among children. These data include a) official data including prescription rates as rough indicators of PCE, b) information about parents (or other legal guardians) endorsing or actively giving prescription drugs to their children with the intention of performance enhancement without medical necessity, and c) self-reports of children who have been asked about their engagement in such behaviour. It has to be noted that not all studies explicitly refer to PCE as a motive for use (further motives are “getting high” for example).

Official data

The global manufacturing, trade, stocks, and consumption of methylphenidate (usually prescribed to treat ADHD) has been rising in the past ten years, according to the International Narcotics Control Board (2019^[39]). High levels of consumption have been reported for northern Europe (e.g. Iceland), North America as well as other parts of Europe. The prevalence of ADHD diagnosis in Germany, for example, increased from 21 of 1 000 children in 2004 to 39 of 1 000 in 2013. The total amount of prescribed drugs and the number of daily doses per case has also risen in that time (Langner et al., 2019^[40]). Reasons for this increase include a rise in the prevalence of ADHD and a higher awareness of parents and physicians about ADHD. However, over-diagnosis (Bruchmüller, Margraf and Schneider, 2012^[41]) including with the purpose of PCE, cannot be ruled out as contributing to these trends (Gaucher, Payot and Racine, 2013^[21]; Graf et al., 2013^[18]). Even if unintentional, such surges in prescriptions make more drugs available for sharing, trading and exchanging, and thus for potential misuse.

Parents’ self-reported PCE behaviour

The actual prevalence of parents administering prescription drugs to their children in order to enhance their cognitive performance is not well-researched. One survey in the US revealed that only 1% of parents of children aged 13-17 (who have no prescribed stimulants to treat ADHD), assumed that their children use “study aids”, while another 4% were not sure (C.S. Mott Children’s Hospital National Poll on Children’s Health, 2013^[42]). However, parents might not be well informed about their children’s behaviour, particularly in the case of older adolescents. Another experimental study found an occasionally moderate but

substantial willingness when parents were asked if they would medicate a healthy child for better school performance (Sattler et al., under review^[43]).

Children's self-reported PCE behaviour

An older meta-analysis estimated the 12-month prevalence rate of non-medical use of prescription drugs in the United States at 5-10% among grade-school students (Wilens et al., 2008^[44]). A more recent study, again in the United States, shows that 1 196 000 (4.8%) adolescents between 12 and 17 years are estimated to have misused psychotherapeutics in 2018, of which 369 000 (1.5%) misused stimulants (Substance Abuse and Mental Health Services Administration, 2019^[45]). When looking at the annual prevalence of the non-medical use of two important amphetamines used for PCE, Ritalin® use decreased from 2009 to 2018 in 8th-, 10th-, and 12th-grade students, while Adderall® use was more stable at higher levels in the same period (Johnston et al., 2019^[46]). In 2012, when asked specifically about ever having taken medication to improve focus, memory, or concentration, 1% young people aged 14-18 surveyed in the United Kingdom reported they had (Clemence et al., 2013^[47]). In a more recent Swiss study, 4.3% of surveyed upper secondary school students (18 or younger) reported prescription drug use for PCE (Liakoni et al., 2015^[48]). When asked about the age of first use of methylphenidate for PCE, a small sample of 16 grammar school pupils (aged 18-21) in Germany retrospectively answered 16.58 years (Franke et al., 2011^[49]). A frequent source of the prescription drugs are friends with prescriptions (e.g. (Garnier-Dykstra et al., 2012^[50])).

What is known about attitudes and factors affecting pharmaceutical cognitive enhancement?

To better understand PCE by children, the attitudes and reasoning that drive the choice of whether to use it or not must be explored. Although research in children is in its infancy, research on parents with children older than 18 or on college or university students suggests possible drivers and barriers of PCE use that might also apply to younger people. The following section reflects on factors driving and mitigating PCE in: a) parents (or other legal guardians) as well as b) children and adolescents (Table 8.2).

Table 8.2. Common factors promoting or inhibiting PCE in children

	Parents	Children and adolescents
Promoting factors	Expected benefits for children (e.g. improved self-confidence); expected benefits for parents (e.g. status gain); social pressure from others' PCE use.	Exaggerated beliefs about benefits; stress; contagion effects through peers.
Inhibiting factors	Negative short- and long-term health-effects; violation of fairness; concerns about intensified competition.	Social support; risk aversion; moral rejection of PCE.

Parents

One important stakeholder group involved in direct and indirect decisions regarding PCE in children is parents (Arria and DuPont, 2010^[51]). Parents can initiate PCE use because they want their children to reach performance goals inside or outside of school (Arria and DuPont, 2010^[51]; Sattler et al., under review^[43]). Motives for this can be, for example, a desire to optimise their children's future, to financially benefit from better performance in the long run, to gain status for themselves or their children, or to remove or overcome stigmatisation of low performing children. Recent studies on parenting discuss a shift towards intensive parenting and competitive mind-sets of parents (Doepke, Sorrenti and Zilibotti, 2019^[52]; Nadesan, 2002^[53]; Wall, 2010^[54]; Ulferts, 2020^[55]). This shift might be also linked to increasing returns of education, the growing importance of cognitive abilities, and growing inequalities (Autor, 2014^[56]). Intensive parenting has many faces, including increasing parent child-interactions to support educational success such as

homework support or tutoring (Borra and Sevilla, 2019^[57]; Gershuny and Harms, 2016^[58]; Wells et al., 2016^[59]). Engaging in cognitive enhancement might be another, less frequently occurring expression of this, as parents may view it as helpful to achieving these goals ((Arria and DuPont, 2010^[51]) cf. (Sattler et al., under review^[43])). One recent study speaks to this by showing that parents in the US with a Machiavellian personality (i.e. individuals who tend to be selfish and extrinsically oriented towards money, success, etc.) tend to be more willing to instrumentalise prescription drugs to give their child an advantage compared to those with a non-Machiavellian personality (Sattler and Linden, under review^[60]). The prospect of higher financial gains also increased willingness, especially for Machiavellians.

If some parents engage with this type of behaviour, it can have contagious or coercive effects (Maher, 2008^[61]). About one third of respondents in an international but predominantly North American survey (without indication about parenthood) reported they would feel pressure to give prescription drugs to their children for enhancement purposes if classmates were also taking them. Such indirect coercion to engage in this behaviour due to feared disadvantage has been also observed in two qualitative studies in Canada with parents of children aged 3-9 (Ball and Wolbring, 2014^[62]) and parents of students aged 25 and under (Forlini and Racine, 2009^[63]). In addition, some parents report considering prescription drugs to be possible means to enhance children's self-confidence, well-being or independence if these drugs were safe and effective (Ball and Wolbring, 2014^[62]).

However, in a qualitative study with American college students (aged 18-26), few students said that their parents would accept if they themselves used prescription drugs in order to get better grades (Cutler, 2014^[64]). A minority of parents in a German sample of parents (of children aged 5-18) report that they would only agree to give prescription drugs to children for enhancement under the supervision of a physician, while other parents would call for legal action against physicians if they were to engage in this (Hiltrop and Sattler, under review^[65]). Several parents in a Canadian study, however, believed that prescription drug use for enhancement should be an individual choice, but also said that students using such drugs should be responsible for the possible consequences (Forlini and Racine, 2009^[63]).

While parents can be promoters of PCE in children, they can also be obstacles because of risk aversion, moral qualms, or because they control resources and access to PCE such as money or making appointments with physicians. The few studies on this topic all indicate that the majority of parents consider PCE in a dismissive way (Ball and Wolbring, 2014^[62]; Forlini and Racine, 2009^[63]; Hiltrop and Sattler, under review^[65]) due for example to the fear of adverse short- and long-term effects such as negative effects on the brain, and unfairness if only some children take such drugs (Forlini and Racine, 2009^[63]; Hiltrop and Sattler, under review^[65]). They compared it to cheating, doping in sports and a form of self-deception.

However, while a fair assessment of performance might become more difficult if some children take PCE, some parents also said that many factors already make such an assessment difficult, such as transmission of human capital from highly educated parents to their children (Hiltrop and Sattler, under review^[65]). Parents were also worried that PCE may intensify the competition in educational settings, undermining free decisions about PCE use because of disadvantages for non-users (Ball and Wolbring, 2014^[62]; Forlini and Racine, 2009^[63]). In line with these dismissive views is the finding that over 85% of respondents favoured restrictions of PCE of healthy children under the age of 16 (Maher, 2008^[61]). Besides teachers and doctors (who should intervene against PCE if it becomes more prevalent), parents also see the school system and politicians as being responsible for taking action and reconfiguring drivers of PCE use such as performance expectations (Hiltrop and Sattler, under review^[65]). Next to such political demands, many parents negatively view other parents who give or force their children to take PCE (Ball and Wolbring, 2014^[62]; Hiltrop and Sattler, under review^[65]).

Children and adolescents

What do children think about PCE? What makes them more likely to engage in it? What holds them back? This has not been well studied, however research with older individuals (such as university students) offers relevant insights and shows the diversity of factors affecting the use of PCE. Here, only a sample of these factors can be described: For example, a study of college students in the United States found that (mis)using prescription drugs was most frequently done due to a desired enhancement of cognitive performance while studying. This motive became more prevalent after the first year in college (Garnier-Dykstra et al., 2012^[50]) cf. a systematic review by (Faraone et al., 2020^[66]). Motives for PCE use were not always to outperform, but also for “catching up” or being on par with others as reported by university students from England (United Kingdom) (Vargo and Petróczi, 2016^[67]). This was also reflected in a sample of high school seniors in the United States where a higher grade-point average was more likely observed in non-users compared to users of prescription drugs using them for non-medically for study purposes (combined with other motives) (Teter et al., 2020^[68]) cf. (Faraone et al., 2020^[66]); interestingly this latter group, and those indicating a use for study purposes only, reported a higher percentage of more highly educated parents.

The use of drugs for PCE and the willingness of future use were particularly high if the relevant drugs were perceived or described as beneficial and less risky (Kinman, Armstrong and Hood, 2017^[69]; Sattler et al., 2013^[70]; Sattler and Wiegel, 2013^[71]). Interestingly, 45% of young people (aged 14-18) surveyed in the United Kingdom expected the taking of such medications to be very or fairly effective for improving focus, memory or concentration (Clemence et al., 2013^[47]), while German university students estimated potential side-effects to be very high (Sattler and Wiegel, 2013^[71]). However, a study with college students in the United States offers no indication that non-medical use of prescription stimulants significantly increased their grade-point average compared to abstainers (Arria et al., 2017^[72]). This might indicate that the drug effects are often overestimated and subjectively perceived rather than objectively observable. Students still seem to expect them to help them cope with stress as indicated by studies with (university) students in Germany (Sattler, 2019^[73]) cf. (Wolff and Brand, 2013^[74]). However, experiencing social support partially buffered the effects of stress, reducing likelihood of engaging in PCE. Thus, social support is an important resource and social relations matter. Nevertheless, suspected PCE use among peers and peer approval also seem to increase PCE as indicated by several European studies (Helmer et al., 2016^[75]; Maier et al., 2013^[76]; Ponnet et al., 2015^[77]; Singh, Bard and Jackson, 2014^[78]).

Research also indicates that personality and other personal characteristics play a role. For example, college and university students who self-identify as more risk prone, who have test anxiety, or who have a tendency towards procrastination have been found to be more likely to engage in PCE (Ponnet et al., 2015^[77]; Sattler and Wiegel, 2013^[71]). Moral objections towards PCE, however, hold a majority of them back (Sattler et al., 2013^[79]). With regard to gender differences, several studies with university students (Champagne, Gardner and Dommett, 2019^[80]; Singh, Bard and Jackson, 2014^[78]) found male students to be more likely to use PCE than female students. There remain many candidate factors associated or causally linked with children’s decisions to use or abstain from PCE that need to be understood.

What are potential strategies to decrease risky use of pharmaceutical cognitive enhancement?

PCE is an important topic for the health, well-being, development and other facets of children’s lives. It is thus crucial to explore strategies that – depending on policy-makers’ goals –reduce the occurrence of this behaviour, or at least reduce risky uses. Targets of such strategies should be children and their parents, but also physicians and teachers. In the following sections, three potential strategies will be briefly presented.

Correcting exaggerated beliefs about prescription drugs and counselling on non-medical alternative strategies for performance enhancement

If parents would like their children to perform better and/or if children have the same goal, they could be educated: a) about misperceptions regarding drug efficacy given the often limited positive effects of prescription drugs for healthy people and the possible detrimental health effects, b) about their potential overestimated prevalence, which might cause indirect coercion or contagion effects (Faraone et al., 2020^[66]; Stock et al., 2013^[81]; Weyandt et al., 2018^[15]), and c) in applying less risky non-medical options for performance enhancement including sufficient sleep, nutrition, memory techniques, meditation, physical exercise or neurofeedback (a technique that gives real-time feedback of brain activity and thereby intends to help with regulating brain functions) (Dresler et al., 2013^[7]; Gruzelier, 2009^[82]). All these latter strategies may have multiple positive “collateral” effects on overall health and well-being. These educational strategies might be integrated in curricula thereby also targeting current non-users. In addition, students struggling academically or at-risk for drug misuse (e.g. because of test-anxiety or engagement in cheating behaviour) should receive resources, support and tailored messages (Sattler and Wiegel, 2013^[71]; Weyandt et al., 2018^[15]).

Screening and assessment for substance misuse and substance-related problems

Two stakeholder groups that can professionally observe substance misuse and substance-related problems are teachers and physicians. Through teachers' frequent interaction with students, they may find indications for non-medical uses of prescription drugs including accompanying side effects (e.g. irritability, feeling sad, reduced appetite) and as recourse, they can for example contact parents or school psychologists. Physicians are also important, because they are gate-keepers of the drugs and it has been observed that physicians not only frequently receive prescription requests for PCE, but that some of them also fill these requests (Hotze et al., 2011^[83]). Thus, physicians should consider non-medical prescription drug use as a source of symptoms when understanding their medical history. They may inform and ask those who receive prescriptions for medical purposes (e.g. to treat ADHD) about potential pressures to and dangers of sharing their medication (including legal consequences for them and potential fatal consequences for users), inquire about their weekly dosage and left over drugs, ask for other risk factors of drug misuse (e.g. with a profile checklist), and conduct toxicology testing if a substance use disorder is suspected (DeSantis, Anthony and Cohen, 2013^[84]; Faraone et al., 2020^[66]; McCabe et al., 2019^[85]; Weyandt et al., 2018^[15]). As a response, physicians may consider changing prescribing practices (for example, by considering non-medical alternatives). Therefore, both teachers and physicians need to be enabled to do so (e.g. with training and resources or through establishing open lines of communication with one another in suspected cases of abuse).

Policies in educational institutions highlighting the unfairness of enhancement drugs and policies restricting access

As mentioned above, Duke University is one example of an institution that lists PCE as one form of academic dishonesty in their university policy. Policies forbidding the use of PCE in schools, colleges and universities may not only change an important determinant of PCE use, namely its moral acceptability, but also directly decrease student willingness to engage in PCE (Sattler et al., 2013^[70]). General restrictions that make access to the drugs more difficult might also be effective. According to a survey of university students in Ireland and the United Kingdom, limited access is a frequently cited barrier to taking PCE, despite interest (Singh, Bard and Jackson, 2014^[78]). Initiatives aimed at making prescription drugs available without prescription must also take this into account, but they should also acknowledge problems of trading such drugs on the black market, which also comes with its own set of risks.

What are the gaps and future directions for research on pharmaceutical cognitive enhancement in children?

In recent years research on the effects, prevalence, attitudes and reasons concerning the use of prescription drugs for cognitive enhancement has grown steadily. However, this is not the case for related research on children. To better understand this phenomenon, but also to inform the ethical debate about which concerns seem to be empirically substantiated, to tailor prevention strategies, and to advise policy-making, we need to know more about a) the functioning of these drugs in healthy individuals, b) exact prevalence estimates, c) attitudes (which also reflect public preferences) and decision-making of relevant stakeholders, as well as d) the effectiveness of prevention strategies and regulations. In the following, four key priorities for future research are set out.

Furthering knowledge of PCE efficacy and risks

PCE in children seems a fact but there is much that is still unknown. Although research on drug efficacy in healthy children is not possible due to ethical reasons, studies in older populations can be used to shed light on potential impacts on children (even if they are not directly transferable). These studies would benefit from larger samples, an acknowledgement of the variability of effects from person to person, a more systematic documentation of side effects and long-term effects, and further investigations into the functioning of the drugs (including the role of expectancy effects and motivational rather than direct cognitive improvements) (e.g. (d'Angelo, Savulich and Sahakian, 2017^[34]; Weyandt et al., 2018^[15])). Also, the question of how lab findings translate to improvements outside the lab would be useful. Moreover, prescription drugs might be compared to other enhancement means such as brain stimulation devices (Farah, 2015^[86]).

Determining more exact prevalence estimates

Current data do not provide a clear picture of the prevalence of PCE in children across countries, although several scholars forecast prevalence increases in the future (O'Connor and Nagel, 2017^[9]; Vargo and Petróczi, 2016^[67]). Political regulation and prevention initiatives would not only provide insight about the current situation, they could also monitor macro changes (such as tensions in the educational system) with a) more representative large-scale studies that b) are longitudinal in nature, c) are sufficiently large (or oversample) to investigate vulnerable groups, d) cover different age-groups of children (with instruments tailored for age) as well as their parents, and e) specifically investigate cognitive enhancement as a motive for use (with a shared definition).

Better understanding attitudes and decision-making of relevant stakeholders

We need a deeper understanding of what children and parents believe about PCE, and why and how they make decisions about PCE use as this is essential to develop and adjust empirically informed intervention strategies and policies. This includes (mis-)perceptions about the functioning of the drugs and related risks (psychological, physiological, legal and social), personality traits (e.g. perfectionism or competitiveness), but also the role of the social context (e.g. peer approval or vicarious experience) (Faraone et al., 2020^[66]; Hiltrop and Sattler, under review^[65]; Schepis et al., 2020^[87]). We know little about the role of physicians in PCE in children, but as already highlighted they are another important stakeholder group, such as when parents approach them and ask for prescriptions or advice. Therefore, the relationships within the child-parent-physician triad should also be investigated. Again, filling this research gap requires high quality data.

Evaluating the effectiveness of prevention strategies and regulations

While gathering evidence for designing prevention strategies or revising regulations is one important step, well-designed empirical evaluations of effectiveness is a next logical step after their implementation. At the moment, such evaluations are limited (Faraone et al., 2020^[66]). In particular, experimental designs with control groups, either as within- or between-subject designs, may test, for example, substance-related strategies (e.g. informing about dangers of substances), as well as interventions targeting general protective factors (such as improving learning strategies, self-efficacy and health literacy) in at-risk populations. To do so, they can utilise different methods such as social media campaigns, curriculum-based approaches or peer-based interventions.

Conclusion

Although PCE in children appears limited, aggregating global numbers suggests that several million children use such drugs for enhancement, voluntarily or not. They are therefore at risk of side effects and experiencing long-term consequences for their personality and brain development, while at the same time provoking other ethical and social problems (such as fairness issues when assessing grades).

The majority of experts have concluded that PCE in children is not advisable nor in the best interest of children (e.g. (Gaucher, Payot and Racine, 2013^[21])). PCE may reduce children's right to an open future to let them experiment, experience creativity, and develop a sound personal identity rather than enforcing conformity and productivity. This aligns with a recent claim that we need a debate about the value of perfection and the pursuit of perfection; should humans have the right to enhance, while on the other hand should there be a right to not enhance, which also begs the questions of what we value in childhood and adolescence (Nagel, 2019^[8]).

These questions have to be answered also by listening to the voices of children. Interestingly, several studies with parents mirror the concerns ethicists have and only a few seem to be willing to use PCE on their children. Thereby, it is also an open question to understand how societal factors and trends may influence parents and children agreeing to PCE. Factors that may promote agreement can be the increasing returns of education, a growing relevance of cognitive abilities and growing inequalities. The answers to these questions will likely vary around the globe due to heterogeneous developments and cultural settings. To find answers to this question and to the many unknowns regarding PCE in children, we need interdisciplinary efforts by psychologists, sociologists, pharmacologists, paediatricians, teachers, ethicists, etc. and a multi-method approach (Nagel, 2019^[8]). In educational settings, it should be considered a) that some children already take PCE (in addition to other forms of enhancement) which might make grading more difficult, b) that conditions in education (in particular performance pressure) contribute to such behaviour, c) that PCE itself can intensify the competition, and d) that teachers can play a key role in detecting and preventing risky substance uses by helping students find less risky alternatives or relevant support.

Acknowledgements

I would like to thank Francesca Gottschalk, Tracey Burns, Simona Petruzzella, and Kati Hiltrop for valuable feedback on a previous version of this manuscript. This research was supported by a grant [SA 2992/2-1] from the German Science Foundation. The views expressed do not necessarily reflect the policies of the funder. The authors did not receive any research support from public or private actors in the pharmaceutical sector.

References

- Arria, A. et al. (2017), “Do college students improve their grades by using prescription stimulants nonmedically?”, *Addictive Behaviors*, Vol. 65, pp. 245-249, <http://dx.doi.org/10.1016/j.addbeh.2016.07.016>. [72]
- Arria, A. and R. DuPont (2010), “Nonmedical prescription stimulant use among college students: Why we need to do something and what we need to do”, *Journal of Addictive Diseases*, Vol. 29/4, pp. 417-426, <http://dx.doi.org/10.1080/10550887.2010.509273>. [51]
- Autor, D. (2014), “Skills, education, and the rise of earnings inequality among the “other 99 percent””, *Science*, Vol. 344/6186, pp. 843-851, <http://dx.doi.org/10.1126/science.1251868>. [56]
- Ball, N. and G. Wolbring (2014), “Cognitive enhancement: Perceptions among parents of children with disabilities”, *Neuroethics*, Vol. 7/3, pp. 345-364, <http://dx.doi.org/10.1007/s12152-014-9201-8>. [62]
- Battleday, R. and A. Brem (2015), “Modafinil for cognitive neuroenhancement in healthy non-sleep-deprived subjects: A systematic review”, *European Neuropsychopharmacology*, Vol. 25/11, pp. 1865-1881, <http://dx.doi.org/10.1016/j.euroneuro.2015.07.028>. [11]
- Beddington, J. et al. (2008), “The mental wealth of nations”, *Nature*, Vol. 455/7216, pp. 1057-1060, <http://dx.doi.org/10.1038/4551057a>. [26]
- Borra, C. and A. Sevilla (2019), “Competition for university places and parental time investments: evidence from the United Kingdom”, *Economic Inquiry*, Vol. 57/3, pp. 1460-1479, <http://dx.doi.org/10.1111/ecin.12761>. [57]
- Bostrom, N. and A. Sandberg (2009), “Cognitive enhancement: Methods, ethics, regulatory challenges”, *Science and Engineering Ethics*, Vol. 15/3, pp. 311-341, <http://dx.doi.org/10.1007/s11948-009-9142-5>. [1]
- Bruchmüller, K., J. Margraf and S. Schneider (2012), “Is ADHD diagnosed in accord with diagnostic criteria? Overdiagnosis and influence of client gender on diagnosis.”, *Journal of Consulting and Clinical Psychology*, Vol. 80/1, pp. 128-138, <http://dx.doi.org/10.1037/a0026582>. [41]
- C.S. Mott Children’s Hospital National Poll on Children’s Health (2013), *One in Ten Teens Using “Study Drugs,” but Are Parents Paying Attention?*, C.S. Mott Children’s Hospital. [42]
- Caviola, L. and N. Faber (2015), “Pills or push-ups? Effectiveness and public perception of pharmacological and non-pharmacological cognitive enhancement”, *Frontiers in Psychology*, Vol. 6, <http://dx.doi.org/10.3389/fpsyg.2015.01852>. [12]
- Champagne, J., B. Gardner and E. Dommett (2019), “Modelling predictors of UK undergraduates’ attitudes towards smart drugs”, *Trends in Neuroscience and Education*, Vol. 14, pp. 33-39, <http://dx.doi.org/10.1016/j.tine.2019.02.001>. [80]
- Clemence, M. et al. (2013), *Wellcome Trust Monitor Wave 2, Tracking Public Views on Science, Research and Science Education*. [47]
- Coates McCall, I. et al. (2019), “Owning ethical innovation: Claims about commercial wearable brain technologies”, *Neuron*, Vol. 102/4, pp. 728-731, <http://dx.doi.org/10.1016/j.neuron.2019.03.026>. [6]

- Conn, B. and A. Marks (2014), "Ethnic/racial differences in peer and parent influence on adolescent prescription drug misuse", *Journal of Developmental & Behavioral Pediatrics*, Vol. 35/4, pp. 257-265, <http://dx.doi.org/10.1097/dbp.0000000000000058>. [37]
- Cutler, K. (2014), "Prescription stimulants are "a okay": Applying neutralization theory to college students' nonmedical prescription stimulant use", *Journal of American College Health*, Vol. 62/7, pp. 478-486, <http://dx.doi.org/10.1080/07448481.2014.929578>. [64]
- d'Angelo, L., G. Savulich and B. Sahakian (2017), "Lifestyle use of drugs by healthy people for enhancing cognition, creativity, motivation and pleasure", *British Journal of Pharmacology*, Vol. 174/19, pp. 3257-3267, <http://dx.doi.org/10.1111/bph.13813>. [34]
- de Wit, H. (ed.) (2014), "Robust resilience and substantial interest: A survey of pharmacological cognitive enhancement among university students in the UK and Ireland", *PLoS ONE*, Vol. 9/10, p. e105969, <http://dx.doi.org/10.1371/journal.pone.0105969>. [78]
- DeSantis, A., K. Anthony and E. Cohen (2013), "Illegal college ADHD stimulant distributors: Characteristics and potential areas of intervention", *Substance Use & Misuse*, Vol. 48/6, pp. 446-456, <http://dx.doi.org/10.3109/10826084.2013.778281>. [84]
- Doepke, M., G. Sorrenti and F. Zilibotti (2019), "The economics of parenting", *Annual Review of Economics*, Vol. 11/1, pp. 55-84, <http://dx.doi.org/10.1146/annurev-economics-080218-030156>. [52]
- Dresler, M. et al. (2013), "Non-pharmacological cognitive enhancement", *Neuropharmacology*, Vol. 64, pp. 529-543, <http://dx.doi.org/10.1016/j.neuropharm.2012.07.002>. [7]
- Dubljević, V., S. Sattler and E. Racine (2018), "Deciphering moral intuition: How agents, deeds, and consequences influence moral judgment", *PLOS ONE* 13. [16]
- Duke University (2019), *Duke Community Standard in Practice: A Guide for Undergraduates. 2019-2020*, Duke University, https://registrar.duke.edu/sites/default/files/bulletins/dcs_guide/2019-20/index.html. [24]
- Farah, M. (2015), "The unknowns of cognitive enhancement", *Science*, Vol. 350/6259, pp. 379-380, <http://dx.doi.org/10.1126/science.aad5893>. [86]
- Faraone, S. et al. (2020), "Systematic review: Nonmedical use of prescription stimulants: Risk factors, outcomes, and risk reduction strategies", *Journal of the American Academy of Child & Adolescent Psychiatry*, Vol. 59/1, pp. 100-112, <http://dx.doi.org/10.1016/j.jaac.2019.06.012>. [66]
- Flanigan, J. (2013), "Adderall for all: A defense of pediatric neuroenhancement", *HEC Forum*, Vol. 25/4, pp. 325-344, <http://dx.doi.org/10.1007/s10730-013-9222-4>. [19]
- Forlini, C., S. Gauthier and E. Racine (2013), "Should physicians prescribe cognitive enhancers to healthy individuals?", *Canadian Medical Association Journal*, Vol. 185/12, pp. 1047-1050, <http://dx.doi.org/10.1503/cmaj.121508>. [22]
- Forlini, C. and E. Racine (2009), *Autonomy and Coercion in Academic 'Cognitive Enhancement' Using Methylphenidate: Perspectives of Key Stakeholders*, *Neuroethics* 2(3). [63]
- Franke, A. et al. (2011), "Non-medical use of prescription stimulants and illicit use of stimulants for cognitive enhancement in pupils and students in Germany", *Pharmacopsychiatry*, Vol. 44/02, pp. 60-66, <http://dx.doi.org/10.1055/s-0030-1268417>. [49]

- Garnier-Dykstra, L. et al. (2012), "Nonmedical use of prescription stimulants during college: Four-year trends in exposure opportunity, use, motives, and sources", *Journal of American College Health*, cf a systematic review by Faraone et al 2020, pp. 226-234, <http://dx.doi.org/10.1080/07448481.2011.589876>. [50]
- Gaucher, N., A. Payot and E. Racine (2013), "Cognitive enhancement in children and adolescents: Is it in their best interests?", *Acta Paediatrica*, Vol. 102/12, pp. 1118-1124, <http://dx.doi.org/10.1111/apa.12409>. [21]
- Gershuny, J. and T. Harms (2016), "Housework now takes much less time: 85 years of US rural women's time use", *Social Forces*, Vol. 95/2, pp. 503-524, <http://dx.doi.org/10.1093/sf/sow073>. [58]
- Graf, W. et al. (2013), "Pediatric neuroenhancement: Ethical, legal, social, and neurodevelopmental implications", *Neurology*, Vol. 80/13, pp. 1251-1260, <http://dx.doi.org/10.1212/wnl.0b013e318289703b>. [18]
- Greely, H. et al. (2008), "Towards responsible use of cognitive-enhancing drugs by the healthy", *Nature*, Vol. 456/7223, pp. 702-705, <http://dx.doi.org/10.1038/456702a>. [2]
- Gruzelier, J. (2009), "A theory of alpha/theta neurofeedback, creative performance enhancement, long distance functional connectivity and psychological integration", *Cognitive Processing*, Vol. 10/S1, pp. 101-109, <http://dx.doi.org/10.1007/s10339-008-0248-5>. [82]
- Helmer, S. et al. (2016), "Personal and perceived peer use and attitudes towards the use of nonmedical prescription stimulants to improve academic performance among university students in seven European countries", *Drug and Alcohol Dependence*, Vol. 168, pp. 128-134, <http://dx.doi.org/10.1016/j.drugalcdep.2016.08.639>. [75]
- Hiltrop, K. and S. Sattler (under review), "Parents' perceptions and ethical assessment of non-medical drug use to enhance performance in healthy children and adolescents: Evidence from qualitative interviews". [65]
- Hotze, T. et al. (2011), "Doctor, would you prescribe a pill to help me ... ? A national survey of physicians on using medicine for human enhancement", *The American Journal of Bioethics*, Vol. 11/1, pp. 3-13, <http://dx.doi.org/10.1080/15265161.2011.534957>. [83]
- International Narcotics Control Board (2019), *Report of the International Narcotics Control Board for 2019*, <https://www.incb.org/incb/en/publications/annual-reports/annual-report-2019.html>. [39]
- Jane, E. and N. Vincent (2017), "Cognitive enhancement: A social experiment with technology", in I. van de Poel, L. Asveld, A. (ed.), *New Perspectives on Technology in Society Experimentation Beyond the Laboratory*, Routledge, London. [36]
- Johnston, L. et al. (2019), *Monitoring the Future National Survey Results on Drug Use 1975-2018: Overview, Key Findings on Adolescent Drug Use*, Ann Arbor: Institute for Social Research. The University of Michigan. [46]
- Juengst, E. (1998), "What does enhancement mean?", in Parens, E. (ed.), *Enhancing Human Traits: Ethical and Social Implications*. [5]
- Kayser, B., A. Mauron and A. Miah (2005), "Viewpoint: Legalisation of performance-enhancing drugs", *The Lancet*, Vol. 366, p. S21, [http://dx.doi.org/10.1016/s0140-6736\(05\)67831-2](http://dx.doi.org/10.1016/s0140-6736(05)67831-2). [25]

- Ketchum, F. and D. Repantis (2016), "Securing opportunities for the disadvantaged, or medicalization through the back door?", *The American Journal of Bioethics*, Vol. 16/6, pp. 46-48, <http://dx.doi.org/10.1080/15265161.2016.1170237>. [28]
- Kinman, B., K. Armstrong and K. Hood (2017), "Perceptions of risks and benefits among nonprescription stimulant consumers, diverters, and non-users", *Substance Use & Misuse*, Vol. 52/10, pp. 1256-1265, <http://dx.doi.org/10.1080/10826084.2016.1273954>. [69]
- Langner, I. et al. (2019), "Potential explanations for increasing methylphenidate use in children and adolescents with attention-deficit/hyperactivity disorder in Germany from 2004 to 2013", *Journal of Clinical Psychopharmacology*, Vol. 39/1, pp. 39-45, <http://dx.doi.org/10.1097/jcp.0000000000000980>. [40]
- Maher, B. (2008), "Poll results: look who's doping", *Nature*, Vol. 452/7188, pp. 674-675, <http://dx.doi.org/10.1038/452674a>. [61]
- Maslen, H. et al. (2014), "The regulation of cognitive enhancement devices: Extending the medical model", *Journal of Law and the Biosciences*, Vol. 1/1, pp. 68-93, <http://dx.doi.org/10.1093/jlb/lst003>. [35]
- McCabe, S. et al. (2019), "Sources of nonmedical prescription drug misuse among US high school seniors: Differences in motives and substance use behaviors", *Journal of the American Academy of Child & Adolescent Psychiatry*, Vol. 58/7, pp. 681-691, <http://dx.doi.org/10.1016/j.jaac.2018.11.018>. [85]
- Mendelson, J. (ed.) (2013), "To dope or not to dope: Neuroenhancement with prescription drugs and drugs of abuse among Swiss University Students", *PLoS ONE*, Vol. 8/11, p. e77967, <http://dx.doi.org/10.1371/journal.pone.0077967>. [76]
- Nadesan, M. (2002), "Engineering the entrepreneurial infant: Brain science, infant development toys, and governmentality", *Cultural Studies*, Vol. 16/3, pp. 401-432, <http://dx.doi.org/10.1080/09502380210128315>. [53]
- Nagel, S. (2019), *Shaping Children: Ethical and Social Questions That Arise When Enhancing the Young*, Springer. [8]
- O'Connor, C. and S. Nagel (2017), "Neuro-enhancement practices across the lifecourse: Exploring the roles of relationality and individualism", *Frontiers in Sociology*, Vol. 2, <http://dx.doi.org/10.3389/fsoc.2017.00001>. [9]
- Ponnet, K. et al. (2015), "Predicting students' intention to use stimulants for academic performance enhancement", *Substance Use & Misuse*, Vol. 50/3, pp. 275-282, <http://dx.doi.org/10.3109/10826084.2014.952446>. [77]
- Racine, E., S. Sattler and W. Boehlen (Under review), "Cognitive enhancement: Unanswered questions about human psychology and social behavior", *Health*. [17]
- Ray, K. (2016), "Not just 'study drugs' for the rich: Stimulants as moral tools for creating opportunities for socially disadvantaged students", *The American Journal of Bioethics*, Vol. 16/6, pp. 29-38, <http://dx.doi.org/10.1080/15265161.2016.1170231>. [27]
- Repantis, D., O. Laisney and I. Heuser (2010), "Acetylcholinesterase inhibitors and memantine for neuroenhancement in healthy individuals: A systematic review", *Pharmacological Research*, Vol. 61/6, pp. 473-481, <http://dx.doi.org/10.1016/j.phrs.2010.02.009>. [13]

- Sahakian, B. et al. (2015), "The impact of neuroscience on society: Cognitive enhancement in neuropsychiatric disorders and in healthy people", *Philosophical Transactions of the Royal Society B: Biological Sciences*, <https://doi.org/10.1098/rstb.2014.0214>. [3]
- Sattler et al. (2013), "The rationale for consuming cognitive enhancement drugs in university students and teachers", *PLoS ONE*, Vol. 8/7. [79]
- Sattler, S. (2019), "Nonmedical use of prescription drugs for cognitive enhancement as response to chronic stress especially when social support is lacking", *Stress and Health*, Vol. 35/2, pp. 127-137, <http://dx.doi.org/10.1002/smi.2846>. [73]
- Sattler, S. (2016), "Cognitive enhancement in Germany: Prevalence, attitudes, terms, legal status, and the ethics debate", in F. Jotterand and V. Dubljević. (ed.), *Cognitive enhancement: Ethical and policy implications in international perspectives*, OUP, Oxford. [4]
- Sattler, S. et al. (2013), "Impact of contextual factors and substance characteristics on perspectives toward cognitive enhancement", *PLoS ONE*, Vol. 8/8, p. e71452, <http://dx.doi.org/10.1371/journal.pone.0071452>. [70]
- Sattler, S. and P. Linden (under review), "Unhealthy parenting strategies: Situational (dis-)incentives, Machiavellian personality, and their interaction on misuse of ADHD medication for healthy children". [60]
- Sattler, S. et al. (under review), "Why parents abuse prescription drugs to enhance the cognitive performance of healthy children: The influence of peers and social media". [43]
- Sattler, S. and I. Singh (2016), "Cognitive enhancement in healthy children will not close the achievement gap in education", *The American Journal of Bioethics*, Vol. 16/6, pp. 39-41, <http://dx.doi.org/10.1080/15265161.2016.1170240>. [29]
- Sattler, S. and C. Wiegel (2013), "Cognitive test anxiety and cognitive enhancement: The influence of students' worries on their use of performance-enhancing drugs", *Substance Use & Misuse*, Vol. 48/3, pp. 220-232, <http://dx.doi.org/10.3109/10826084.2012.751426>. [71]
- Schelle, K. et al. (2014), "Attitudes toward pharmacological cognitive enhancement: A review", *Frontiers in Systems Neuroscience*, Vol. 8, <http://dx.doi.org/10.3389/fnsys.2014.00053>. [10]
- Schepis, T. et al. (2020), "Prescription drug misuse: Taking a lifespan perspective", *Substance Abuse: Research and Treatment*, Vol. 14, p. 117822182090935, <http://dx.doi.org/10.1177/1178221820909352>. [87]
- Schermer, M. (2008), "On the argument that enhancement is "cheating"", *Journal of Medical Ethics*, Vol. 34/2, pp. 85-88, <http://dx.doi.org/10.1136/jme.2006.019646>. [23]
- Singh, I. and K. Kelleher (2010), "Neuroenhancement in young people: Proposal for research, policy, and clinical management", *AJOB Neuroscience*, Vol. 1/1, pp. 3-16, <http://dx.doi.org/10.1080/21507740903508591>. [38]
- Smith, M. and M. Farah (2011), "Are prescription stimulants "smart pills"? The epidemiology and cognitive neuroscience of prescription stimulant use by normal healthy individuals.", *Psychological Bulletin*, Vol. 137/5, pp. 717-741, <http://dx.doi.org/10.1037/a0023825>. [14]

- Stock, M. et al. (2013), "The prototype/willingness model, academic versus health-risk information, and risk cognitions associated with nonmedical prescription stimulant use among college students", *British Journal of Health Psychology*, Vol. 18/3, pp. 490-507, <http://dx.doi.org/10.1111/j.2044-8287.2012.02087.x>. [81]
- Storebø, O. et al. (2015), "Methylphenidate for attention-deficit/hyperactivity disorder in children and adolescents: Cochrane systematic review with meta-analyses and trial sequential analyses of randomised clinical trials", *BMJ*, p. h5203, <http://dx.doi.org/10.1136/bmj.h5203>. [31]
- Substance Abuse and Mental Health Services Administration (2019), *Key Substance Use and Mental Health Indicators in the United States: Results from the 2018 National Survey on Drug Use and Health*. [45]
- Teter, C. et al. (2020), "Nonmedical use of prescription stimulants among US high school students to help study: Results from a national survey", *Journal of Pharmacy Practice*, cf. Faraone et al 2020, pp. 38-47. [68]
- Ulferts, H. (2020), "Why parenting matters for children in the 21st century: An evidence-based framework for understanding parenting and its impact on child development", *OECD Education Working Papers*, No. 222, OECD Publishing, Paris, <https://dx.doi.org/10.1787/129a1a59-en>. [55]
- Vargo, E. and A. Petróczi (2016), "It was me on a good day": Exploring the smart drug use phenomenon in England", *Frontiers in Psychology*, Vol. 7, <http://dx.doi.org/10.3389/fpsyg.2016.00779>. [67]
- Volkow, N. et al. (2009), "Effects of modafinil on dopamine and dopamine transporters in the male human brain", *JAMA*, Vol. 301/11, p. 1148, <http://dx.doi.org/10.1001/jama.2009.351>. [32]
- Vrana, K. (ed.) (2015), "The use of prescription drugs, recreational drugs, and "soft enhancers" for cognitive enhancement among Swiss secondary school students", *PLOS ONE*, Vol. 10/10, p. e0141289, <http://dx.doi.org/10.1371/journal.pone.0141289>. [48]
- Walcher-Andris, E. (2006), "Ethische Aspekte des pharmakologischen „cognition enhancement“ am Beispiel des Gebrauchs von Psychostimulanzien durch Kinder und Jugendliche", *Ethik in der Medizin*, Vol. 18/1, pp. 27-36, <http://dx.doi.org/10.1007/s00481-006-0411-4>. [20]
- Wall, G. (2010), "Mothers' experiences with intensive parenting and brain development discourse", *Women's Studies International Forum*, Vol. 33/3, pp. 253-263, <http://dx.doi.org/10.1016/j.wsif.2010.02.019>. [54]
- Warren, K. (2016), "Promoting stimulants to increase educational equality: Some concerns", *The American Journal of Bioethics*, Vol. 16/6, pp. 52-54, <http://dx.doi.org/10.1080/15265161.2016.1170235>. [30]
- Wells, R. et al. (2016), "Socioeconomic disparities in the use of college admission-enhancing strategies among high school seniors from the 1990s to 2000s", *Teachers College Record*, Vol. 118. [59]
- Weyandt, L. et al. (2018), "Neurocognitive, autonomic, and mood effects of adderall: A pilot study of healthy college students", *Pharmacy*, Vol. 6/3, p. 58, <http://dx.doi.org/10.3390/pharmacy6030058>. [15]

- Wilens, T. et al. (2008), "Misuse and diversion of stimulants prescribed for ADHD: A systematic review of the literature", *Journal of the American Academy of Child & Adolescent Psychiatry*, Vol. 47/1, pp. 21-31, <http://dx.doi.org/10.1097/chi.0b013e31815a56f1>. [44]
- Winder-Rhodes, S. et al. (2010), "Effects of modafinil and prazosin on cognitive and physiological functions in healthy volunteers", *Journal of Psychopharmacology*, Vol. 24/11, pp. 1649-1657, <http://dx.doi.org/10.1177/0269881109105899>. [33]
- Wolff, W. and R. Brand (2013), "Subjective stressors in school and their relation to neuroenhancement: a behavioral perspective on students' everyday life "doping"", *Substance Abuse Treatment, Prevention, and Policy*, Vol. 8/1, <http://dx.doi.org/10.1186/1747-597x-8-23>. [74]

9 The myth of the digital native: Why it persists and the harm it inflicts

Rebecca Eynon

Department of Education and Oxford Internet Institute, University of Oxford, United Kingdom

The digital native is just one of many terms that describe young people as a digitally savvy group, distinctively different in the ways that they understand and use technology when compared to older generations. A term popularised two decades ago, it has influenced the ways policy makers and other stakeholders think about young people and the most appropriate ways to educate and support them. It is a way of framing young people's relationship with technology that has limited empirical basis, yet persists and indeed grows stronger year by year. The goal of this chapter is to demonstrate the problems behind this term and the negative implications it can have for some young people, particularly those who are already experiencing forms of social inequalities.

Overview

The discussion below is divided into five main sections. In the first, the notion of the digital native is detailed. Second the empirical evidence of young people's uses of technology is reviewed, and contrasted with the concept of the digital native, demonstrating that the key premises of the term are inaccurate and not based on research evidence. The third section argues that the continuing support for the idea of the digital native is harmful to children and young people: both in the (lack of) support that they receive to use new technologies and at a more general level of policy making, where assumptions about digitally savvy youth drive services for young people online. The penultimate section examines why this discourse persists even when it is not supported by the evidence. The final section concludes with some proposals for future research and some ways forward for education systems.

Digital natives vs. digital immigrants

"Digital native" is one of a group of terms – net generation, Google generation or millennials – which make strong claims for the significance of technologies within the lives of young people. For some (Prensky, 2001^[1]; Oblinger and Oblinger, 2005^[2]; Palfrey and Gasser, 2011^[3]), new technologies have been such a defining feature in the lives of younger generations that they predict a fundamental change in the way young people communicate, socialise, create and learn: "These kids are different. They study, work, write, and interact with each other in ways that are very different from the ways you did growing up" (Palfrey and Gasser, 2011^[3]); "they took to it [technology] like ducks to water" (Tapscott, 2008^[4]).

The key elements of the digital native concept, as described by Prensky, is that young people should be considered "Native speakers of the digital language of computers, video games and the Internet." This makes them fundamentally different to older generations - 'the immigrants' - who simply do not know how to "speak the language" of technology in the same way. This is a big problem, Prensky suggests, as it is vital that education is changed to support digital natives – but the digital natives are being taught and guided by digital immigrants (Prensky, 2001^[1]).

There are some positives and negatives in the idea of the digital native. From a more positive perspective, it is very important that we understand young people and their uses of technology. It is not so long ago that young people's experiences and perspectives were discounted by the research community, and only became a genuine focus of research in the 1960s, with the rise of the sociology of childhood and related fields. Furthermore, digital technologies are a complex set of social and cultural artefacts which need to be understood in relation to the ways that people use them and think about them. Thus, any move that encourages researchers, policy makers, teachers and other stakeholders to consider young people's technology use can only be a good thing.

There are also some grains of 'truth' in the notion of the digital native: a higher proportion of young people do use the Internet and other new technologies than older generations. Age tends to be quite a strong factor in models that help explain who uses technology and who is likely to benefit the most from it. Also, it is very clear, that for every generation, they are connected to one another by a common culture and technology is certainly a part of that for the majority of young people (Jenkins, 2009^[5]). Indeed, for many young people, technology is one important way to experience a sense of autonomy and personal control over various aspects of their lives (Buckingham, 2008^[6]; Davies and Eynon, 2013^[7]).

However, there are also many problems in this way of conceptualising young people. The idea is intended as a way to think about and understand young people, but there is a lack of precision driving the argument. A basic problem is one of definition - who is a 'digital native?' All of the arguments in support of the notion are primarily based on when a person was born. However, this is problematic because these ideas have been discussed for a significant period of time. Indeed, if we agree with Prensky, then anyone born after 1980 is a digital native. The term therefore covers quite a wide range of people over ages and life-stages

and a significant proportion of the population. This makes the term almost meaningless as many parents and teachers are now as technically proficient as their younger, digitally native, counterparts (Jones and Czerniewicz, 2010^[8]).

Beyond problems with the definition, there are also problems with the way that digital native discourse conceptualises young people and technology in essentialist terms. It is one part of a wider set of simplistic discourses about young people that either frame their relationship with technology in dystopian terms (where vulnerable children will be exploited by this technology) or promote a utopian view where children, unlike adults, have a natural innate ability to use and excel at using technologies (Buckingham, 2008^[6]). These views have been popular for many years and co-exist. For example, Selwyn identifies six discourses about young people and new technologies in the United Kingdom prominent in media and policy circles since 1980 to 2000. These include: the 'natural' child computer user where children are seen as having an innate ability to use technology (i.e. a digital native); the 'adult' child computer user where children are experts and teachers are novices and young people have to show adults (in a non-threatening way) how to use technology; and the 'victimised' child computer user where innocent young children are exposed to undesirable content (Selwyn, 2003^[9]).

Although this work was some time ago, similar themes can be seen in much of the popular and policy discourse around young people today. Indeed, the digital native perspective still perpetuates and is perhaps even gaining increasing currency within discussions about the future direction of education and the most appropriate way to provide public services and social support for young people. The digital native notion becomes a kind of shorthand argument in this respect which claims that formal education short-changes young people who can do so much more on their own initiatives, and in their own contexts, than adults are aware of or can engage with; and that any initiative to support young people needs to use technology in order to meaningfully connect with them.

Debunking the myth

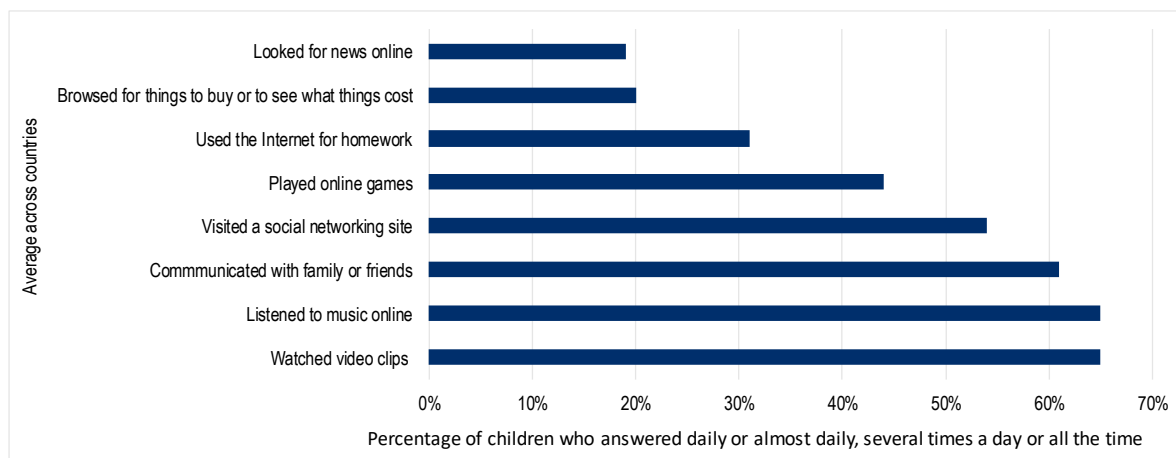
Critiques of the digital native concept are not particularly new (Bennett and Maton, 2010^[10]; Facer and Furlong, 2001^[11]; Valentine, Holloway and Bingham, 2002^[12]; Helsper and Eynon, 2010^[13]). Many of these critiques compare the popular discourse to the empirical evidence available about young people and their technology use. First, analysis of survey data across generations demonstrates that the differences between older and younger generations are not fundamental, or as clear cut as the digital native myth suggests. For example, in their analysis of nationally representative survey data in Britain, Helsper and Eynon (2010^[13]) found that younger generations did tend to be more likely to have certain characteristics that we would expect if they were 'digital natives'. They had a greater range of technologies in the household, tended to use the Internet as a first port of call, had higher levels of Internet self-efficacy, multitasked more and used the Internet more for particular activities (such as homework). However, they also found that generation was not the only significant variable in explaining these patterns: education, experience and gender also played a part. In sum, individuals could be placed along a continuum of engagement with the Internet and other new technologies, there was no clear generational divide (Helsper and Eynon, 2010^[13]).

The lack of clear generational differences is not the only aspect of the assumptions behind the notion of the digital native that are not supported by the evidence. Empirical research has presented a more fine-grained and balanced picture of how this supposedly homogenous generation actually engage with digital technologies, especially in their own time, within their own settings. There is significant evidence from an array of countries that young people and their uses of technology cannot really be understood as one homogeneous group. Instead there are significant variations in how and why young people use new technologies. There are for example, differences in the levels of engagement with activities like creativity, communicating, participating, information seeking, entertainment; differences in quality of access to

technologies and young people's level of digital skills. There are also significant shifts in usage over time from pre-teen to post-teen years reflecting the wider social and cultural aspects of growing up; and the levels of benefits young people are able to achieve from technology (socially, economically and educationally) also vary significantly (Davies and Eynon, 2013^[7]; Davies and Eynon, 2018^[14]; Facer and Furlong, 2001^[11]; Eynon and Malmberg, 2011^[15]; Hooft Graafland, 2018^[16]; Livingstone and Helsper, 2007^[17]; Livingstone et al., 2019^[18]; Ito, 2013^[19]).

These differences in engagement have been mapped across countries for many years. For example, the most recent EU Kids Online survey of over 25 000 children aged 9–16 from 19 European countries found significant trends in access and nature of Internet use. The survey data, collected between autumn 2017 and summer 2019, demonstrated the varied ways that young people may access the Internet, with the smartphone the most popular form of access across all countries. The survey also showed that in general watching videos, listening to music, socialising and playing games were the most common activities (see Figure 9.1) but patterns varied significantly across countries. There were also age differences with 15-16 year-olds tending to do more online (both frequency and range) than younger age groups. Finally, while operational and social skills across the 19 countries were consistently quite high, information navigation skills and creative skills were far more uneven (Smahel et al., 2020^[20]).

Figure 9.1. Percentage of Internet users aged 9-16 who carry out online activities daily



Note: All children 9-16 who use the Internet from Czech Republic, Croatia, Estonia, France, Germany, Italy, Lithuania, Malta, Norway, Poland, Portugal, Romania, Serbia, Slovak Republic, Spain, Switzerland.

Source: Adapted from (Smahel et al., 2020^[20])

As will be discussed below, the reasons for these differences are multifaceted and related to individual and local contexts as well as macro level factors including the nature of the educational system, broadband infrastructure, legal systems and cultural expectations (Smahel et al., 2020^[20]). These differences are in stark contrast to the homogeneous vision of young people offered by those supportive of the notion of the digital native; and have significant implications for how young people should be supported in their technology use.

The risks of the digital native discourse

The significant disconnects between the discourse of the digital native and the research evidence available in many countries is highly problematic. In this section three problems are highlighted: the effect this

discourse has on educators, parents/guardians, its neglect of the realities of digital inequalities among young people, and its acceptance of the status quo with respect to the current role of technology in society. Each is discussed in turn.

Supporting children in a networked era

As noted above, research demonstrates that there is no obvious generational divide in the ways that people access and use technology. As argued by Helsper and Eynon, in their study of Internet use, adults (i.e. parents and teachers) can “speak the same language of technology” as young people if they want to do so. There are differences in why and how people use technology, but this speaks more to life-stage, social context and interest than any kind of fundamental inability to use or understand technology in a particular way (Helsper and Eynon, 2010^[13]).

In addition, we know from many studies the important role that schools, parents/guardians play in young people’s digital experiences, for example, in supporting access to technology, in supporting them to develop digital skills and providing them with a series of support networks that they can draw upon to further their interests and engagements with technology (e.g. (boyd, 2014^[21]; Philip and Garcia, 2013^[22])). This support of course, is not only ensuring young people are able to make the most of new technologies but also to help them navigate the risks of the Internet and related technologies so they are protected from harm (Livingstone et al., 2019^[18]).

However, many parents, guardians, and school teachers often feel that they do not have anything to offer young people in using technology, and position them instead as the experts. The digital native rhetoric is actively disempowering for many of the people who can and should be supporting young people (Bayne and Ross, 2011^[23]; Helsper and Eynon, 2010^[13]). As a society, it is important to make decisions about how society wishes young people to use and engage with new technologies, and how education systems are developed to support that vision. The lack of proper debate, and a belief in the notion of digital natives is having negative impacts on young people. Indeed, this ‘hands off’ approach, particularly by schools, is likely to have the most significant implications for those young people who are already experiencing forms of social exclusion.

Digital inequalities

Research has also shown consistent differences in the ways that young people use technology and the benefits they obtain from them, and these patterns are in part explained by socio-economic factors. In general, those who are not as well-off tend to have less quality of access to technologies (e.g. own device, suitability of device for learning, quality of home Internet connection etc.), have fewer people who can support them (often as their parents or guardians may not have high levels of digital skills) and tend to be less skilled (without access to technologies or appropriate support then skills development is difficult).

Those young people who are not able to effectively use technology are increasingly disadvantaged. For example, they experience challenges while in education as they may be unable to do homework set online as they do not have access. They may also not have the skills to use technology effectively, and in some settings the necessary range of skills are not always taught at school as certain skill levels can be assumed for ‘digital natives’ (Davies and Eynon, 2018^[14]). Outside of school, they are ostracised from peer networks and forms of civic engagement, and often miss out on other additional support services as most support for young people moves online (Robinson, 2009^[24]; Eynon and Geniets, 2015^[25]; Helsper, 2017^[26]; boyd, 2014^[21]).

Researchers have highlighted these inequalities for decades (Facer and Furlong, 2001^[11]; Valentine, Holloway and Bingham, 2002^[12]), yet most of the time these young people remained largely invisible to policy makers, supported by the digital native discourse. The recent COVID-19 crisis, where in many countries schools were closed as part of the reaction to the pandemic, finally made visible to many the

significant inequalities there are both within and across countries in relation to young people's ability to access and use new technologies. Many were shocked by the extent of the problem.

How we address these inequalities is important. Although there is a strong instinct to focus on the provision of digital access in the form of a laptop and Internet connection, such schemes will be insufficient (Sims, 2013^[27]). They need to be part of a far wider educational agenda. As boyd (2014^[21]) notes if schools absent themselves from engaging in supporting young people in their development of their uses of the digital, this reproduces inequality. For example, the EU Kids Online survey, showed that young people tend to deal with negative online experiences by talking to parents or friends as opposed to school teachers or other professionals (Smahel et al., 2020^[20]). Thus, those who have parents and friends who are less digitally literate will have fewer resources beyond school to support their development of digital literacy, even once they are online.

Policies to address digital inequalities also need to be part of a wider commitment of social change. For most young people, the reason they do not have access to technology in the home is due to a lack of material resources. Having a laptop does not eradicate problems of families not having sufficient money for food or heating, or adequate health care or job opportunities. Digital inequalities are very highly correlated with other measures of social inequality. The importance of ensuring we think about technology and youth with an awareness of wider social structures brings us to the next risk.

An acceptance of the status quo

The digital native discourse effectively celebrates all young people's uses of technology in an uncritical fashion, and does this alongside an uncritical and deterministic model of technology, where all technology is exciting and positioned as the factor that will drive our future society. This leads to an overriding acceptance of the status quo and a deterministic view of technology that does not help young people or those trying to support them.

The acceptance of technology as 'a good thing' is reflected in statements such as this one by the International Telecommunication Union (ITU), which suggests that "Information and Communications Technology (ICTs) can enhance education, reduce youth unemployment and promote social and economic development. Youth can only leverage the transformative power of ICTs, however, when they have access to ICTs and are equipped with a range of digital skills to use them to their benefit." (ITU, 2020^[28]). In other words, technology is a good thing and young people have to simply be able to leverage its potential.

However, young people themselves are not convinced of the straightforward benefits of technology. For example, a Pew survey of teenagers' technology use in the United States in 2018 found that, "Despite the nearly ubiquitous presence of social media in their lives, there is no clear consensus among teens about these platforms' ultimate impact on people their age. A plurality of teens (45%) believe social media has neither a positive nor negative effect on people their age. Meanwhile, roughly three-in-ten teens (31%) say social media has had a mostly positive impact, while 24% describe its effect as mostly negative" (Anderson and Jiang, 2018^[29]). In addition, we know that the majority of young people use a fairly small range of apps or platforms typically related to socialising and entertainment, where young people are behaving merely as consumers of the Internet (Davies and Eynon, 2018^[14]).

Relatedly, there are concerns about the use of digital technologies by young people that lead to the production and use of digital trace data across the life course that commercial companies profit from (Lupton and Williamson, 2017^[30]). It is important to attend to the ever increasing role of corporate and third party actors in the collection and storage and processing of data for activities that young people do online, including for learning and education. Indeed, there has been a significant discussion about the needs for children's rights to be firmly integrated into the agendas of global debates about ethics and the use of 'Big Data' that are ongoing and need significant attention (Berman and Albright, 2017^[31]; Livingstone and Third, 2017^[32]; Lupton and Williamson, 2017^[30]). As a society it is important to think about these emerging

patterns, both in young people's use of technology and the wider technical, commercial, legal and political environment.

At the same time, there is also evidence of an increasing “responsibilisation” of young people. In other words, that young people are responsible for their success in the ‘fourth industrial revolution’ in ways that promote neoliberal logics and neglect wider social structures. Despite concerns across the globe about growing levels of inequality, typically the way to resolve these issues is through education and a focus on the individual as opposed to wider interventions that support social justice. This can be seen in a variety of aspects of education (see e.g. (Hope, 2015^[33]; Reveley, 2016^[34])) including in the focus on coding in schools. Coding is promoted as a way to guaranteed ‘success’ for the individual and society – but coding does not translate into the same opportunities for everyone. All young people have different levels of economic, social, cultural and political resources and this clearly influences the kinds of opportunities they are able to get from new technologies (even if their use, skills and access looks the same) (Davies and Eynon, 2018^[14]).

In essence, the digital native discourse does not encourage critical reflection on the relationships between technology, education, young people and society. Do we want to live in such an unequal society, and accept the status quo, or do we want something different for future generations?

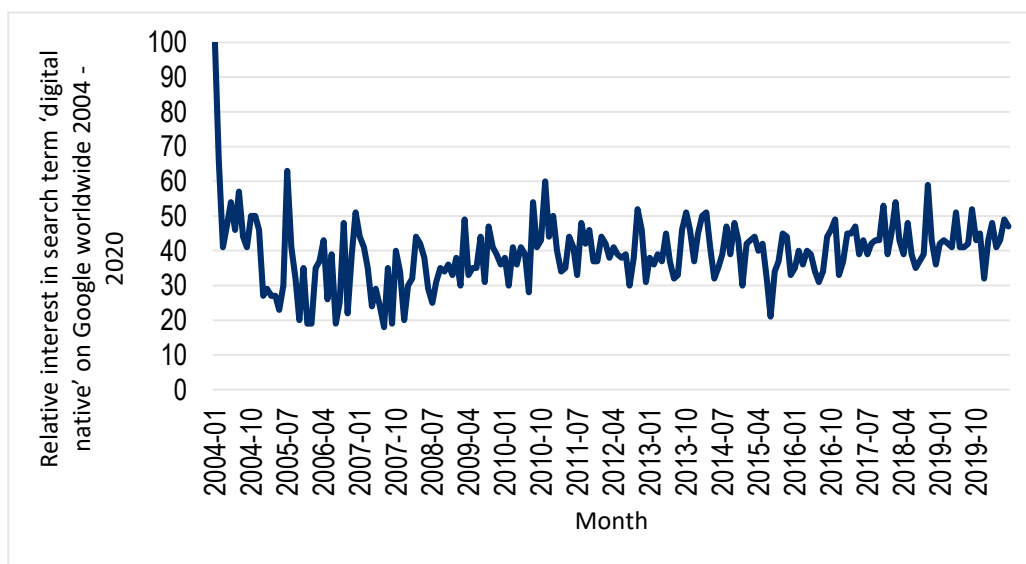
Why the discourse persists

Despite there being limited empirical evidence to support the notion of a digital native, this term is well recognised in popular and policy discourse alike. The briefest of Internet searches will reveal a host of reports, blogs and policy statements that continue to use the term ‘digital natives’ and take as their starting point that all young people are digitally savvy for a whole host of topics related to education, employment and well-being.

Systematic searches of public interest in this domain clearly show that interest in defining young people in this technologically deterministic way is not significantly diminishing and remains strong (Judd, 2018^[35]). Following some of the analyses by Judd, we can see from a simple google trends search that the relative interest in searching for digital natives worldwide has not significantly diminished since around 2005 (Figure 9.2).

Given the power of the digital native discourse, it is important to think about why the term digital native and other popular discourses about young people persist. Quite simply, who benefits from this continued promotion?

Although there may be many beneficiaries it seems the most prominent are the commercial sector (Selwyn, 2003^[9]). The digital native rhetoric encourages parents and guardians to purchase devices for their children to support their homework. This purchasing of technology to support young people does not end there. The digital native rhetoric also provides additional justification for discourse that supports technology as a solution to wider social challenges. For example, the need to use technology to reform education, or to promote ‘social mobility’ by providing young people with the means to get on in life through the take up of online opportunities.

Figure 9.2. Relative interest in search term 'digital native' on Google worldwide 2004-2020

Note: Google defines Interest over time as: "Numbers represent search interest relative to the highest point on the chart for the given region and time. A value of 100 is the peak popularity for the term. A value of 50 means that the term is half as popular. A score of 0 means there was not enough data for this term."

As some authors have argued, the digital native discourse is not something that can be tackled through empirical evidence alone, the metaphor itself needs to be directly interrogated. This includes the "underlying discrimination implicit in its metaphors" of the native vs. immigrant discourse" (Bayne and Ross, 2011^[23]), and the market-driven, essentialist views of technology discussed above (Bayne and Ross, 2011^[23]). As Selwyn notes, "the notion of the digital native should be seen more as a discursive than a descriptive device, employed by those seeking to exert some form of power and control over the shaping of the (near) digital future" (Selwyn, 2009^[36]). It is therefore important that research with young people does not inadvertently reinforce and exacerbate the digital native debate by legitimising the term through acknowledgement of it and allowing such discourse to set the agenda.

A future agenda

An important way to achieve a change in the discourse is to encourage a wider group of stakeholders to engage in deliberation about the role and future design of technology in the lives of young people (Bijker, and Pinch, 2012^[37]). This penultimate section highlights some key issues for future work and policy making that could help to achieve this goal.

Education policy and practice

As noted above, a central point in research to date is that teachers need to recognise their importance in supporting young people in their uses of technology. Young people are not all experts, and just like all areas of education, adults have a responsibility to support young people in their endeavours. Stakeholders need to decide whether to continue down the current path, and see the same patterns of behaviour or decide to more actively intervene in providing support for young people of all ages in their uses of technology (Smahel et al., 2020^[20]).

This relates to wider questions of the role of schooling in society. As Biesta argues there are three interrelated functions of the school: to enable young people to acquire qualifications that reflect their “knowledge skills and dispositions to be able to do something”; to facilitate (in both unintended and intended ways) the ways that young people “become part of particular social, cultural, and political “orders.” (i.e. socialisation)”; and help young people “to become more autonomous and independent in their thinking and acting” (i.e. subjectification) (Biesta, 2015^[38]). Most of the focus on young people and technology use in schools is accomplished through the prism of qualifications and skills, tending to ignore subjectification and socialisation. However, such important aspects of schooling should not be ignored in relation to technology (see e.g. (Jenkins, 2009^[5])).

One way to achieve all three roles of schooling is to incorporate a critical digital literacies agenda into schools, enabling young people to challenge the status quo with regard to technology, learning and everyday life and to support a more holistic transition to adulthood. Such a move would be in contrast to the relatively narrow digital skills agenda that has manifested itself in many countries that focus primarily on the need for young people to code (Davies and Eynon, 2018^[14]). Indeed, there has been much analysis and debate about the need for a more democratic educational agenda related to digital skills policies with many concerned that there is a significant disconnect between what young people want and need to learn as part of their formal education and what schools offer (Wallis and Buckingham, 2016^[39]; Morgan, 2016^[40]; Biesta, 2015^[38]). This could be achieved in many ways, for example, there is increasing support for ‘critical digital design’ that brings together the production of artefacts with a focus on ethics (i.e. drawing attention the power relations and inequalities that are apparent in current society); and the personal (i.e. highlighting that the way individuals make meaning when engaging with technology in everyday life can be understood as a learning resource), supporting agency and identity development (Pangrazio, 2014^[41]).

Similarly, there are important issues to explore in relation to who is setting the technology agenda, and how the current landscape is dominated by a few commercial actors. There are many implications of this, but one significant set of questions is around young people’s data rights and right to privacy. As noted above, this is an issue both in and outside schools and is particularly important for policy makers. Indeed, education is distinct from other domains in which big data are being applied and needs special consideration particularly for younger age groups (Clayton and Halliday, 2017^[42]). There needs to be a more holistic view of how and where learning and education takes place, and by whom, to ensure that all institutions engaged in learning (not just formal educational institutions) are accountable; and that the rights, needs and experiences of all young people are recognised.

Research

There are a number of research gaps in our current understandings of young people and technology. First, most of the data available about how young people experience technology is currently collected via traditional social science methods (for example, from interviews, surveys, or diaries). However, very little work has used other methods from social data science that could enable tracking what young people actually do with technology as a complement to existing approaches that measure how young people experience and value technology in their lives. For example, many young people use social networking sites such as YouTube and TikTok as places to socialise and learn about topics that are of interest to them. As they use these platforms they leave a trail of digital traces behind them: views, content, comments, time spent are all tracked by the companies that own such sites. Companies tend to use this kind of large scale digital trace to improve profits. In contrast, researchers could potentially use this kind of data to get insights into how young people learn and engage with new technologies over time that would complement the self-report measures typically collected by social scientists. Indeed, a large proportion of work about young people and their experiences of the digital realm is cross-sectional. It is therefore difficult to see or measure what the social, educational and health implications of using technologies are over time and the use of digital trace data could help to address this. There are, quite rightly, significant ethical concerns about the use of such data by companies. However, these concerns should not mean that strong ethical practices

cannot be developed in this domain by researchers in collaboration with young people. The potential additional insights into young people's practices with technology could be considerable.

Second, although there has been some very rich work in this space, there is a lack of research in some parts of the globe (Holloway and Livingstone, 2013^[43]; Hooft Graafland, 2018^[16]; Livingstone et al., 2019^[18]). The vast majority of the work to date with young people has focused predominately in Europe and North America, with very little focus on the experiences of those from low and middle income countries (Livingstone et al., 2019^[18]). However, this is changing. For example, Global Kids Online - a collaborative initiative between UNICEF, the London School of Economics and Political Science, and the EU Kids Online network is an ongoing initiative to capture more of the world's experiences of technology. Countries now included in this important initiative include: Argentina, Brazil, Bulgaria, Chile, Ghana, Montenegro, Serbia, South Africa, the Philippines and Uruguay, and fieldwork is underway in Albania and Canada (Livingstone et al., 2019^[18]).

There are also limited amounts of research with those from younger age groups: very little is known about the social, health and educational implications of ever younger children using new technologies including the Internet (Holloway and Livingstone, 2013^[43]; Livingstone et al., 2019^[18]). However, this is also changing. For example, the Australian Research Council (ARC) seven-year Centre of Excellence for the Digital Child focuses on the experiences of children aged zero to eight and their families.

Thirdly, much of the work on 'digital youth' tends not to be carried out in significant conversation with the broader youth studies or sociology of childhood literature. In general, a significant proportion of the work in this area is highly empirical with limited engagement with theory. It is important to build on more theoretical work in understanding students' digital practices (Beckman, Bennett and Lockyer, 2019^[44]; Selwyn, 2012^[45]; Sims, 2013^[27]; Robinson, 2009^[24]; Livingstone and Sefton-Green, 2016^[46]) to critique the digital native discourse and provide a strong alternative that can develop over time. Indeed, more theoretical work would protect against the ahistorical nature of much of the debate about young people and technology and ideally offer a way to provide a meaningful alternative to the digital native discourse (Bennett and Maton, 2010^[10]; Selwyn, 2012^[45]).

Conclusion

The digital native discourse does not fit with the empirical evidence. Young people have very diverse uses, attitudes and experiences of technology. Although they may participate in a distinct teenage culture in relation to the digital world this does not make it impossible for adults from all stakeholder groups to help young people navigate their use of technology, just as it is not impossible to help them to develop the wider competence and knowledge they need to operate meaningfully in the world. Though catchy, and easy for policy makers to respond to, the discourse of the digital native does not offer appropriate ways to conceptualise the relationships between young people and technology nor offers insight into appropriate interventions to educate and support them. Indeed, though not directly harmful for the majority, it has highly negative implications for some, particularly those who are already experiencing forms of social inequalities. It is imperative that we reframe the discourse and find new, research informed ways forward for our education system and wider support for young people.

References

- Anderson, M. and J. Jiang (2018), *Teens Social Media and Technology 2018*, Pew Research Center, <https://www.pewresearch.org/internet/2018/05/31/teens-social-media-technology-2018/>. [29]

- Bayne, S. and J. Ross (2011), “‘Digital native’ and ‘digital immigrant’ discourses”, in *Digital Difference*, SensePublishers, Rotterdam, http://dx.doi.org/10.1007/978-94-6091-580-2_12. [23]
- Beckman, K., S. Bennett and L. Lockyer (2019), “Reproduction and transformation of students’ technology practice: The tale of two distinctive secondary student cases”, *British Journal of Educational Technology*, Vol. 50/6, pp. 3315-3328, <http://dx.doi.org/10.1111/bjet.12736>. [44]
- Bennett, S. and K. Maton (2010), “Beyond the ‘digital natives’ debate: Towards a more nuanced understanding of students’ technology experiences”, *Journal of Computer Assisted Learning*, Vol. 26/5, pp. 321-331, <http://dx.doi.org/10.1111/j.1365-2729.2010.00360.x>. [10]
- Berman, G. and K. Albright (2017), *Children and the Data Cycle: Rights and Ethics in a Big Data World*, <https://www.unicef-irc.org/publications/907/>. [31]
- Biesta, G. (2015), *Good Education in an Age of Measurement: Ethics, Politics, Democracy*, Routledge. [38]
- Bijker, W., H. and T. Pinch (2012), *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*, The MIT Press, <https://muse.jhu.edu/book/19813>. [37]
- boyd, D. (2014), *It’s Complicated: The Social Lives of Networked Teens*, Yale University Press, <https://www.jstor.org/stable/j.ctt5vm5gk>. [21]
- Clayton, M. and D. Halliday (2017), “Big data and the liberal conception of education”, *Theory and Research in Education*, Vol. 15/3, pp. 290-305, <http://dx.doi.org/10.1177/1477878517734450>. [42]
- Davies, C. and R. Eynon (2013), *Teenagers and Technology*, Routledge. [7]
- Davies, H. and R. Eynon (2018), “Is digital upskilling the next generation our ‘pipeline to prosperity’?”, *New Media & Society*, Vol. 20/11, pp. 3961-3979, <http://dx.doi.org/10.1177/1461444818783102>. [14]
- Eynon, R. and A. Geniets (2015), “The digital skills paradox: How do digitally excluded youth develop skills to use the internet?”, *Learning, Media and Technology*, Vol. 41/3, pp. 463-479, <http://dx.doi.org/10.1080/17439884.2014.1002845>. [25]
- Eynon, R. and L. Malmberg (2011), “Understanding the online information-seeking behaviours of young people: The role of networks of support”, *Journal of Computer Assisted Learning*, Vol. 28/6, pp. 514-529, <http://dx.doi.org/10.1111/j.1365-2729.2011.00460.x>. [15]
- Facer, K. and R. Furlong (2001), “Beyond the myth of the ‘cyberkid’: Young people at the margins of the information revolution”, *Journal of Youth Studies*, Vol. 4/4, pp. 451-469, <http://dx.doi.org/10.1080/13676260120101905>. [11]
- Helsper, E. (2017), “A socio-digital ecology approach to understanding digital inequalities among young people”, *Journal of Children and Media*, Vol. 11/2, pp. 256-260, <http://dx.doi.org/10.1080/17482798.2017.1306370>. [26]
- Helsper, E. and R. Eynon (2010), “Digital natives: Where is the evidence?”, *British Educational Research Journal*, Vol. 36/3, pp. 503-520, <http://dx.doi.org/10.1080/01411920902989227>. [13]

- Holloway, D. and S. Livingstone (2013), *Zero to eight. Young children and their internet use Zero to Eight*, LSE, London: EU Kids Online, <http://www.eukidsonline.net> (accessed on 16 March 2018). [43]
- Hoofst Graafland, J. (2018), "New technologies and 21st century children: Recent trends and outcomes", *OECD Education Working Papers*, No. 179, OECD Publishing, Paris, <https://dx.doi.org/10.1787/e071a505-en>. [16]
- Hope, A. (2015), "Governmentality and the 'selling' of school surveillance devices", *The Sociological Review*, Vol. 63/4, pp. 840-857, <http://dx.doi.org/10.1111/1467-954x.12279>. [33]
- Ito, M. (2013), *Hanging Out, Messing Around, and Geeking Out: Kids Living and Learning with New Media*, The MIT Press, Cambridge, <https://library.oapen.org/handle/20.500.12657/26060>. [19]
- ITU (2020), *Youth and Children*, <https://www.itu.int/en/ITU-D/Digital-Inclusion/Youth-and-Children/Pages/Youth-and-Children.aspx>. [28]
- Jenkins, H. (2009), *Confronting the Challenges of Participatory Culture: Media Education for the 21st Century*, MIT Press. [5]
- John D. and Catherine T. MacArthur Foundation Series on Digital Media and Learning (ed.) (2008), *Youth, Identity, and Digital Media*, London: MIT Press. [6]
- Jones, C. and L. Czerniewicz (2010), "Describing or debunking? The net generation and digital natives", *Journal of Computer Assisted Learning*, Vol. 26/5, pp. 317-320, <http://dx.doi.org/10.1111/j.1365-2729.2010.00379.x>. [8]
- Judd, T. (2018), "The rise and fall (?) of the digital natives", *Australasian Journal of Educational Technology*, Vol. 34/5, <http://dx.doi.org/10.14742/ajet.3821>. [35]
- Livingstone, S. and E. Helsper (2007), "Gradations in digital inclusion: Children, young people and the digital divide", *New Media & Society*, Vol. 9/4, pp. 671-696, <http://dx.doi.org/10.1177/1461444807080335>. [17]
- Livingstone, S. et al. (2019), "Comparative global knowledge about the use of digital technologies for learning among young children", in *The Routledge Handbook of Digital Literacies in Early Childhood*, Routledge, <http://dx.doi.org/10.4324/9780203730638-6>. [18]
- Livingstone, S. and J. Sefton-Green (2016), "The Class: Living and learning in the digital age". Online resource. Parenting for a digital future", *London School of Economics and Political Science*, <http://blogs.lse.ac.uk/parenting4digitalfuture/>. [46]
- Livingstone, S. and A. Third (2017), "Children and young people's rights in the digital age: An emerging agenda", *New Media & Society*, Vol. 19/5, pp. 657-670, <http://dx.doi.org/10.1177/1461444816686318>. [32]
- Lupton, D. and B. Williamson (2017), "The datafied child: The dataveillance of children and implications for their rights", *New Media & Society*, Vol. 19/5, pp. 780-794, <http://dx.doi.org/10.1177/1461444816686328>. [30]
- Morgan, C. (2016), "Testing students under cognitive capitalism: Knowledge production of twenty-first century skills", *Journal of Education Policy*, Vol. 31/6, pp. 805-818, <http://dx.doi.org/10.1080/02680939.2016.1190465>. [40]

- Oblinger, D. and J. Oblinger (2005), *Educating the Net Generation*, [2]
<http://bibpurl.oclc.org/web/9463>.
- Palfrey, J. and U. Gasser (2011), *Born Digital: Understanding the First Generation of Digital Natives*, ReadHowYouWant.com. [3]
- Pangrazio, L. (2014), "Reconceptualising critical digital literacy", *Discourse: Studies in the Cultural Politics of Education*, Vol. 37/2, pp. 163-174, [41]
<http://dx.doi.org/10.1080/01596306.2014.942836>.
- Philip, T. and A. Garcia (2013), "The importance of still teaching the IGeneration: New technologies and the centrality of pedagogy", *Harvard Educational Review* 83, Vol. 2, [22]
 pp. 300–319.
- Prensky, M. (2001), "Digital natives, digital immigrants part 1", *On the Horizon*, Vol. 9/5, pp. 1-6, [1]
<http://dx.doi.org/10.1108/10748120110424816>.
- Reveley, J. (2016), "Neoliberal meditations: How mindfulness training medicalizes education and responsabilizes young people", *Policy Futures in Education*, Vol. 14/4, pp. 497-511, [34]
<http://dx.doi.org/10.1177/1478210316637972>.
- Robinson, L. (2009), "A taste for the necessary", *Information, Communication & Society*, [24]
 Vol. 12/4, pp. 488-507, <http://dx.doi.org/10.1080/13691180902857678>.
- Selwyn, N. (2012), "Making sense of young people, education and digital technology: The role of sociological theory", *Oxford Review of Education*, Vol. 38/1, pp. 81-96, [45]
<http://dx.doi.org/10.1080/03054985.2011.577949>.
- Selwyn, N. (2009), "The digital native – myth and reality", *Aslib Proceedings*, Vol. 61/4, pp. 364-379, [36]
<http://dx.doi.org/10.1108/00012530910973776>.
- Selwyn, N. (2003), "'Doing it for the kids': Re-examining children, computers and the 'information society'", *Media, Culture & Society*, Vol. 25/3, pp. 351-378, [9]
<http://dx.doi.org/10.1177/0163443703025003004>.
- Sims, C. (2013), "From differentiated use to differentiating practices: Negotiating legitimate participation and the production of privileged identities", *Information, Communication & Society*, Vol. 17/6, pp. 670-682, [27]
<http://dx.doi.org/10.1080/1369118x.2013.808363>.
- Smahel, D. et al. (2020), "EU Kids Online 2020 survey results from 19 countries", [20]
<http://dx.doi.org/10.21953/lse.47fdeqj01ofo>.
- Tapscott, D. (2008), *Grown Up Digital: How the Net Generation Is Changing Your World HC*, [4]
 Mcgraw-Hill.
- Valentine, G., S. Holloway and N. Bingham (2002), "The digital generation?: Children, ICT and the everyday nature of social exclusion", *Antipode*, Vol. 34/2, pp. 296-315, [12]
<http://dx.doi.org/10.1111/1467-8330.00239>.
- Wallis, R. and D. Buckingham (2016), "Media literacy: The UK's undead cultural policy", [39]
International Journal of Cultural Policy, Vol. 25/2, pp. 188-203,
<http://dx.doi.org/10.1080/10286632.2016.1229314>.

Part IV Policies, practices, partnerships and the pending agenda

10 Child empowerment, well-being and inequality

Francesca Gottschalk, OECD Directorate for Education and Skills, France

Child empowerment is on the policy agenda of countries around the world. Equipping children with the skills and knowledge to make informed decisions for their own health and well-being is important for child outcomes, and in enabling them to be agents of change and positively impact their surroundings in the future. However, social inequalities can undermine child health and empowerment, especially as countries are dealing with the economic uncertainty exacerbated by the COVID-19 crisis. These are thus key policy areas for OECD and partner countries to target in order to ensure equitable outcomes for all children.

Introduction

In recent decades, child rights and empowerment have made their way onto policy agendas around the world. The UN Convention on the Rights of the Child (1989^[1]) underlines the importance and expectation of children as actors in their own right concerning matters that affect them, suggesting that adults should engage in dialogue and respond to the views of children when making decisions concerning them.

Alongside this evolving landscape, views of children have shifted from being dependent and innocent to knowledgeable, active and social participants in society (Prout, 2005^[2]). This shift in perception challenges the notion that children are vulnerable and unable to make decisions for themselves in their own best interests (Bradbury-Jones, Isham and Taylor, 2018^[3]). When children and young people are included in processes such as producing knowledge that can impact decision making in their communities, it can foster a stronger sense of responsibility to others, and has the potential to promote both community and individual health while also potentially increasing the relevance of research, policy and practice for children and young people (Wong, Zimmerman and Parker, 2010^[4]).

Education systems play a key role in empowering students in becoming responsible, informed and engaged citizens, allowing them to actively participate in societal conversations and to make decisions for the good of themselves and their communities. Students who are better prepared for the future can be agents of change, positively impacting their surroundings, and understanding and anticipating how their actions will affect themselves and others in both the short and long term (OECD, 2018^[5]). Education itself must evolve in order to continue helping individuals develop as people, but also as citizens and professionals especially in our complex and quickly changing world (OECD, 2019^[6]).

Despite the strides society and education systems have made in terms of child empowerment, persistent inequalities continue to challenge and undermine these efforts. Socio-economic inequalities are endemic; one in seven children in OECD countries lives in income poverty (OECD, 2019^[7]), and inequitable learning outcomes by socio-economic status exist in all countries, albeit with varying intensities (OECD, 2017^[8]). Socio-economic disadvantage is also negatively related to a number of different health outcomes and behaviours (Inchley et al., 2020^[9]) and contributes to digital inequalities, curtailing children's capacity to exercise their rights to information and play in digital environment (Burns and Gottschalk, 2019^[10]).

One of the starkest reminders of the persistence of inequalities in childhood became apparent while schools were closed during the COVID-19 crisis. Opportunities to transition smoothly to digital learning were not available for all students around the OECD, disproportionately affecting those from lower socio-economic backgrounds (OECD, 2020^[11]) (see also Chapter 3). The role of the school in terms of service delivery, such as meal programmes and providing opportunities for sports and exercise, especially for disadvantaged children became clear. Moving forward, education systems will play a key role in mitigating social inequalities that were augmented during the pandemic.

This chapter will cover how education systems teach children about health and well-being, and focus on their digital inclusion. It looks at how systems strive for equity in terms of health and digital outcomes, highlighting areas in need of policy scrutiny and development highlighting examples from the 21st Century Children Policy Questionnaire.

Knowledge as power: Educating children for their health and well-being

Many countries have seen broadening of educational goals to include educating children in and supporting their well-being, social development and personal growth. They have moved towards taking a “whole child” perspective which involves balancing the focus on cognitive, social and emotional skills (OECD, 2015^[12]). Educating children about their own health and fostering digital skills are important in empowering them to be informed decision makers now and in the future regarding their health, well-being and social inclusion.

Learning about health and well-being

Education is an important tool that can be used to teach children about their own health and the health of others in the community. Education systems use a number of avenues to do this (see Table 10.1). One common avenue of educating children to develop healthy habits and improve wellness is through curricular methods, often through incorporating health studies and learning about healthy habits into the physical education curriculum.

In some contexts, aspects of health literacy are also explored in science education, civics and ethics, which is the case for example in the Mexican curriculum, and in Finland this is in environmental studies for children in grades one to six. Health frameworks can also be used as avenues to promote health literacy through encouraging effective delivery of health and physical education. Other routes include taking population-based approaches through national frameworks, initiatives and informational campaigns.

Table 10.1. Learning about health and healthy behaviours

Country	Curriculum/policy	Goals
Australia	Australian Curriculum: Health and Physical Education	Acquire movement skills and learn how the body moves, and to develop positive attitudes towards physical activity, learn to appreciate outdoor recreation and sport.
Czech Republic	Health 2020	Increasing health literacy in the population and in vulnerable groups including through provision of online programmes for good nutrition and obesity prevention, dissemination of good practices within communities, acquisition of good health knowledge in education.
Finland	Health Education	Focus on multidisciplinary knowledge base to develop health literacy and foster respect for human life and dignity in compliance with human rights. Health education includes topics related to health, well-being and safety and focuses on building knowledge, skills, self-awareness and ethical responsibility for health.
Ireland	Get Active Ireland! Framework	Recognises the need for effective delivery of physical health literacy programmes to equip children with the skills and confidence for lifelong participation in physical recreation and sport.
Latvia	Skola 2030	Setting out to change health attitudes and behaviours in schools, with an update to the physical health curriculum to help them develop a deeper understanding of how to develop a healthy lifestyle and promote healthy environments within their families and communities.
Mexico	Curriculum	Health is explored within different disciplines for example in the following subjects: Knowledge of the Environment, Natural Sciences and Technology, Biology and Chemistry, Civic and Ethics. Physical education is also used to promote an active and healthy lifestyle, including knowledge about and care for the body as well as practicing physical activities.
Prince Edward Island (Canada)	Prince Edward Island Curriculum: Health and Physical Education	Renewing and integrating intermediate health and physical education curriculum, including content on sexual health, to include content on some challenges faced by students today.
Turkey	Physical education and sports competencies	Basic health values are promoted, such as appropriate hygiene and self-care, as well as developing plans to protect oneself from physical and mental health risks.

Source: 21st Century Children Policy Questionnaire

Sexuality education¹ is an important pillar of health and wellness education, which when effectively implemented can promote beneficial health and well-being outcomes such as delayed initiation of sexual intercourse, decreased number of sexual partners, reduced risk taking and increased use of contraception including condoms (UNESCO, 2018^[13]). Research also suggests that sexuality education does not increase sexual activity, risk-taking behaviour or rates of STI/HIV infections (Montgomery and Knerr, 2016^[14]). Education alone is not enough to promote reduced risk-taking and uptake of safer sex practices. A 2016 review concluded that sexuality education should be part of a larger-scale strategy that engages young people in learning about their sexual and reproductive futures, working with actors in the health sectors, within the community and families (Montgomery and Knerr, 2016^[14]). Many children also use digital spaces or turn to peers to seek information regarding health and well-being, including sexuality (see Box 10.1).

Box 10.1. Let's talk about sex (online)

The Internet gives access to near limitless amounts of information. In recent years, young people use the digital environment to socialise or play games, they also use it to seek important information about their own bodies, sex and relationships. A recent survey by UNESCO (2020^[15]) highlighted that friends and peers tend to be the top ranked source of information on bodies, sex and relationship, with digital spaces coming closely in second place, edging out school-based education. Some digital spaces are explicitly designed or designated as spaces for sexuality education, whether this is through websites, apps or chatrooms.

Children aged 15-18 in this survey reported accessing digital information on a number of different topics such as the human body and anatomy, sexually transmitted diseases, and gender identity, roles and discrimination. Young people who self-identified in another way from male or female (such as transgender or non-binary), or those who preferred not to divulge their sex or gender, reported looking online more frequently for content related to bodies, sex and relationships than their male or female identifying peers (UNESCO, 2020^[15]). Anonymity in digital spaces can allow young people, especially LGBTQ+, opportunities to participate in discussions and explore their identities in safe and supportive environments, without facing stigma or discrimination (OECD, 2020^[16]).

The Internet is an important source of information for children, especially for topics that are difficult to find in “mainstream” sexuality education programming. For example, in New Zealand an evaluation by the Education Review Office in 2017 found inconsistent coverage of the sexuality education curriculum and many schools having large gaps in coverage. Although biological aspects of sexuality and puberty are well covered, more in-depth coverage is needed for aspects like consent, digital technologies and relationships. While the Internet and digital resources can certainly fill some of these gaps, there are risks in terms of children accessing and sharing unverified or untrue information therefore making the case for developing digital skills and media literacy even more pressing.

Partnerships are also an important part of delivering effective health and well-being programming. For example, in the Flemish Community of Belgium, [Sensoa](#) is the Flemish center of expertise for sexual health that advocates for sexual education in schools and provides education and training opportunities for educators. Their *Tussen de lakens*, or “*between the sheets*”, teaching package focuses on sex education materials for children aged 10-17 including modules on the body, contraception, sexually transmitted diseases and sexually transgressive behaviour (Ministre de l'Enseignement obligatoire et de Promotion sociale, 2013^[17]).

Despite the emphasis on educating children on health and well-being, many countries report problems in a number of health behaviours in children such as lack of exercise and poor eating habits, which is reflected in rising obesity rates and increased sedentary time. There is also room to improve in terms of instilling the importance of safer sex practices in young people. Although few countries report struggling with teen pregnancy or sexually transmitted diseases/infections as a pressing policy priority according to the Policy Questionnaire, young people still report that they engage in risky sexual behaviours. In a survey of adolescents in Europe and Canada, one in four 15-year-olds who have had sex reported not using a condom or contraceptive pill during their last sexual intercourse (Inchley et al., 2020^[9]).

Box 10.2. The importance of learning about health and developing health literacy

Health literacy refers to both competence and knowledge of individuals to meet the demands of health in today's society (Sørensen et al., 2012^[18]). It requires a combination of cognitive, social and critical analysis skills, incorporating reading, listening analysis and decision making (OECD, 2019^[19]). One key issue associated with low health literacy is that it can exacerbate existing socio-economic inequalities (Moreira, 2018^[20]), while on the other hand being highly health literate empowers individuals to take control over their own health decisions and to understand how different lifestyle habits can help or hinder their health (OECD, 2019^[19]).

Despite the importance of having the personal tools, knowledge and competences to make informed decisions about one's health, rates of health literacy tend to be quite low. For example PISA 2015 data highlights that across OECD countries, only 20% of 15 year-old students surveyed reported they could easily understand a newspaper report on a health issue, interpret the scientific information provided on the labelling of food items, or describe the role of antibiotics in the treatment of disease (OECD, 2017^[21]). Low health literacy in adults has been associated with lower income, self-reported poor health, lower rates of exercise and a high body mass index (HLS-EU Consortium, 2012^[22]). Effective health literacy education starts early, from compulsory schooling, and extends throughout the lifespan (Abrams, Klass and Dreyer, 2009^[23]).

Improving health literacy can be done through updating national curricula, establishing sustainable sources of funding, capitalising on key partnerships between education and health sectors and through measuring the levels of health literacy in young people (Winkelman et al., 2016^[24]). There are currently a number of instruments measuring health literacy in adolescents and children. However due to differing definitions of health literacy and lack of standardisation these instruments often measure different things. Therefore comparing health literacy in different samples is challenging (Okan et al., 2018^[25]). Governments and researchers should work towards a streamlined approach and common agreement among what it is we are measuring and focusing on when talking about health literacy.

In terms of child empowerment, when developing a health education agenda in schools it is important to include the voices of children in the development and implementation stages of these models. Research suggests that “vessel” participation types that describe more traditional youth-adult relationships that are adult-driven and involve little to no input from young people have low empowerment potential (Wong, Zimmerman and Parker, 2010^[4]). Despite the fact that young people can learn skills and knowledge, there exists little space for them to co-learn and contribute their own ideas to the discussion. Open dialogical practices where adults and children can contribute their perspectives can help develop critical consciousness, allowing room to address concerns (Wong, Zimmerman and Parker, 2010^[4]).

Promoting digital skills and inclusion

With the rise in digital technologies and the convergence of digital and physical spaces, acquiring digital skills is necessary for children in the 21st century. Despite the ever present nature of digital risks, digital tools provide near endless opportunities, for example access to unprecedented amounts of information, opportunities for personalised learning and instruction, and for children to create content and creatively express themselves. Indeed, research suggests that many young people turn to the Internet for health-related resources, and information seeking is a common health-related Internet use (Park and Kwon, 2018^[26]). In order to fully participate in the digital world, all children need material access to digital tools, and a baseline level of digital skills (for initiatives systems use to lessen digital inequalities, refer to Chapter 11 in (Burns and Gottschalk, 2019^[10])).

Children who are digitally skilled and media literate will be able to search for information and resources regarding their own physical and emotional well-being, and will be more adept in using online platforms to search for and book medical appointments, and access and manage online medical records. Higher levels of media literacy will allow them to discern between information that could be misleading or fake, and promotes their consumption of higher quality information from trusted sources.

Box 10.3. Get (media) smart

Being media literate is important in the 21st century. Children need the skills to discern fact from fiction, to determine the quality of information they consume, and to be able to find trustworthy sources online especially when it comes to their health and well-being. Alongside media literacy, developing a baseline level of science literacy so that individuals can understand how knowledge is produced and how to interpret scientific findings is important. In general, more highly educated people are more confident in science as they are able to leverage their skills in understanding it. Together, science and the media are important influencers of civic values and discourse. Being able to be discerning consumers of both will help children now and in the future to make good decisions surrounding their health, well-being, and more generally in other areas of their civic, educational and social lives.

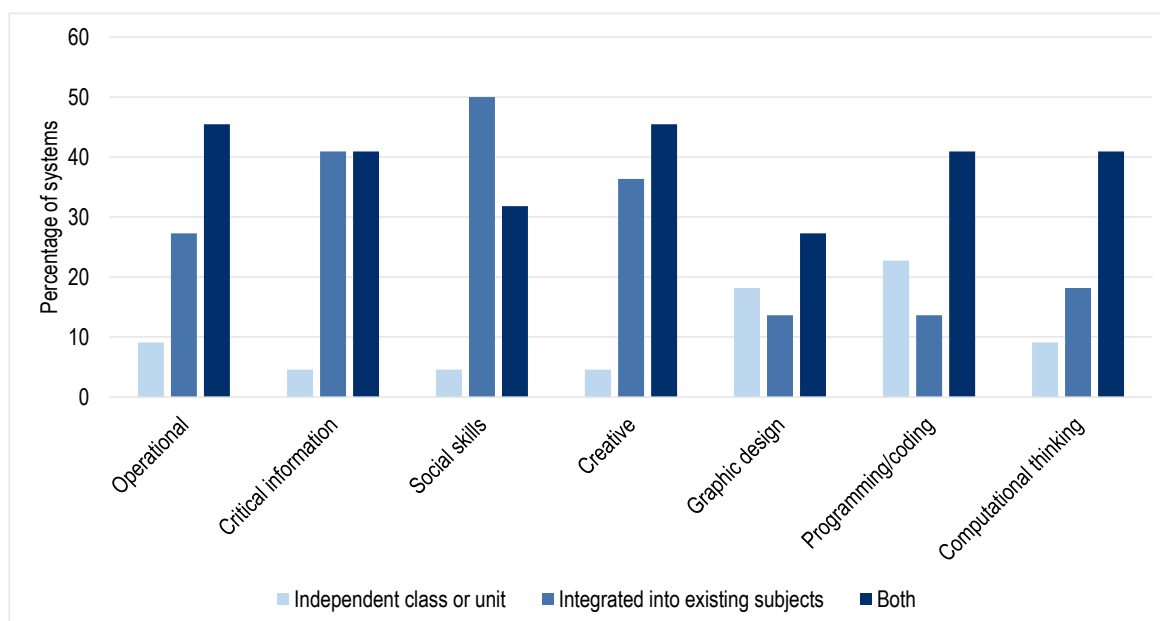
Developing media literacy is something that many education systems around the OECD are investing in and focusing on through expanding curricula, implementing school-based programmes and fostering partnerships with key actors working in the media literacy space (Burns and Gottschalk, 2019^[10]). Programmes can target media literacy and promote individuals to engage in health information sharing. Some examples developed by Canadian non-profit organisation MediaSmarts include:

- [*Break the Fake*](#): teaches four main skills for developing habits in finding and verifying information online, understanding that it is imperative to verify information before sharing it.
- [*Check then Share*](#): aimed at information around COVID-19, providing concrete tools such as a dedicated search engine to find information from trusted expert sources. It promotes sharing of reliable information to improve the ratio of quality to weak or misinformation.

Other media literacy interventions take a gamified approach, tapping into children's habits and tendencies to play online games, and are therefore able to rather seamlessly integrate into their daily lives. One example of this is the [*Bad News Game*](#) where players become fake news tycoons, gaining followers by spreading disinformation. Games of this nature can help people (as these are not limited to children) in preparing themselves on how to encounter and combat misinformation or conspiracy theories which they may come across online. There are a plethora of online resources that can be used to promote media literacy in children. Forming key partnerships with well trusted experts and organisations working on these initiatives should be high on education policy agendas.

Teaching digital skills tends to feature more heavily in secondary education than in primary, and less so in pre-primary and early childhood education and care (Burns and Gottschalk, 2019^[10]). Education systems take different approaches to teaching and learning digital skills in their curricula. Figure 10.1 highlights how different skills are incorporated into teaching and learning either as an independent subject, incorporated into existing course content or through a combination of the two. Generally, digital skills are integrated into existing subjects or are integrated and feature as independent classes or units. Some countries are engaging or have already engaged in an overhaul of the curriculum, whereas others are incorporating digital skills across the existing curriculum. Having a sound grasp on operational, critical thinking and social skills in digital spaces will allow for children to effectively harness the available resources to gain insight and make good decisions into their own health and well-being.

Figure 10.1. How systems incorporate digital skills into teaching and learning



Note: Respondents were asked which digital skills were taught in school, and how these were taught.

Source: 21st Century Children Policy Questionnaire

To highlight one example, the Danish Ministry of Education has launched a three-year experiment in compulsory education. Running from 2018-2021 with DKK 68 million of funding, it examines the importance of technology and automation in society, with a focus on ethics, security and consequences of digital technologies. Some of the digital skills it focuses on include: computational thinking/informatics, knowledge of networks and algorithms, programming, abstraction, pattern recognition and data modelling.

Box 10.4. Technology and teaching children with special needs

UNICEF defines inclusive education as providing "...real learning opportunities within the regular school system for groups who have traditionally been excluded, such as children with disabilities and speakers of minority languages." (UNICEF, 2017^[27]).

The Flemish Community of Belgium's [ADIBib](#) project is targeted at students in primary and secondary school with written communication impairments (serious reading and writing disorders), aiming to enable them to participate fully in social life and achieve better academic outcomes. At the end of 2017, [another programme](#) was launched to fund availability of software for children with dyslexia (text-to-speech software). 650 000 euros is reserved to further distribute the software with the aim of supporting pupils, parents and schools.

With schools moving towards more integrated and inclusive classrooms, there is a need for professional development for teachers in this domain, as well as programmes providing opportunities for children with special needs (OECD, 2019^[28]). Furthermore, instructional leadership for school principals can help improve the level of preparedness for inclusive education; according to TALIS 2013 the reported need for professional development was lowest in schools that had greater instructional leadership (Cooc, 2018^[29]).

Striving for equity: Reducing health and digital inequalities for all children

There are many factors that affect child health and well-being outcomes (see Chapter 2). Socio-economic status is an important mediator of many physical health trends. However it is a proxy for underlying relationships between factors caused by material disadvantage and increased likelihoods for engaging in risky or detrimental lifestyle behaviours (Aston, 2018^[30]). To give an example, individuals living in communities where there is inadequate access to safe facilities for physical activity (such as gardens or green spaces) will increase the chance that these individuals are less physically active (Schalkwijk et al., 2017^[31]). Thus the environmental factor, which is more common in more deprived areas with low cost housing, is independently related to physical activity regardless of parental knowledge or education on the importance of regular physical activity (Schalkwijk et al., 2017^[31]).

Table 10.2. Relationships between affluence and health behaviours and outcomes in adolescents

Trends across countries based on family affluence in Europe and Canada

	Likelihood in students from advantaged compared to disadvantaged backgrounds
Healthy eating habits (daily breakfast, family meals, fruit and vegetables every day)	Higher
Brush teeth twice a day	Higher
Physical activity participation	Higher
Overweight/obese	Lower
Negative body image	Lower
Self-reported health	Higher
Alcohol consumption	Higher
Family and peer support	Higher

Note: Findings from the 2017/2018 Health Behaviour in School-aged Children (HBSC) survey in Europe and Canada.

Source: (Inchley et al., 2020^[9])

By accounting for various social differences and providing programming for those in need, education systems can target disparities among children and aim for more equitable outcomes. Effective approaches targeting equitable education outcomes include investing in early childhood education and care, removing barriers to participation and ensuring quality, as well as finding and providing specialised support to low performers in school, and supporting disadvantaged schools (OECD, 2017^[8]). It is also essential for education systems to address other barriers to educational attainment related to children's social status and environment. Ensuring children have healthy food to eat, opportunities for physical activity and access to well-being services that would otherwise be inaccessible are key for educational success and child wellbeing. This section provides an overview of some high priority policy areas and the programmes and practices governments are implementing to improve child opportunities and outcomes.

Targeting child nutrition and food insecurity

Many factors influence the dietary habits and nutrition of children including age, socio-economic status, food security, food preference and palatability, as well as factors such as how foods are marketed. Cost is a barrier to consumption of healthy foods. A systematic review analysing food cost and diet quality found that lower quality diets tend to cost less per calorie, and tend to be selected more by people from lower socio-economic backgrounds. Despite the availability of some nutrient dense foods available at low costs, palatability and cultural acceptableness are factors that influence their purchase by low-income consumers (Darmon and Drewnowski, 2015^[32]).

Exposure to a wide range of good food choices, and healthy role modelling by parents will play a role in determining children's eating tendencies (Scaglioni et al., 2018^[33]), and repeated exposure to unfamiliar foods can promote liking of previously rejected foods (Wardle et al., 2003^[34]). In the effort to promote healthier habits, evidence suggests that increasing the amount of fruits and vegetables served to children at mealtimes can promote intake of these foods and reduce the energy density of foods ingested at meals. However, children who dislike the fruits and vegetables being served, are unlikely to consume more of them irrespective of portion size (Mathias et al., 2012^[35]). There is an opportunity cost to rejected foods and the cost of wasted food is too high especially for disadvantaged families, which is why families often resort to more palatable "safe" foods, despite having fewer health benefits.

Food security is an issue that affects many children around the OECD. It depends on food access, availability, utilisation and stability over time (Ashby et al., 2016^[36]), and is related to poverty, influenced also by regional context (Pereira, Handa and Holmqvist, 2017^[37]). Childhood food insecurity is related to a number of outcomes, such as emotional, behavioural and academic problems; outcomes differ in part based on the time at which a child is insecure in the developmental process (i.e. during infancy, school-aged) and may demonstrate a dose-response (i.e. the more time a child is food insecure, the larger the effect) (Shankar, Chung and Frank, 2017^[38]). These are just some of the barriers for children in accessing and eating healthy food in adequate quantities. Alongside educating children in the importance of food and nutrition so they are able to make healthy choices, education systems play a key role in feeding children.

Policies and practices

Many systems implement approaches to enhance children's nutrition. At a population level, financial disincentives such as taxes on sugary or junk foods can be used to reduce consumption in children (UNICEF, 2019^[39]). Education systems play a key role as well, taking a number of different approaches as highlighted in Table 10.3. Some examples focus on food provision such as free or subsidised meals, reducing the provision of unhealthy food offerings while increasing availability of healthy options. Other tactics focus on behavioural change and information dissemination such as educating about healthy eating practices, and disseminating guidelines or best practice principles to be implemented in schools or at home. Some systems adopt integrated approaches, harnessing the power of partnerships and implementing a range of measures from the system to the classroom level to enhance food availability and nutrition. Often, food and nutrition are incorporated into teaching and learning about health literacy.

Table 10.3. Food and nutrition policies and practices

Examples of how systems tackle student food and nutrition needs in and out of the school

Policy target	Examples
School meals	- universal free school lunch programmes (Finland, Sweden) - needs-based provision of school lunches (Ireland) - funding mechanisms for school lunches with cost dependent on parental income level (France) - needs-based free breakfast programmes (Canada, France)
Food insecurity	one initiative in Scotland's Diet and Healthy Weight Delivery plan is an investment of GBP 1 million to support children experiencing food insecurity during school holidays
Establishing healthy food environments in school	- online provision of guidelines for healthy eating environments (New Zealand) - hiring teachers with specific knowledge on diet and nutrition to provide guidance (Japan) - online resources for children/families/teachers with healthy eating tips and ideas (Australia, French Community (Belgium), Scotland) - resources guiding how schools can apply for professional support and financial assistance in developing healthy eating plans (French Community (Belgium)) - regulation or guidelines of foods that can be sold or provided in schools (Czech Republic, Flemish Community (Belgium), Scotland) - protecting children from food marketing (Czech Republic)

	• a common focus on cultural shift towards an environment where awareness about nutrition and access to healthy food choices is the norm (Canada)
Curriculum	• incorporating nutrition studies in health education and other relevant areas of the curriculum (Canada, Ireland)
Partnerships/multi-sectoral approaches	• partnerships with the food industry in developing school food policies (Flemish Community of Belgium) • targeted information for parents, caregivers, educators, youth workers and health professionals (Scotland) • agreements for the provision of complementary services between the education network and the health, social services and community networks to address poor dietary/nutrition (Québec (Canada)) • hiring a school food environment officer responsible for investigating alternate ways of providing local, nutritious, affordable food choices for students (Prince Edward Island (Canada))

Source: 21st Century Children Policy Questionnaire

One example of an effective public-private partnership focused on school nutrition is found in the Flemish Community of Belgium. In 2016 the Education Ministry in partnership with the food industry committed to having more balanced and healthier drink and snacks policies in Flemish schools, targeting a reduction in soft drink consumption (which is already decreasing) as well as unhealthy food, while promoting wide availability of water, milk and fresh fruit. The goal in Flemish schools is to have no sugar and fat-rich drinks and snacks on offer by 2021. This initiative has thus far had some success – the Flemish Institute for Healthy Living, which surveyed over 650 schools, found that seven in ten primary and secondary schools no longer offered sweetened soft drinks to students in the 2017-2018 school year, and since 2015 schools offer significantly fewer unhealthy drinks and snacks. The majority of primary schools (90%) no longer offer cakes, chocolate or candy, although these were still available in 45% of secondary schools surveyed.

Box 10.5. The importance of school meals, especially in times of COVID-19

What children eat and drink at school can play a key role in their health. Children have on average 7 590 hours of compulsory instruction during primary and secondary education and eat at least one meal per day at school (OECD, 2019^[40]). In the US, up to two thirds of children's daily nutritional needs are met through meals and snacks consumed at school and that these tend to be healthier than foods consumed outside of school (Dunn et al., 2020^[41]). The provision of nutritious school meals works to support student health, particularly for those less well-off. Access to healthy food at school affects not only student physical and emotional well-being, it can also support learning, leading to better academic performance.

In April 2020, at the height of school closures during the COVID-19 pandemic, 369 million children around the world were missing out on school meals (World Food Programme, 2020^[42]). Countries responded to this concern in different ways. For example in the United Kingdom, policy approaches included providing supermarket vouchers to the opening of school canteens for children of families working what were considered “key worker” positions (i.e. health professionals, police etc.). In Colombia, decision-making powers were delegated to regional authorities to enact programmes based on local capacities and needs, while in Costa Rica school canteens were initially kept open then closed in favour of setting up distribution points for food baskets to families (WFP, UNICEF and FAO, 2020^[43]).

As the pandemic continues with “second waves” around the world, systems will need to ensure continuity in access to food programmes in the case of country-wide or localised school closures. Reaching children reliant on school meal programmes who are required to self-isolate following exposure to COVID-19 or a positive diagnosis will also be an important measure.

Strategic partnerships in Scotland (United Kingdom) have also been created to improve nutrition information and provision of food and drink. This multifaceted approach involves training of front-line staff

ensuring parents receive information and support, training front-line staff (e.g. healthcare professionals, educators, youth workers) to ensure parents receive appropriate support and advice. Other facets include provision of health and wellbeing support to schools and authorities, expanding the provision of free meals and milk, updating regulations and guidelines on nutritional requirements in Scottish schools, and improving food provision and food education. Despite these initiatives, students still report that they need more support and guidance in making healthy food choices and establishing lifelong healthy eating habits. Another British initiative, [the Food Dudes](#) was developed in Wales and has been adapted and implemented in [Ireland](#). This initiative works to encourage children to eat more fruit and vegetables, and is based on positive role modelling, repeated tasting and rewards.

Health support and service delivery in schools

In many OECD countries the school serves as a location for students to access important health services and information that they would not necessarily have access to otherwise. Research suggests that adolescents often lack access to preventative care and tend to have lower rates of primary health care use than other age groups (Rand and Goldstein, 2018^[44]; American Academy of Pediatrics, 2016^[45]). In a review of 102 countries, Baltag and colleagues (2015^[46]) found that in over half of the countries health services were provided in schools by dedicated health personnel. The most common interventions in schools included “vaccinations, sexual and reproductive health education, vision screening, nutrition screening, and nutrition health education,” (Baltag, Pachyna and Hall, 2015^[46]). Especially for low-income adolescents, or those who lack access to health insurance, school-based health centres/interventions are important sources of medical care to which they would not otherwise have access (Boonstra, 2015^[47]). Table 10.4 highlights some examples of school-based programming or policies implemented to support children’s health in OECD education systems.

Table 10.4. Health supports in schools

School-based programming or policies in different systems to promote positive and equitable health outcomes

Country/region	Policy	Goals
Canada	Pan-Canadian Joint Consortium for School Health (JCSH)	Strengthens cooperation among ministries, agencies, departments, and others in support of healthy schools; builds the capacity of the health and education sectors to work together more effectively and efficiently; and promotes understanding of, and support for, the concept and benefits of comprehensive school health initiatives across Canada.
Flemish Community (Belgium)	Healthy School project by the Flemish Institute for Healthy Living	The Institute surveys health policy in primary and secondary schools every three years, in collaboration with the Association for Alcohol and Other Drug Problems. The Institute promotes the setting of health policies in schools on topics such as nutrition, smoking, sedentary behaviours, movement, mental health, environment policy, and relationships and sexuality. Schools assess their unique situation, determining priorities and work on an action plan, followed by an evaluation and adjustment period. The strategies promoted include education, environmental interventions, forming agreements and rules, and providing care and guidance.
Mexico	Health in your school	Joint initiative of the Secretary of Health and the Public Education Secretary to strengthen prevention and health care, while also promoting healthy lifestyles in children and young people. One pillar of this plan involves visits from professionals will help consult and monitor student health in the school, and promote healthy habits; students who require it will be referred to health centers to receive attention and follow-up care.
New Brunswick (Canada)	Health Support Service Policy	Standards and procedures required for the provision of health support services to students while they are the responsibility of the public school system, recognising this responsibility is shared among parents, the public education system and health care providers.
Scotland (United Kingdom)	Headspace	Access to specialist support is available to students, specifically targeting mental health. This programme has been reported to reduce referrals to general practitioners and child and adolescent mental health services.

Source: 21st Century Children Policy Questionnaire

Health interventions and programmes in schools are implemented along one of three tiers:

1. Universal whereby the whole school or classroom is targeted.
2. Selective interventions target subgroups that are at a higher risk of developing a health issue than their peers.
3. Indicated and treatment interventions target those who are already showing signs of a health issue (Costello, Egger and Angold, 2005^[48]).

Many school-based interventions also target health behaviours and attitude changes. Some examples include changing attitudes towards risky behaviours, building awareness of healthy behaviours, teachers and school staff as role models (modelling healthy behaviours) and building healthy school environments (Aston, 2018^[30]). Other forms of support include providing access to goods that children need for their health or well-being, such as menstrual products (see Box 10.6), or to contraceptive products as is the case in France (since 2008 all high schools are required to be equipped with at least one automatic condom dispenser). Effective interventions and service delivery on the whole rely on forming key partnerships between education and health sector actors.

Box 10.6. Nobody left out. Period.

The importance of ameliorating period poverty

Still to this day the topic of menstruation is shrouded in taboo. In recent years global efforts to lift this shroud have attempted to empower and educate individuals about their periods and period hygiene, as well as tackle cultural stigma that is still prominent in many societies. The abolishment of the “tampon tax” in many countries such as Australia, Canada, Colombia and Germany, whereby menstrual health products have traditionally been subject to value-added sales tax (taxed as luxury products rather than basic necessities that would be tax exempt), has been a step in the right direction for “menstrual equity”. However, the taboo persists in many societies, with many around the world suffering from period poverty (i.e. experiencing financial barriers to accessing adequate sanitary products). Not to mention the potential health problems (e.g. caused by using unhygienic items), period poverty can result in missing school and can thereby perpetuate disadvantage (Sommer et al., 2015^[49]). Often thought of as an issue affecting those in low to middle income countries, period poverty resulting in missed school days is a reality in OECD countries as well and systems are finding ways of addressing this issue.

In New Zealand, a 2021 policy to support young people in period poverty will be rolled out with a NZD 2.6 million investment whereby the Ministry of Education will provide free period products in schools. A 2019 survey highlighted that 12% of students in years 9-13 (age 12-18) who had their period experienced difficulty in getting period products due to cost. This inequity disproportionately affected Maori and Pacific students, and students in disadvantaged communities (Youth2019, 2020^[50]). In 2018, Scotland became the first country in the world to provide free sanitary products in schools, colleges and universities. Students benefitting from this GBP 5.2 million programme have reported that having easy access to these products at school has had a positive impact, and it has also sparked more of an open conversation, that has relied heavily on student initiative and involvement, around periods to reduce associated stigma (Scottish Government, 2019^[51]).

Research suggests that school-based interventions can have promising effects on youth health outcomes. For example, school-based health centres in the United States that provide sexual health services can improve reproductive health outcomes in young people (such as reducing teen rates of sexually transmitted diseases), and students tend to view these centres positively (McCann et al., 2020^[52]). Embedding mental health services in schools is linked to enhanced student mental health and educational attainment (Fazel et al., 2014^[53]). In order to implement sustainable school-based interventions, school leadership should be

committed to its continuity and school staff involved in implementation (whether this is teachers or health professionals) must be knowledgeable and motivated to continue delivering the programmes. Student engagement and available resources are also important factors influencing continuity of programming (Herlitz et al., 2020^[54]), resources being a potential barrier especially for disadvantaged schools.

Movement for all: Promoting physical activity in and out of school

Despite the policy attention rates of physical activity in children and youth have been declining in recent years in many countries. Only 19% of adolescent respondents in the HBSC 2017/2018 survey achieved the recommended daily amount of 60 minutes of moderate-to-vigorous physical activity (Inchley et al., 2020^[9]). A number of factors contribute to child physical activity rates. For example, children from higher socio-economic backgrounds are more likely to do more activity than their disadvantaged peers and boys tend to get more exercise per day than girls (Inchley et al., 2020^[9]). Opportunities for participation in sports are also affected by relative advantage or disadvantage, with more disadvantaged individuals having less access overall, despite the push in many European countries for “Sports for All” initiatives (Vandermeersch et al., 2016^[55]). Education is also a protective factor as those who are more highly educated tend to engage in more physical activity (Costa-Font and Gil, 2013^[56]), and age affects rates with trends in physical activity rates generally decline as children get older, especially once they reach school age (Farooq et al., 2017^[57]; Reilly, 2016^[58]).

Irrespective of background and demographic factors, many children do not engage in recommended amounts of physical activity, of which guidelines across countries are relatively consistent recommending 60 minutes or more per day of moderate to vigorous physical activity for school-aged children (Konstabel et al., 2014^[59]). Inadequate physical activity has implications for health outcomes such as obesity and overweight (Konstabel et al., 2014^[59]), mental health outcomes (Biddle and Asare, 2011^[60]), and physical activity tends to correlate positively with academic outcomes (Kari et al., 2017^[61]; Erwin et al., 2012^[62]). In the early years, physical activity, especially activity that is at least moderate-to-vigorous, is associated with motor development, fitness, and bone and skeletal health (Carson et al., 2017^[63]). For children, both in the early years and for those who are school-aged the rule of thumb generally seems to be that more is better when it comes to health outcomes (Carson et al., 2017^[63]; Janssen and LeBlanc, 2010^[64]). For children aged 5-17, while benefits can be seen from engaging in 30 minutes per day, at least 60 minutes per day will bring more benefit (Janssen and LeBlanc, 2010^[64]) and meeting physical activity guidelines versus being inactive across the population level is associated with lower levels of mortality (Long et al., 2015^[65]).

Policies and practices

Many education systems have implemented initiatives to increase the amount of physical activity and sport children do during the school day. These programmes tend to be universal, encouraging all students to take part and increase their movement and physical activity during the day and sometimes provide the only opportunities to engage in sports and activity for disadvantaged students.

Evaluating programmes to determine efficacy is important. For example the University of Luxembourg studied the outcomes of the Clever Move initiative, and found that 70% of students thought including movement during class time made it more enjoyable than traditional lessons. Another example of programme evaluation was in Finland for the Finnish Schools on the Move programme. This was piloted in 2010-2012, and as of August 2018 more than 90% of municipalities and 88% of comprehensive schools were involved. Examples of areas that schools evaluate themselves on include: students spending breaks outdoors, agreed upon practices to break up periods of excessive sitting during lessons, ensuring enough bicycle parking and storage for helmets, cooperation with local organisations to arrange activities, and that school staff and students jointly participate in promoting physical activity. EUR 21 million was allocated over 2016-18 specifically to implement this initiative, with additional grant funding for programmes such as cooperation between sports clubs and schools, renovation of school years and acquiring sporting goods and equipment.

Table 10.5. Initiatives promoting children's physical activity

Country	Initiative	Goals
Australia	Sport 2030: National Sport Plan	This is a long-term strategy covering participation, performance, prevention through physical activity. This plan aligns with the Australian Curriculum, and also includes recommendations for including physical activity for students during school time.
Belgium (Flemish Community)	Action Plan to strengthen health policy in schools	Focus on promoting exercise, and sport friendly infrastructure in schools. In partnership with MOEV , there is a range of practical materials for providing information to schools, students and parents on how to get more active, and organised activities (often free) such as mountain biking, football and swimming. MOEV helps schools develop movement policies, embedded in school health policies.
Canada	Decentralised programming	Provinces and territories use policies or curricular measures to increase physical activity in schools. Approaches include prescribed number of physical education minutes over the course of the school week, or mandatory courses.
Finland	Schools on the Move	The programme targets schools and municipalities, which implement individual plans to increase physical activity, focusing on areas outside of physical education, during the school day.
Ireland	Curricular 0013/2016	This gives information to schools and the education sector on their important role in promoting the national Healthy Ireland agenda through contributing to different elements of well-being in young people. This curricular highlights and emphasises the importance of physical activity and healthy eating.
Ireland	Active School Flag Programme	This programme has three main pillars, curricular physical education, physical activity and partnerships. Active School Week programmes are also common in Irish schools, with many committing to having it included in the annual calendar. The Active School Flag is awarded to schools that thrive to achieve a school community that is physically educated and active.
Latvia	<i>Sporto visa klase</i>	Aim to strengthen the role of sports in society, inspire children to engage in regular activity and to monitor the effects of physical activity on their health. Inaugurated in 2014, this programme is targeted for children in grades 2-6 who receive two mandatory physical education lessons per week. The programme provides three optional lessons per week, thereby providing the opportunity for children to engage in daily physical activity. Lessons are intended for different activities such as swimming, football and general physical fitness.
Luxembourg	Clever Move	Schools that encourage students to move more during the day will receive the Clever Move label. The initiative advocates for movement breaks during lessons, for up to 15-20 minutes per day.
Portugal	<i>Desporto Escolar</i>	Promote sports and physical activity in all students. Promote healthy habits and values such as discipline, respect, solidarity, courage. Training available for teachers.
Québec (Canada)	<i>À l'école, on bouge!</i>	Support for preschool and primary schools to ensure students are physically active for at least 60 minutes per day. Schools where this measure is in place can sign up for the "Force 4 du Grand Défi Pierre Lavoie" programme, and will receive support over a three-year period as an incentive to promote structural change for new ways of doing things, in terms of both organisation and activities.
Switzerland	<i>Schule bewegt</i>	The School Moves programme in Switzerland is to promote more movement in schools. It advocates for teachers taking active or calming movement breaks during class time, depending on the needs of the learners, and also how teachers can incorporate movement into the teaching and learning process.

Source: 21st Century Children Policy Questionnaire

Ways in which education systems can promote equitable outcomes in terms of physical activity include:

- providing affordable or subsidised access to after school sports or sports clubs.
- ensuring safe play spaces, outdoors or indoors, are available for recreational use (and encouraging their use) during breaks, recess or after school.
- adapting programming to be inclusive and accessible for children with special needs.
- including children's opinions in the development and implementation of programming, ensuring representation from disadvantaged students and those with special needs.

It is important to note that effective interventions targeting behaviours such as physical activity and nutrition often have limited effects (Russ et al., 2015^[66]; Jago et al., 2015^[67]). However, some mediating factors that can affect programme success include child engagement (when children feel they have some autonomy over their behaviour this can increase success), teachers role modelling healthy diet and physical activity behaviours, engaging parents and community members, and providing adequate resourcing (Jago et al., 2015^[67]). Interventions should also start early, as rates of physical activity may start declining as early as age seven (Farooq et al., 2017^[57]), with a concurrent increase in sedentary time (Reilly, 2016^[58]).

Box 10.7. Movement in the classroom

Physical education need not be the only opportunity in the school day for children to be active and enjoy movement. Programmes such as *TAKE 10!* are designed and implemented to reduce sedentary time and increase movement during teaching and learning time outside of PE. This initiative has been associated with increased focus on learning, increased physical activity during the school day and can be used by schools to help with wellness initiatives (Kibbe et al., 2011^[68]).

Classrooms that incorporate physical activity in the teaching and learning process may see slightly improved academic achievement and may enhance student enjoyment of lessons. A recent systematic review and meta-analysis highlights some of the limitations of the research base in terms of statistical randomised controlled trials. Few studies included measures on cognitive abilities and attention (Bedard et al., 2019^[69]).

Pedagogies such as embodied learning, where the main idea is that students who consciously use their bodies to learn are more engaged than those who are at a desk or a computer, can involve integration of physical education and dance into academic tasks and core subject areas (Paniagua and Istance, 2018^[70]). Creative activities based on self-expression and aesthetics are more likely to engage learners than academic activities.

In some countries, policy initiatives embed movement into the school day. For example, in [Denmark](#) primary school pupils need to move for an average of 45 minutes per day, which is to be ensured by the school head. Teachers can incorporate movement throughout the day in different ways such as including short bouts of activity during traditional teaching and learning activities in the classroom, or during specific periods dedicated to movement and exercise. This can be in collaboration with local sports associations, and can take place in sports fields, the gym, the classroom or outside.

Focusing on encouraging behaviour changes that make sense to children and including their input in the development and implementation of programmes that affect their lives in and out of school is key in developing long lasting and effective change. Furthermore, continuing efforts with measuring outcomes and evaluating progress of these interventions are key steps in ensuring accountability and promoting effective use of scarce resources. Interventions targeting behaviour change will be more difficult to evaluate than programmes with easier to measure indicators of effectiveness or programme delivery (e.g. number of school meals delivered to children).

Tackling digital inequalities

Children will often turn to the Internet to seek health-related information, whether through websites, apps, games and other modalities. Research suggests that this behaviour can have potential positive impacts on health outcomes, with particularly strong evidence for mental health (Liverpool et al., 2020^[71]). However, digital inequalities, in access to digital devices or digital skill level (Burns and Gottschalk, 2019^[10]) can undermine children's health information seeking and participation in these interventions.

Digital inequalities are persistent. Despite increasing access to digital tools, inequalities in skills, attitudes and usages remain and in some instances have widened in the last decade. These issues are high on the policy agenda of education systems around the OECD, especially with the expansion of digital education strategies and the use of digital tools in the teaching and learning process, especially post COVID-19 crisis (for more see Chapter 3). Now more than ever, education systems need to address digital inequalities and coordinated efforts across different sectors of government are important to address the underlying factors influencing these inequalities.

In sum

Education systems play a key role in empowering students to become well-informed decision makers in terms of their own health, and for those around them. Through fostering key skills and incorporating important topics such as health, digital skills, and well-being into the teaching and learning process, children will be able to search for and verify important information online, or find who to turn to in times of need. Providing programming that targets equitable health outcomes is also essential, especially in the post COVID-19 era as many children around OECD countries live in disadvantaged circumstances that have worsened during the pandemic. Barriers for children to access healthy food, primary care, and to equitable participation in the digital sphere are essential to overcome.

It is clear around OECD countries that many have made efforts and large strides in targeting the skills, competences, as well as health needs of children. There is room to grow in many countries however, and focusing on equitable programming and targeting students in need to ameliorate both health and educational outcomes should be at the forefront of education and health policy agendas. Education systems also need to focus on key challenges schools face in implementing health interventions which include lack of staff support, lack of resources and facilities, initiative overload, low school autonomy and government-led academic priorities to name some examples (Christian et al., 2015^[72]). This is especially important for schools that are disadvantaged or serve more disadvantaged populations. Key partnerships between education and health experts and policy makers will be necessary in developing and implementing effective and cost-effective school-based programming.

References

- Abrams, M., P. Klass and B. Dreyer (2009), "Health literacy and children: Introduction", [23]
Pediatrics, Vol. 124/Supplement 3, pp. S262-S264, <http://dx.doi.org/10.1542/peds.2009-1162a>.
- American Academy of Pediatrics (2016), "Achieving quality health services for adolescents", [45]
Pediatrics, Vol. 138.
- Ashby, S. et al. (2016), "Measurement of the dimensions of food insecurity in developed [36]
 countries: A systematic literature review", *Public Health Nutrition*, Vol. 19/16, pp. 2887-2896,
<http://dx.doi.org/10.1017/s1368980016001166>.
- Aston, R. (2018), "Physical health and well-being in children and youth: Review of the literature", [30]
OECD Education Working Papers, No. 170, OECD Publishing, Paris,
<https://dx.doi.org/10.1787/102456c7-en>.
- Baltag, V., A. Pachyna and J. Hall (2015), "Global overview of school health services: Data from [46]
 102 countries", *Health Behavior and Policy Review*, Vol. 2/4, pp. 268-283,
<http://dx.doi.org/10.14485/HBPR.2.4.4>.
- Bedard, C. et al. (2019), "A systematic review and meta-analysis on the effects of physically [69]
 active classrooms on educational and enjoyment outcomes in school age children", *PLOS*
ONE, Vol. 14/6, p. e0218633, <http://dx.doi.org/10.1371/journal.pone.0218633>.
- Biddle, S. and M. Asare (2011), "Physical activity and mental health in children and adolescents: [60]
 A review of reviews", *British Journal of Sports Medicine*, Vol. 45/11, pp. 886-895,
<http://dx.doi.org/10.1136/bjsports-2011-090185>.

- Boonstra, H. (2015), "Meeting the sexual and reproductive health needs of adolescents in school-based health centers", *Guttmacher Policy Review*, Vol. 18/1, <https://www.guttmacher.org/gpr/2015/04/meeting-sexual-and-reproductive-health-needs-adolescents-school-based-health-centers>. [47]
- Bradbury-Jones, C., L. Isham and J. Taylor (2018), "The complexities and contradictions in participatory research with vulnerable children and young people: A qualitative systematic review", *Social Science & Medicine*, Vol. 215, pp. 80-91, <http://dx.doi.org/10.1016/j.socscimed.2018.08.038>. [3]
- Burns, T. and F. Gottschalk (eds.) (2019), *Educating 21st Century Children: Emotional Well-Being in the Digital Age*, Educational Research and Innovation, OECD Publishing, Paris, <https://dx.doi.org/10.1787/b7f33425-en>. [10]
- Carson, V. et al. (2017), "Systematic review of the relationships between physical activity and health indicators in the early years (0-4 years)", *BMC Public Health*, Vol. 17, <http://dx.doi.org/10.1186/s12889-017-4860-0>. [63]
- Christian, D. et al. (2015), "Community led active schools programme (CLASP) exploring the implementation of health interventions in primary schools: Headteachers' perspectives", *BMC Public Health*, Vol. 15/1, <http://dx.doi.org/10.1186/s12889-015-1557-0>. [72]
- Cooc, N. (2018), "Who needs special education professional development?: International trends from TALIS 2013", *OECD Education Working Papers*, No. 181, OECD Publishing, Paris, <https://dx.doi.org/10.1787/042c26c4-en>. [29]
- Costa-Font, J. and J. Gil (2013), "Intergenerational and socioeconomic gradients of child obesity", *Social Science & Medicine*, Vol. 93, pp. 29-37, <http://dx.doi.org/10.1016/j.socscimed.2013.05.035>. [56]
- Costello, E., H. Egger and A. Angold (2005), "10-Year research update review: The epidemiology of child and adolescent psychiatric disorders: I. Methods and public health burden", *Journal of the American Academy of Child & Adolescent Psychiatry*, Vol. 44/10, pp. 972-986, <http://dx.doi.org/10.1097/01.chi.0000172552.41596.6f>. [48]
- Darmon, N. and A. Drewnowski (2015), "Contribution of food prices and diet cost to socioeconomic disparities in diet quality and health: A systematic review and analysis", *Nutrition Reviews*, Vol. 73/10, pp. 643-660, <http://dx.doi.org/10.1093/nutrit/nuv027>. [32]
- Dunn, C. et al. (2020), "Feeding low-income children during the Covid-19 pandemic", *New England Journal of Medicine*, Vol. 382/18, p. e40, <http://dx.doi.org/10.1056/nejmp2005638>. [41]
- Erwin, H. et al. (2012), "A quantitative review of physical activity, health, and learning outcomes associated with classroom-based physical activity interventions", *Journal of Applied School Psychology*, Vol. 28/1, pp. 14-36, <http://dx.doi.org/10.1080/15377903.2012.643755>. [62]
- Farooq, M. et al. (2017), "Timing of the decline in physical activity in childhood and adolescence: Gateshead Millennium Cohort Study", *British Journal of Sports Medicine*, Vol. 52/15, pp. 1002-1006, <http://dx.doi.org/10.1136/bjsports-2016-096933>. [57]
- Fazel, M. et al. (2014), "Mental health interventions in schools in high-income countries", *The Lancet Psychiatry*, Vol. 1/5, pp. 377-387, [http://dx.doi.org/10.1016/s2215-0366\(14\)70312-8](http://dx.doi.org/10.1016/s2215-0366(14)70312-8). [53]

- Herlitz, L. et al. (2020), "The sustainability of public health interventions in schools: A systematic review", *Implementation Science*, Vol. 15/1, <http://dx.doi.org/10.1186/s13012-019-0961-8>. [54]
- HLS-EU Consortium (2012), *Comparative report of health literacy in eight EU member states*. [22]
- Inchley, J. et al. (eds.) (2020), "Spotlight on adolescent health and well-being", Findings from the 2017/2018 Health Behaviour in School-aged Children (HBSC) survey in Europe and Canada, International report. [9]
- Jago, R. et al. (2015), "Lessons learned from the AFLY5 RCT process evaluation: Implications for the design of physical activity and nutrition interventions in schools", *BMC Public Health*, Vol. 15/1, <http://dx.doi.org/10.1186/s12889-015-2293-1>. [67]
- Janssen, I. and A. LeBlanc (2010), "Systematic review of the health benefits of physical activity and fitness in school-aged children and youth", *BioMed Centra*, pp. 1-16, <http://dx.doi.org/10.1186/1479-5868-7-40>. [64]
- Kari, J. et al. (2017), "Longitudinal associations between physical activity and educational outcomes", *Medicine & Science in Sports & Exercise*, Vol. 49/11, pp. 2158-2166, <http://dx.doi.org/10.1249/mss.0000000000001351>. [61]
- Kibbe, D. et al. (2011), "Ten Years of TAKE 10!®: Integrating physical activity with academic concepts in elementary school classrooms", *Preventive Medicine*, Vol. 52/SUPPL., pp. S43-S50, <http://dx.doi.org/10.1016/j.ypmed.2011.01.025>. [68]
- Konstabel, K. et al. (2014), "Objectively measured physical activity in European children: The IDEFICS study", *International Journal of Obesity*, Vol. 38/2, pp. S135-S143, <http://dx.doi.org/10.1038/ijo.2014.144>. [59]
- Liverpool, S. et al. (2020), "Engaging children and young people in digital mental health interventions: Systematic review of modes of delivery, facilitators, and barriers", *Journal of Medical Internet Research*, Vol. 22/6, p. e16317, <http://dx.doi.org/10.2196/16317>. [71]
- Long, G. et al. (2015), "Mortality benefits of population-wide adherence to national physical activity guidelines: A prospective cohort study", *European Journal of Epidemiology*, Vol. 30/1, pp. 71-79, <http://dx.doi.org/10.1007/s10654-014-9965-5>. [65]
- Mathias, K. et al. (2012), "Serving larger portions of fruits and vegetables together at dinner promotes intake of both foods among young children", *Journal of the Academy of Nutrition and Dietetics*, Vol. 112/2, pp. 266-270, <http://dx.doi.org/10.1016/j.jada.2011.08.040>. [35]
- McCann, H. et al. (2020), "Sexual health services in schools: A successful community collaborative", *Health Promotion Practice*, p. 152483991989430, <http://dx.doi.org/10.1177/1524839919894303>. [52]
- Ministre de l'Enseignement obligatoire et de Promotion sociale (2013), *Education à la vie relationnelle, affective et sexuelle (EVRAS)*. [17]
- Moreira, L. (2018), "Health literacy for people-centred care: Where do OECD countries stand?", *OECD Health Working Papers*, No. 107, OECD Publishing, Paris, <https://dx.doi.org/10.1787/d8494d3a-en>. [20]
- OECD (2020), "Coronavirus special edition: Back to school", *Trends Shaping Education Spotlights*, No. 21, OECD Publishing, Paris, <https://dx.doi.org/10.1787/339780fd-en>. [11]

- OECD (2020), *Love & let live*, OECD Publishing, <https://doi.org/10.1787/e6d23b76-en>. [16]
- OECD (2019), “A healthy mind in a healthy body”, *Trends Shaping Education Spotlights*, No. 17, OECD Publishing, Paris, <https://dx.doi.org/10.1787/eb25b810-en>. [19]
- OECD (2019), *Changing the odds for vulnerable children: Building opportunities and resilience*, OECD Publishing, Paris, <https://dx.doi.org/10.1787/a2e8796c-en>. [7]
- OECD (2019), *Education At a Glance 2019: OECD Indicators*, OECD Publishing, Paris, <https://dx.doi.org/10.1787/f8d7880d-en>. [40]
- OECD (2019), *TALIS 2018 results (Volume I): Teachers and school leaders as lifelong learners*, TALIS, OECD Publishing, Paris, <https://dx.doi.org/10.1787/1d0bc92a-en>. [28]
- OECD (2019), *Trends Shaping Education 2019*, OECD Publishing, Paris, https://dx.doi.org/10.1787/trends_edu-2019-en. [6]
- OECD (2018), “The future of education and skills: Position paper”, [https://www.oecd.org/education/2030-project/about/documents/E2030%20Position%20Paper%20\(05.04.2018\).pdf](https://www.oecd.org/education/2030-project/about/documents/E2030%20Position%20Paper%20(05.04.2018).pdf). [5]
- OECD (2017), *Educational opportunity for all: Overcoming inequality throughout the life course*, Educational Research and Innovation, OECD Publishing, Paris, <https://dx.doi.org/10.1787/9789264287457-en>. [8]
- OECD (2017), *PISA 2015 Results (Volume III): Students’ Well-Being*, OECD Publishing, Paris, <https://dx.doi.org/10.1787/9789264273856-en>. [21]
- OECD (2015), *Skills for Social Progress: The Power of Social and Emotional Skills*, OECD Publishing, Paris, <https://dx.doi.org/10.1787/9789264226159-en>. [12]
- Okan, O. et al. (2018), “Generic health literacy measurement instruments for children and adolescents: A systematic review of the literature”, *BMC Public Health*, Vol. 18/1, <http://dx.doi.org/10.1186/s12889-018-5054-0>. [25]
- Paniagua, A. and D. Istance (2018), *Teachers as Designers of Learning Environments: The Importance of Innovative Pedagogies*, OECD Publishing, Paris, <https://dx.doi.org/10.1787/9789264085374-en>. [70]
- Park, E. and M. Kwon (2018), “Health-related internet use by children and adolescents: Systematic review”, *Journal of Medical Internet Research*, Vol. 20/4, p. e120, <http://dx.doi.org/10.2196/jmir.7731>. [26]
- Pereira, A., S. Handa and G. Holmqvist (2017), “Prevalence and correlates of food insecurity among children across the globe”, *Innocenti Working Papers*, No. 2017/9, United Nations, New York, <https://dx.doi.org/10.18356/9206b37d-en>. [37]
- Prout, A. (2005), *The Future of Childhood: Towards the Interdisciplinary Study of Children*, Routledge Falmer, London and New York. [2]
- Rand, C. and N. Goldstein (2018), “Patterns of primary care physician visits for US adolescents in 2014: Implications for vaccination”, *Academic Pediatrics*, Vol. 18/2, pp. S72-S78, <http://dx.doi.org/10.1016/j.acap.2018.01.002>. [44]

- Reilly, J. (2016), “When does it all go wrong? Longitudinal studies of changes in moderate-to-vigorous-intensity physical activity across childhood and adolescence”, *Journal of Exercise Science & Fitness*, Vol. 14/1, pp. 1-6, <http://dx.doi.org/10.1016/j.jesf.2016.05.002>. [58]
- Russ, L. et al. (2015), “Systematic review and meta-analysis of multi-component interventions through schools to increase physical activity”, *Journal of Physical Activity and Health*, Vol. 12/10, pp. 1436-1446, <http://dx.doi.org/10.1123/jpah.2014-0244>. [66]
- Scaglioni, S. et al. (2018), “Factors influencing children’s eating behaviours”, *Nutrients*, Vol. 10/6, p. 706, <http://dx.doi.org/10.3390/nu10060706>. [33]
- Schalkwijk, A. et al. (2017), “The impact of greenspace and condition of the neighbourhood on child overweight”, *European Journal of Public Health*, Vol. 28/1, pp. 88-94, <http://dx.doi.org/10.1093/eurpub/ckx037>. [31]
- Scottish Government (2019), “Free sanitary products for students”, <https://www.gov.scot/news/free-sanitary-products-for-students/>. [51]
- Shankar, P., R. Chung and D. Frank (2017), “Association of food insecurity with children’s behavioral, emotional, and academic outcomes”, *Journal of Developmental & Behavioral Pediatrics*, Vol. 38/2, pp. 135-150, <http://dx.doi.org/10.1097/dbp.0000000000000383>. [38]
- Sommer, M. et al. (2015), “Comfortably, safely, and without shame: Defining menstrual hygiene management as a public health issue”, *American Journal of Public Health*, Vol. 105/7, pp. 1302-1311, <http://dx.doi.org/10.2105/ajph.2014.302525>. [49]
- Sørensen, K. et al. (2012), “Health literacy and public health: A systematic review and integration of definitions and models”, *BMC Public Health*, Vol. 12/1, <http://dx.doi.org/10.1186/1471-2458-12-80>. [18]
- UNESCO (2020), *Switched on: Sexuality education in the digital space*, <https://unesdoc.unesco.org/ark:/48223/pf0000372784>. [15]
- UNESCO (2018), *International technical guidance on sexuality education: An evidence-formed approach*, <https://unesdoc.unesco.org/ark:/48223/pf0000260770>. [13]
- UNESCO (ed.) (2016), *Review of the evidence on sexuality education. Report to inform the update of the UNESCO International Technical Guidance on Sexuality Education*, UNESCO. [14]
- UNICEF (2019), *The State of the World’s Children 2019. Children, food and nutrition: Growing well in a changing world*, UNICEF, New York. [39]
- UNICEF (2017), *Inclusive education: Including children with disabilities in quality learning*. [27]
- United Nations Assembly (1989), *Convention on the Rights of the Child*, United Nations Human Rights Office of the High Commissioner, New York, NY. [1]
- Vandermeersch, H. et al. (2016), “Sports, poverty and the role of the voluntary sector. Exploring and explaining nonprofit sports clubs’ efforts to facilitate participation of socially disadvantaged people”, *VOLUNTAS: International Journal of Voluntary and Nonprofit Organizations*, Vol. 28/1, pp. 307-334, <http://dx.doi.org/10.1007/s11266-016-9799-8>. [55]

- Wardle, J. et al. (2003), "Modifying children's food preferences: The effects of exposure and reward on acceptance of an unfamiliar vegetable", *European Journal of Clinical Nutrition*, Vol. 57/2, pp. 341-348, <http://dx.doi.org/10.1038/sj.ejcn.1601541>. [34]
- WFP, UNICEF and FAO (2020), *Interim guidance note: Mitigating the effects of the COVID-19 pandemic on food and nutrition of schoolchildren*, <http://dx.doi.org/10.4060/ca8434en>. [43]
- Winkelman, T. et al. (2016), "Promoting health literacy for children and adolescents", *PEDIATRICS*, Vol. 138/6, pp. e20161937-e20161937, <http://dx.doi.org/10.1542/peds.2016-1937>. [24]
- Wong, N., M. Zimmerman and E. Parker (2010), "A Typology of youth participation and empowerment for child and adolescent health promotion", *American Journal of Community Psychology*, Vol. 46/1-2, pp. 100-114, <http://dx.doi.org/10.1007/s10464-010-9330-0>. [4]
- World Food Programme (2020), *Global monitoring of school meals during COVID-19 school closures*, <https://cdn.wfp.org/2020/school-feeding-map/index.html>. [42]
- Youth2019 (2020), *Youth19- Period poverty fact sheet*, Youth2019, a Youth2000 Survey. [50]

Note

¹ UNESCO defines comprehensive sexuality education as "a curriculum-based process of teaching and learning about the cognitive, emotional, physical and social aspects of sexuality. It aims to equip children and young people with knowledge, skills, attitudes and values that will empower them to: realize their health, well-being and dignity; develop respectful social and sexual relationships; consider how their choices affect their own well-being and that of others; and, understand and ensure the protection of their rights throughout their lives." (UNESCO, 2018, p. 16_[13]).

11 Education and child safety

Francesca Gottschalk and Tracey Burns

OECD Directorate for Education and Skills, France

One of the most important priorities for parents, policy makers and education systems around the world is keeping children safe. Despite large improvements in many areas of child safety such as reductions in accidental injury and child mortality rates, challenges still remain. Almost a billion children around the world experience violence in one form or another. Many children also face risks to their digital safety, including cyberbullying and privacy concerns. Education plays a key role in protecting children and in many systems, teachers are required to take action when risks to child safety or well-being are suspected. Developing robust policies and providing teachers with the support they need to protect children in both the physical and in the digital environment is essential.

Introduction

Education systems play a key role in empowering children to make informed decisions regarding their health and well-being, behaviour in the digital environment and more. At the same time, education systems and policy makers share responsibility for protecting children from risks in both the physical world and the digital environment. Schools and teachers are responsible for implementing a range of measures to protect children, with the involvement of parents and often in collaboration with other experts and sectors.

Education systems are key actors in upholding child rights and ensuring they are protected and safe. They additionally help children develop the tools to be resilient in the face of adversity (Burns and Gottschalk, 2019^[1]). In many instances they are influential in tackling other issues associated with child safety and health, from physical safety of playground and school buildings to protection from gangs and bullies, both face to face and digital.

Yet protection from risk is not always positive. The notion of “surplus safety” refers to children’s experiences being so severely curtailed due to excessive fear of risks that they limit their life opportunities (Wyver et al., 2010^[2]). One example is overprotective parenting (so-called “helicopter parenting”), which, while well-intentioned, can stifle child autonomy and is linked to potentially negative child outcomes (Ulferts, 2020^[3]; see also Chapter 4 in this volume). Although an important part of child learning, growth and development is letting them learn by making their own mistakes, children’s interactions with their surroundings are increasingly being governed by adults, be they parents, teachers or policy makers, in attempts to protect them from risk and ensure their safety (Smith, 2014^[4]).

Ensuring that children have safe spaces to play and learn and take advantage of the benefits of their environments while also allowing them to take some degree of risk, is important. This is true for both the physical world and outdoor play (Chapter 4) as well as the digital environment (Burns and Gottschalk, 2019^[1]). Separating risk from harm, and teaching children how to manage risk, rather than keeping them away from all danger, is an essential element to resilience and participation in 21st century life.

This chapter will explore the role of education systems as they relate to key areas of child safety and protection in OECD and partner countries, highlighting policies and practices that systems implement in keeping children safe in digital and non-digital environments.

Making spaces safe for kids

The last several decades have increasingly seen an emphasis on child safety, in digital and physical environments. With the introduction of legislation and policy responses on digital safety, the traditional emphasis on physical safety has also entered the digital environment. Digital risks such as cyberbullying and revenge porn can negatively impact child well-being, and concerns over children’s privacy may encompass the collection of children’s personal data by third party actors without the child’s consent. Digital safety initiatives work to ensure children have virtual spaces in which they can safely play, learn, explore and realise the benefits of the digital environment.

In the physical sphere, improved safety regulations and guidelines have resulted in decreasing rates of accidental child mortality and morbidity over the last few decades (see Chapters 1 and 4). Regulations from the introduction of child car seats and seatbelts, enacting safe play space protocols, to broader urban planning and pollution control initiatives have drastically increased child health and safety. However, injuries and well-being concerns caused by intentional violence against children remain a public health concern in many countries. This section will look at safety in digital and physical spaces in turn.

Safe digital spaces

While the digital environment provides tremendous opportunities for children, with greater connectivity comes greater risks. Many digital risks are simply offline risks moving into the digital environment, such as bullying, sexual predation and racism (OECD, 2020^[5]). However there are unique risks in the digital environment including (for more detail see (Hooft Graafland, 2018^[6]) and (Ronchi and Robinson, 2019^[7]):

- Content risks – this risk category encompasses accessing content that is illegal, age-inappropriate or harmful. It also includes receiving harmful advice. Examples include digital hate-speech or exposure to “fake news”.
- Contact risks – like content risks, the child is also the recipient in this case. Contact risks include being on the receiving end of cyberbullying, cybergrooming or sexting.
- Consumer risks – this category refers to children receiving marketing messages that are inappropriate or illegal for children, or that are not easily identifiable as commercial messaging. It also encompasses digital frauds or scams.
- Conduct risks – in this instance, the child is the actor who engages in harmful or inappropriate behaviour in the digital environment not limited to bullying others, illegal activity (downloading, hacking) or creating/sharing harmful material.

One of the risks receiving increased attention in policy and research spheres is privacy and “datafication” of children (Siibak, 2019^[8]). Data derived from children’s digital activity falls into three categories:

1. Data given – data children share about themselves or that is shared by others.
2. Data traces – data left online through cookies or metadata for example.
3. Inferred data – data derived from analysing data given and traces (Stoilova, Nandagiri and Livingstone, 2019^[9]).

The use and misuse of this data gives rise to risks such as algorithms directing children towards harmful advertising, sharing of children’s personal information that could make them targets for inappropriate contact, and children’s data being collected unknowingly or without informed consent (OECD, 2020^[5]). Legislative and policy responses must be proportionate to the level of risk, and increasingly involve co-operation from digital providers. Policy approaches and legislation, such as levying fines, have put pressure on digital platforms and service providers to do more in the effort of protecting children in the digital environment (OECD, 2020^[5]; OECD, 2020^[10]).

Education systems take a number of approaches to tackle challenges to children’s digital safety as outlined in Table 11.1 (see (Ronchi and Robinson, 2019^[7]) and Chapter 12 in (Burns and Gottschalk, 2019^[11]) for more detail). These approaches vary across countries, and sometimes even within countries. When looking at data protection, some countries take a national approach (e.g. Norway) whereas others are more decentralised at the level of the state or province (e.g. Australia and Canada) or to the level of schools and municipalities (e.g. the Czech Republic, Denmark, Ireland, Portugal, Russia and Scotland (United Kingdom)) (Burns and Gottschalk, 2019^[11]). In Europe these practices must comply with the General Data Protection Regulation, however implementation and student data protection is generally coordinated by individual schools or municipalities, so different practices might be seen.

Despite these efforts, policy responses are sometimes fragmented and a lack of consistent measuring and reporting (including varying definitions and terminology) makes evidence-informed policy making a challenge (Burns and Gottschalk, 2019^[11]; OECD, 2020^[10]). Scholars in the field advocate for a more policy-relevant and comprehensive approach to studying digital data and privacy implications regarding children’s digital engagement, as well as the potential harms associated with infringing on children’s privacy (Stoilova, Nandagiri and Livingstone, 2019^[9]). Equipping children, parents and teachers with the skills and knowledge on how to keep themselves and their data safe in the digital environment is essential.

Table 11.1. Promoting digital safety: country examples

Challenges	Policy/practice type	Examples
Cyberbullying	Informational campaigns and resources	Ireland: Webwise is the Irish Internet Safety Awareness Centre. It develops and disseminates resources to help teachers integrate Internet safety into their teaching, and provides information to parents, including developing awareness resources and campaigns on topics like cyberbullying.
	Child centred support outside of school and reporting mechanisms	Helplines to phone and receive support in Belgium (French Community), France and Latvia . In Australia , The office of the eSafety Commissioner operates a reporting scheme to deal with serious cyberbullying.
	National frameworks and policy approaches	Action plans to address bullying are in place in Ireland, Saskatchewan (Canada) and Scotland (United Kingdom) .
Sexting and revenge porn	Legal avenues (criminal liability or laws in prohibition)	Australia, Canada, France, Germany, Ireland, Israel, Japan, New Zealand, Spain, Sweden, the United Kingdom, and 46 states + the District of Columbia in the United States have specific laws to address revenge porn.
	Informational resources and campaigns	In Latvia and Portugal informational campaigns disseminating key information about the dangers of underage sexting have been implemented. In Latvia, online tools and resources and a helpline are available.
Security and privacy	Safe log-ins and single sign on	Greece, Norway and Switzerland have all implemented single sign on or safe login programmes for schoolchildren.
	Guidelines for schools	In Luxembourg the Bee Secure initiative outlines rights according to GDPR and provides a forum and instructions on how individuals can lodge complaints or take legal actions. In Belgium (Flemish community), Ireland and Latvia , schools are issued with guidance and resources on data safety practices.
	National laws and policies	In France and the United States , national laws have been implemented on student data protection. In the Canadian provinces Québec and Nova Scotia , data protection is governed by provincial policies, guiding schools to act within local legal frameworks.
	Integrated approaches (collaboration with different stakeholders and focus on different thematic approaches)	In Hungary the Digital Child Protection Strategy focuses on three pillars: awareness raising and media education, protection and safety, and applying sanctions and providing help. Different actors are involved in awareness raising including the government, NGOs and the private sector.
Access to harmful content and online predators	Secure content policies and filters in schools	The Greek School Network is in charge of operating a control service that applies a secure content policy to prevent children from accessing inappropriate online content.
	Co-operation with computer crime networks	In Greece , collaboration between the Greek School Network and the Computer Crime unit of the Police provides space for schools to engage in meetings and discussions on digital safety.
	Informational resources	In Latvia the Safer Internet Centre provides information and educational activities about harmful content and contact risks.

Note: For a more detailed overview, see Chapter 11 in (Burns and Gottschalk, 2019^[1]).

Source: 21st Century Children Policy Questionnaire

Safe physical spaces

Although one in four individuals in OECD countries lives in rural regions across the OECD, our world is becoming increasingly urban (OECD, 2016^[11]). This highlights the need for child-friendly and inclusive urban planning, and a focus on safety measures in increasingly densely populated areas and around schools. Initiatives aimed at reducing air pollution or traffic in school neighbourhoods can be found in different education systems around the OECD. For example, in the Flemish Community of Belgium, there is a policy initiative aiming at reducing air pollution in school neighbourhoods. The *Paraat voor de schoolstraat* (*Ready for the school street*) initiative effectively pedestrianises streets near schools (barring regional roads or main streets with lots of through traffic) for a set period of time in the morning or the afternoon. Motorised vehicles cannot pass during these times, leaving the streets open for pedestrians and bicycles. Municipalities, communities or parents can request the creation of a school street, which is a voluntary initiative. The effectiveness of this initiative is assessed by monitoring the number of schools that subscribe.

In Korea, the Education Ministry has established guidelines for kindergartens and elementary schools regarding fine dust, and in 2017 the Ministry of Environment of Korea developed the “Comprehensive Action Plan on Fine Dust”. Fine dust are tiny airborne particles such as soot from diesel vehicles and are prominent pollutants in a number of countries including Korea. The Action Plan includes various measures, such as providing funding to build gymnasiums so children can engage in physical activities inside and reduce exposure to these particles, as well as development of standards for the indoor air qualities of facilities that are attended by vulnerable groups like children and elderly. This involves the establishment of air quality monitoring networks, the increase in indoor sports facilities and the conversion of school buses to environmentally friendly vehicles (Lee, 2018^[12]). There is increasing public concern about this dust and the effects it has on people’s health, especially in more vulnerable populations such as children, the elderly and those with respiratory issues (Kang and Kim, 2014^[13])

Yet creating and governing healthy spaces extends far beyond the school and the realm of education. The provision of play spaces is often regulated by specific guidelines and frameworks from multiple ministries (see Table 11.2). These can be monitored by governmental bodies or be the sole responsibility of municipalities such as in Greece and Portugal.

Table 11.2. Examples of guidelines governing safe play spaces

Country	Guideline/goals	Issuing body
Czech Republic	Ensure that sanitary requirements for premises and operation of the facilities and establishments for the upbringing and education of children and adolescents are respected.	Department of Health
Ireland	Specific guidelines on safe play spaces to improve design and functionality of school buildings.	DES Planning and Building unit
Japan	Guidelines for Safety of Playground Equipment in Urban Parks.	Ministry of Land, Infrastructure, Transport and Tourism
	Guidelines for School infrastructure.	
Latvia	Guidelines created in 2012 for safety requirements for child play spaces; their use is voluntary. Child play spaces in childcare settings (such as in supermarkets) must be publicly registered, ensuring safety and hygiene regulations.	Consumer Rights Protection Centre of Latvia
Russia	Define state standards for equipment and coverage of children’s playgrounds, building codes and regulations and sanitary norms.	
Sweden	Recommendations on the quality of children’s outdoor environments and play spaces.	National Board of Housing, Building and Planning

Source: 21st Century Children Policy Questionnaire

The design of play spaces should indeed be a component of a broader policy agenda aimed at child-friendly urban planning. Child-friendly urban planning and design involves a set of ideas about designing cities so that children are active and visible, and have opportunities to play and get around their neighbourhood and the wider city (Gill, 2017^[14]). This idea emphasises the importance of the built environment as a factor in children’s development, recognising the potential of design to unite a set of other agendas, including health and well-being, resilience and safety (ARUP, 2017^[15]). In addition to the external space that children inhabit, the quality of indoor spaces is also important to monitor and regulate.

Box 11.1. Indoor pollution and child health

Children spend a lot of time indoors, with a large portion at school. While indoor pollution has been declining, it is still a contributing factor to poor health. As childhood is an important time for physical and cognitive development, avoiding early exposure to air pollution as much as possible is important. A study by the Royal College of Paediatrics and Child Health in the United Kingdom highlighted the links between indoor pollution and children's respiratory health that include respiratory problems, eczema and other skin conditions, as well as implications for child cognition (RCPCH, 2020^[16]). There is some research suggesting that air pollutants are found in classrooms, and that poor air quality can have effects on child health, as well as school attendance and performance (Annesi-Maesano et al., 2013^[17]).

Addressing this issue and ensuring clean air in classrooms requires a multi-sectoral approach and the coordination of various actors. Education, environmental and health policy are essential areas needed to coordinate effective population-wide responses to this challenge.

Violence, bullying and abuse

The United Nations Convention on the Rights of the Child posits freedom from violence as a fundamental right of children (United Nations Assembly, 1989^[18]). Despite this, children around the globe are subjected to violence in different situations, with their first exposure likely to occur in the home. Globally over 1 billion children aged 2-17 experience violence, which amounts to over half of all children (Hillis et al., 2016^[19]).

It is important to account for the different forms violence can take including physical violence, sexual violence and emotional violence (which can include acts that affect the emotional health and development of a child such as restricting their movements, ridicule, threats, and other forms of hostile treatment that are nonphysical) (Maternowska, Potts and Fry, 2016^[20]). Although there is little comparative data on prevalence of child maltreatment across OECD countries (OECD, 2019^[21]), it is crucial to develop and reinforce this. Child maltreatment has major implications for development and can undermine well-being, learning, the development of social relationships and trust, and long-term life outcomes.

Children most often experience violence, both physical and emotional, at the hands of household members followed by student peers (Devries et al., 2018^[22]). School bullying is one of the most prevalent forms of youth violence, although young people engage in different violent behaviours both in-person and digitally (Inchley et al., 2020^[23]). PISA 2018 reports that many parents consider safety as their number one concern when choosing a school for their child (OECD, 2019^[24]). This might reflect parental anxieties about bullying and violence in and around schools, despite the general decreasing trend of bullying rates across many countries (Inchley et al., 2020^[23]).

Different groups of children may be more or less vulnerable to experiencing different forms of violence, and to being perpetrators of violence themselves. For example, children with disabilities are at a higher risk of bullying victimisation (Emerson, 2012^[25]) and violence (Jones et al., 2012^[26]), and immigrant youth tend to report more bullying victimisation than non-immigrants with more pronounced differences for first than second-generation immigrants (Stevens et al., 2020^[27]). Boys in general tend to engage more in physical fighting than girls, with rates declining with age (Inchley et al., 2020^[23]). In general, rates of physical violence from other students and caregivers decline over adolescence while emotional violence remains relatively constant across age (Devries et al., 2018^[22]).

Adverse childhood experiences including abuse, neglect and witnessing domestic violence, have been associated with negative health outcomes and behaviours later in life such as chronic illness and disease, mental health disorders, high perceived stress, relationship problems and substance abuse (Anda et al.,

2010^[28]). Exposure to traumatic stress in childhood can impact neurodevelopment, and child maltreatment has been linked to long-term brain changes in structure and function (Anda et al., 2010^[28]). Children are particularly vulnerable to trauma and stressors, due to this being a sensitive time for brain development (Gottschalk, 2019^[29]). Studies have associated adverse childhood experiences with changes in nervous, endocrine and immune systems in children and adults (Danese and McEwen, 2012^[30]), while on the other hand responsive, supportive relationships and consistent routines are associated with positive development and better learning (National Scientific Council on the Developing Child, 2020^[31]).

National governments have implemented many initiatives to combat violence against children. Child protection and alternative care systems are enshrined in law and governed by explicit policies that are being reformed on an ongoing basis (OECD, 2019^[21]). One issue very specifically related to education is corporal punishment (e.g. slapping or spanking). 132 countries around the world prohibit this as a practice in schools, although 68 countries still allow it (UNESCO, 2019^[32]). This also extends to the home sphere: In 1979 Sweden became the first country to make it illegal to spank children in all settings, with other Nordic countries enacting similar legislation soon after. As of 2020, 60 countries had banned corporal punishment in all settings, including the home (Global Initiative, 2020^[33]).

Education systems have a role to play in reducing violence suffered by children in the school setting, notifying relevant bodies when violence or suspected abuse is taking place outside of the school environment, and in bolstering student resilience in dealing with violence and adverse childhood experiences. Early intervention can impact later life outcomes and well-being. The World Health Organization (WHO) advocates for a multi-sectoral approach to preventing youth violence, including input from the health sector and others.

Bullying and fighting

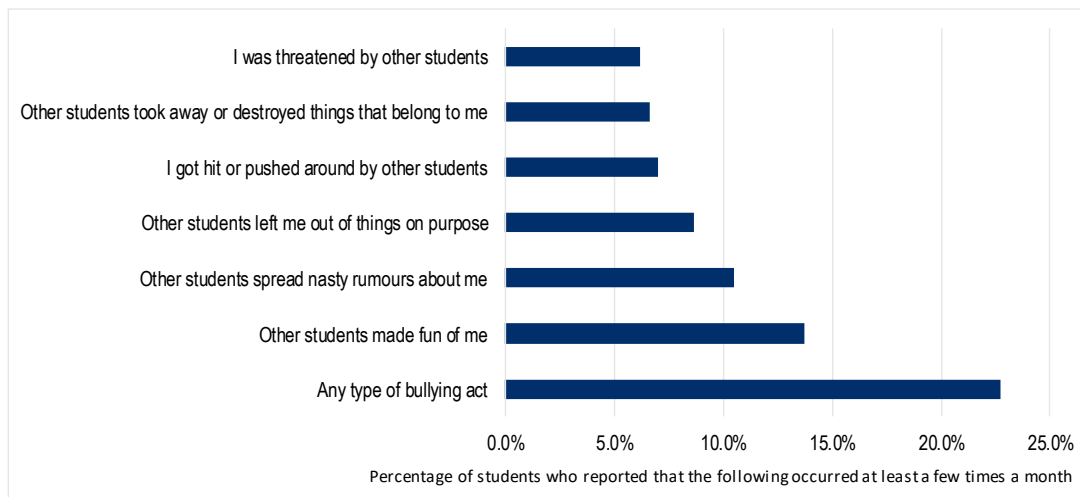
In many countries, youth violence, particularly bullying, is a serious challenge in education systems. PISA 2018 data shows that 23% of students in OECD countries reported being bullied at least a few times a month with 8% reporting as being frequently bullied (OECD, 2019^[24]). PISA and HBSC data both show large between-country difference in terms of reported exposure to bullying (OECD, 2019^[24]; Inchley et al., 2020^[23]). Rates of being bullied at least a few times a month according to PISA ranged from over 40% in students in Brunei Darussalam, the Dominican Republic, Indonesia, Morocco and the Philippines to less than 15% of students in Korea, the Netherlands, Portugal and Chinese Taipei (OECD, 2019^[24]). The good news is that rates of bullying are declining, and despite dramatic headlines in the media, the likelihood of being bullied has not increased (Inchley et al., 2020^[23]). In addition, eight in ten students in PISA 2018 agreed with anti-bullying statements such as that it is “wrong to join in bullying” or that it is “good to help students who are unable to defend themselves” (OECD, 2019^[24]).

In terms of how students are bullied, there are a range of behaviours that bullies employ against their victims such as physical violence, spreading rumours or intentionally leaving someone out. Figure 11.1 shows the prevalence of these types of behaviours across OECD countries in 15 year-old students.

Bullying affects children’s lives in a number of ways. It can impact their emotional well-being, as both perpetrators and victims of bullying are more likely to have depressive and anxiety symptoms, low self-esteem, feelings of loneliness and are prone to losing interest in activities (Choi, 2018^[34]). With the advancement of digital technologies, links between bullies and victims extends well beyond the reach of traditional face to face bullying, extending across space and time beyond the school day and grounds. Cyberbullying also has the potential to reach a greater audience and can remain accessible for much longer, potentially forever. It also facilitates easily copying and distributing material (OECD, 2020^[10]). As a result, the impact may be greater (Hooft Graafland, 2018^[6]).

Bullying can also take a toll on the physical health of students, both directly and indirectly. For example, bullying was associated with a range of physical health outcomes such as substance use, violent behaviour and unsafe sexual behaviour in a sample of over 4 000 students in the United States (Litwiller and Brausch, 2013^[35]).

Figure 11.1. Student exposure to different types of bullying across OECD countries (PISA 2018)



Note: OECD average, based on student reports of bullying acts occurring at least a few times per month.

Source: OECD, PISA 2018 Database, Table III.B1.2.1

Box 11.2. Violent video games

The majority of young people play video games (Lenhart et al., 2015^[36]; Przybylski and Weinstein, 2017^[37]), and despite the potential benefits they afford, the literature on gaming disproportionately focuses on potential negative outcomes (Granic, Lobel and Engels, 2013^[38]). Some scholars argue for a link between playing violent video games and participating in violence offline, such as school shootings (Carnagey, Anderson and Bushman, 2007^[39]; Dillio, 2014^[40]).

However, this is not a black and white issue and the debate as to whether violent video games are related to violence or aggression in children is contentious in academic and policy discourse. Despite some research pointing to potential links between the two, there are scholars who question the strength of these conclusions, noting that measures of aggression used in these studies are poor indication of real aggressive behaviours (see (McCarthy et al., 2016^[41])). Recent research from the United Kingdom found no positive association between violent video game playing and aggressive behaviour or lower levels of prosocial behaviour (Przybylski and Weinstein, 2019^[42]). Furthermore, there is evidence to suggest that playing action video games (which are often first or third-person shooter games) may have positive effects on cognitive processes such as attentional control (see Chapter 8).

Policies and practices

Across countries, many different anti-bullying policies and practices are employed to help reduce the behaviour, educate teachers and parents, and provide routes of recourse for affected individuals (for a fuller overview see (Burns and Gottschalk, 2019^[1])). A number of systems have developed dedicated digital

hubs or have informational resources for students, teachers and parents, and many also develop awareness raising campaigns to inform the general population, not just parents and teachers, about bullying and the harms it can cause.

Table 11.3. Raising awareness about bullying: Digital hubs and campaigns

	Resource	Target audience and content
Australia	Student Wellbeing Hub	- resources for educators, parents and students organised by grade level (primary/secondary) - resources for the following topics: Healthy Minds and Bodies, Protecting Against Bullying, Respecting Diversity, Building Positive Relationships, Safe and Responsible Choices, Being Safe Online
	Bullying. No Way! And National Day of Action	website and day of action managed by the Safe and Supportive School Communities (SSSC) Working Group which is made of representatives responsible for national education, as well representatives from the different States and private education bodies (including independent and Catholic schools)
France	Non au Harcèlement	- the first Thursday in the month of November is considered a national day for the fight against bullying - the campaign aims to educate students, teachers and parents about the dangers of bullying and has a dedicated phone number where individuals can report and talk about instances of bullying
Greece	Network against Violence in Schools	online counselling and support available for teachers and children
Ireland	Tackle Bullying Website	offers resources, forums and tools for reporting bullying for parents, students, teachers and schools
Latvia	"Katrina" and "Roberts" Campaign (2016)	- videos to help and motivate children and teachers to recognise and not ignore bullying and to understand the reality and consequences of the problem - teacher training as well as educational classes for children
New Zealand	Bullying-free New Zealand	- information and resources to support schools, students and parents - resources ranging from approaches to preventing and responding to bullying, to professional development modules and classroom activities to a collective bank for sharing good ideas
United States	Stopbullying.gov	- resources for students, educators and parents - topics: guidelines for policies and rules, laws and policies, media guidelines, online training, digital awareness resources for parents
	National Bullying Prevention Awareness Month and stompoutbullying.org	resources for the media and communities to engage with and disseminate

Source: 21st Century Children Policy Questionnaire

Other anti-bullying measures generally found across education systems include providing teachers with dedicated training on how to identify and appropriately deal with cases of bullying, guidelines and advice from education ministries on the development and implementation of anti-bullying programmes in schools, incorporating anti-bullying learning opportunities into the curriculum such as in physical education or into school assemblies and promoting collaboration among teachers and parents such as through online forums and tools. Some systems employ an integrated approach to combatting bullying. For example in Greece the Network against Violence in Schools, established in 2010 by the Ministry of Education and the General Secretariat for Youth and the Children's Ombudsman, strives to create dialogue and understanding through scientific and social dialogue on what bullying is and how systems can effectively intervene. The Network also provides training and support to teachers, promotes research on the topic of bullying, and focuses on raising awareness in students, parents and society. Alongside telephone and online counselling for teachers, parents and students, the Network has a unit that can intervene in cases of violence or intimidation.

Education ministries also establish or fund external groups or foundations that focus efforts on anti-bullying. For example the School and Safety Foundation in the Netherlands aims to create healthy school environments that are safe and social. One of the main pillars of a safe school is that it prevents, recognises and addresses transgressive behaviours such as bullying and violence. The Foundation helps ensure a safe school environment through encouraging sharing of knowledge, experiences and expertise, and through advising and supporting schools on how to stimulate positive behaviour.

Child abuse and maltreatment in the home

Children's first experience of violence is often in the home. Approximately three quarters of children aged two to four are regularly subjected to physical discipline by their parents or caregivers. This amounts to almost 300 million worldwide (UNICEF, 2017^[43]). 25% of children under the age of five are indirectly affected by violence, as they live with a mother who was a recent victim of violence at the hands of their intimate partner (UNICEF, 2017^[43]). Although there is no OECD-wide data available on children's exposure to intimate partner violence, self-report surveys by parents (primarily mothers) suggest that the majority of children in households with intimate partner violence will be directly exposed to it, which has severe implications for child well-being and education outcomes (OECD, 2019^[21]). Furthermore, intimate partner violence often co-occurs with child maltreatment (Hamby et al., 2010^[44]). Violence against children can produce intergenerational effects, with the consequences of maltreatment in childhood lasting through adulthood, and there is an association between exposure to violence in childhood and the risk of perpetrating or experiencing violence in adulthood (Guedes et al., 2016^[45]).

Box 11.3. Violence against children during the COVID-19 lockdown

While the virus responsible for COVID-19 was transported and transmitted across the globe, many governments confined people to their homes in an effort to slow the spread. Widespread lockdowns and other curtailments are likely responsible for saving a number of lives around the globe, although the disruption severely disrupted children's schooling, resulted in enormous job losses and triggered the most severe economic recession in nearly a century. These stressors, combined with increasing social isolation, compounded the risks for children, especially the most vulnerable (Humphreys, Myint and Zeanah, 2020^[46]). In a number of countries, reports of domestic abuse and violence increased. For many children, school is a safe haven away from violence or abusive homes (OECD, 2020^[47]).

Cybercriminals also took advantage of the pandemic as a time to target children. Europol reported an increase in activity for those searching for child abuse material online, and finding opportunities to engage with children for grooming and sexual extortion purposes as they were expected to be more vulnerable due to lower supervision, more isolation and by virtue of spending more time in the digital environment (Europol, 2020^[48]). Audrey Azoulay, Director-General of UNESCO, stated "During the COVID-19 pandemic, and the related school closures, we have seen a rise in violence and hate online – and this includes bullying", highlighting that violence in the digital environment was not just perpetuated by seasoned cybercriminals.

School closures and distance learning meant that teachers no longer had the opportunity to detect and report cases of suspected child abuse. Confinement also resulted in routine medical care being postponed, limiting contact with children's primary healthcare providers who could also flag suspected abuse (Humphreys, Myint and Zeanah, 2020^[46]). This highlights the importance of continuity of care, even in times of disaster (Disaster Preparedness advisory council/committee on pediatric emergency medicine, 2015^[49]), and of safe and effective reporting mechanisms and swift recourse and solutions provided for those in need.

In their responses to the 21st Century Children Policy Questionnaire, four countries identified abuse as a pressing challenge in their national context. In some countries the sheer number of cases reported to authorities highlights the scope of the issue, and in some the media attention, such as in the Netherlands, placed on this issue makes it a pressing concern for national governments. In France in the 2015-2016 school year there were 27 799 cases reported to departmental authorities from the national education system where the health, safety or morals of a child were seen to be at risk or in danger. These could also include cases where there was reason to suspect that the conditions of their physical, emotional, intellectual or social development were being compromised or in danger of being compromised. The vast majority of these reports (80%) arose within the family context.

New Zealand and the Russian Federation also reported struggling with child maltreatment. In 2015-2016, the New Zealand government agency Child, Youth and Family (now known as Oranga Tamariki – the Ministry for Children) received 142 249 Child and Protection notifications. Furthermore, in 2015 New Zealand police recorded ten homicides of children and young people under 20 by a family member, while 63 were hospitalised for an assault perpetrated by a family member. In 2016, 2 163 sexual victimisations were reported for children aged 16 or under.

Child abuse and maltreatment is a serious concern across OECD countries, and education systems can play an important role in coordinating effective responses and making child protection services more accessible. Children, especially the most vulnerable, receive better service when actors such as the school, medical workers, child protection and the police work together (OECD, 2019^[21]). Developing guidelines or action plans outlining potential avenues for cross-ministerial and sectoral collaboration can assist in bridging silos, ensuring young people receive the appropriate support when they need it (OECD, 2019^[21]). Teachers are also important actors and in many systems have legal or policy responsibilities when there are signs or suspicions of child abuse or maltreatment.

Teachers' responsibility for student well-being

As adults who interact with children on a near daily basis, teachers are uniquely positioned in children's lives to notice changes in behaviour, physical manifestations of violence, or changes in educational outcomes that may result from abuse, mental health concerns or ill health. Children, particularly the youngest children, are reliant on adults such as teachers not only for the recognition of physical and mental disorders, but also for the provision of support and referral to professional help (Jorm et al., 2010^[50]).

Child self-report of experiencing physical abuse is more than 75 times higher than what is reported through official channels (Stoltenborgh et al., 2013^[51]). This underscores the importance of having trusted adults who children can turn to in times of need, and who have the skills and knowledge of how to effectively report suspected abuse or maltreatment, and safeguard children's well-being. However, there is still a gap between needs and resources available for ensuring child well-being, especially for the most disadvantaged schools and children (Kieling et al., 2011^[52]).

In order to assess what teachers should know about the well-being and protection of their students, it is important to consider various factors. Firstly, it is important to assess teachers' education and training for the identification of such challenges. Teachers' perceptions, understanding and awareness of physical and emotional health and well-being challenges might affect their ability to respond to such challenges in the classroom (Graham et al., 2011^[53]). The 21st Century Children Policy Questionnaire highlighted that while teachers in many education systems receive training at the pre-service or in-service level on children's emotional and physical well-being, this is not widely available in all systems. Furthermore, almost two-thirds of systems do not require teacher training for understanding or assessing digital risks to students, a surprising gap considering the importance of this issue.

Box 11.4. School environments for well-being

A safe and supportive school environment not only promotes students' academic achievement, well-being and self-esteem but can also protect them from engaging in deviant and risky behaviours (OECD, 2019^[24]). A positive school climate may also constitute a protective factor for mental health outcomes; these climates are likely to be less stressful and more supportive and should also foster a sense of social belonging. Positive school climate has also been linked to lower bullying prevalence. According to PISA 2018, students who attend schools with a high prevalence of bullying are more likely to feel a weaker sense of belonging, a poorer disciplinary climate and less co-operation with their schoolmates than those in schools with a low prevalence of bullying (OECD, 2019^[24]). Being enrolled in a poor-quality school that has few available health resources, high levels of violence and a poor school climate has negative implications for child physical and mental health (in (Huang, Cheng and Theise, 2013^[54])).

As educators and role models, teachers have an important role in fostering the development of a positive school climate. For their role as mentors and learning facilitators, teachers can also contribute to raising children's self-esteem, motivation and emotional stability (OECD, 2015^[55]). When analysing which teaching behaviours might contribute to respectful and positive climates, one of the most cited aspects is teacher support, meaning how willing they are to help students. A second important factor that contributes to the development of positive school climates is trusting and strong student-teacher relationships. Students who have sensitive and supportive teachers tend to be more likely to experience a favourable climate and sense of belonging in school (LaRusso, Romer and Selman, 2007^[56]). In addition, having good relationships with teachers is associated with higher perceived levels of support and better handling of stress in students (Choi, 2018^[34]). Respecting students' point of view and decision making capabilities (LaRusso, Romer and Selman, 2007^[56]), being supportive, enthusiastic and responsive and cooperate by exchanging ideas and best practices (OECD, 2019^[24]) are all factors that can help teachers and school leaders build school climates that encourage healthy behavioural norms.

Teacher self-efficacy is also a crucial factor in how they respond to child well-being challenges. Research has assessed that teachers' responses to mental and emotional well-being challenges might be mediated by their level of concern, confidence and support of the school administration (Williams et al., 2007^[57]; Graham et al., 2011^[53]). In a sample of Australian teachers, teachers tended to report that they felt confident in dealing with issues such as divorce, family break up and school transitions, although less so in dealing with issues such as abuse, family violence or home conflict (Graham et al., 2011^[53]). A third factor concerns the recognition of teachers' agency and their ability to take action. Supporting and valuing teachers' agency in identifying students' needs and challenges and making informed decisions is crucial in enabling the detection of children's well-being challenges (OECD, 2019^[58]). Pedagogical decisions are based on both teacher professional knowledge and analysis and evaluation of specific contextual and situational factors, with professional judgment mediating decision making (Révai, 2018^[59]).

Box 11.5. Teacher-student abuse

Most studies on school violence focus on bullying or student on student violence. However, the unfortunate reality is that teachers can also be perpetrators of abuse against children, whether it be emotional or physical. Emotional abuse can include verbal abuse such as using sarcasm, yelling, name-calling, mocking students, and ridiculing or making negative comments about the child or close others. It can also be non-verbal including neglect, ignoring the student or using punishment in response to an incorrect answer to a question (McEachern, Aluede and Kenny, 2008^[60]). In a study of Korean middle school students (n=1 777), almost one third reported being victims of emotional or physical maltreatment by teachers in the last year (Lee, 2015^[61]). In a sample from the United States (n=453), 44% reported experiencing at least one event they would label as emotional abuse (Fromuth et al., 2015^[62]). Certain groups may be more susceptible to verbal abuse by teachers. For example, boys and children with antisocial or attentional problems from an early age are more likely to experience verbal abuse in elementary school (Brendgen, Wanner and Vitaro, 2006^[63]).

In terms of physical abuse, a particular concern is sexual exploitation of children and youth by teachers or school personnel. Prevalence rates are hard to accurately ascertain and are likely underestimated (Wurtele, Mathews and Kenny, 2018^[64]). One Canadian study identified 750 cases between 1997 and 2017 involving a minimum of 1 272 students and 714 offenders. Not all provinces and territories publish details and data of professional misconduct cases, therefore the media is the sole source of information in over half of all cases depending on the province or territory (Canadian Centre for Child Protection Inc., 2018^[65]).

Policies and practices

The countries that responded to the 21st Century Children Policy Questionnaire highlighted different roles of teachers in identifying and responding to situations of suspected child well-being concerns or abuse. In some countries there are legal requirements for teachers to report suspected well-being concerns, whereas in others they are indirectly responsible or they are not responsible (see Table 11.4).

In many systems, teachers are mandated reporters and therefore legally responsible for reporting suspected or confirmed cases of child abuse/maltreatment to concerned authorities. In some systems, specific guidelines are in place to help teachers ascertain the steps they need to take in protecting children when they suspect them to be in dangerous situations. For example, in the Netherlands, a new 'meldcode' has been developed, which gives guidance to professionals when there are signs or suspicions of abuse or exposure to unsafe conditions, and how these can be reported to authorities. The meldcode covers suspicions of physical violence, and also psychological or sexual violence, as well as neglect. The code applies to all professionals working in education, as well as other child-oriented sectors such as healthcare, day-care and social work.

In decentralised systems such as Canada, legislation governing duties to report suspected cases of abuse is set by the Provincial or Territorial government. In British Columbia (Canada), Section 14 of the Child, Family and Community Service Act requires individuals (this includes any member of the public including professionals working closely with children) to report if a child under the age of 19 has been or is likely to be physically harmed, sexually abused or exploited, or neglected by a parent, or otherwise in need of protection. This reporting must be prompt and to a child protection social worker. Simply informing another person such as a colleague or the school principal does not relieve the individual of their legal duty to report, and it overrides duty of confidentiality. In Ontario (Canada), Section 125 of the Child, Youth and Family Services Act posits that anyone who has reasonable grounds to suspect that a child (under the age of 16) is or might be in need of protection must promptly report the suspicion to a children's aid society.

Table 11.4. Teacher responsibility for student well-being

Are teachers responsible for identifying children who are at either risk of developing or already suffering from health or emotional well-being problems?

Countries	Type of responsibility	More details
Czech Republic	Teachers are not formally responsible	
France	Teachers are indirectly responsible	Teachers play a role in monitoring students to recommend to medical practitioners or psychologists if needed, and have digital resources to provide guidance on how to deal with situations such as harassment or bullying.
Greece	Teachers are indirectly responsible	Teachers can give recommendations and guide children on how to obtain support.
Ireland	Teachers are formally responsible / Whole-of-school responsibility	Teachers are responsible for helping to protect children from harm in accordance with the law. Referral systems for well-being are present in all schools so children have access to resources within the school or from outside partners. Schools have autonomy to establish student support systems, and to provide whole-staff training.
Latvia	Teachers are not formally responsible	Teachers are learning how to recognise and support these children through professional development and through materials from the National Children Rights Protection Inspectorate and other organisations.
Portugal	Teachers are formally responsible	Teachers receive special training and have access to a teacher expert on child well-being and a psychologist in the school.
Russian Federation	Teachers are indirectly responsible	Teachers must ensure the protection of the life and health of students during the educational process; although there is no regulation of competencies for the teacher in terms of identifying children's well-being concerns.
Scotland (UK)	Teachers are formally responsible	All teachers are responsible for student well-being, with some having specialist roles to provide more focused support on various issues (e.g. substance misuse, relationships etc.).

Source: 21st Century Children Policy Questionnaire

In sum

Around the world, policy makers are grappling with how to keep children safe while striking a delicate balance of letting children be children and learn from making their own mistakes. When it comes to different forms of violence, abuse and neglect, many systems have integrated approaches to protect children from harm, often relying on teachers as trusted adults to report suspicions of maltreatment or well-being problems. Safeguarding children from digital risks and protecting their broader environmental (for example, ensuring clean air and safe streets and play spaces) require policy coordination across multiple ministries within countries. However, in-country co-ordination is not enough: many environmental and digital risks cross-national and regional boundaries. Co-ordinated efforts integrating expertise from different ministries, international organisations and research groups will be essential in tackling these challenges in the long term.

Keeping children safe and allowing them autonomy to play, explore and learn in their natural, built and digital environments should be an important issue on policy agendas around the world. Despite the progress made thus far, long-standing economic and social inequalities still impact all aspects of children's lives, from their family environment, housing, quality of schools and urban planning and communities. Shocks like as the COVID-19 pandemic and subsequent lockdowns also affect the safety and security of children around the world and shine a light on systemic weaknesses present in the system. Including children in designing their own learning, conversations on digital safety, developing anti-violence agendas, and urban planning decisions and environmental initiatives will all be key in setting effective long-term strategies to promote child safety across the board.

References

- Anda, R. et al. (2010), “Building a framework for global surveillance of the public health implications of adverse childhood experiences”, *American Journal of Preventive Medicine*, Vol. 39/1, pp. 93-98, <http://dx.doi.org/10.1016/j.amepre.2010.03.015>. [28]
- Annesi-Maesano, I. et al. (2013), “Indoor air quality and sources in schools and related health effects”, *Journal of Toxicology and Environmental Health, Part B*, Vol. 16/8, pp. 491-550, <http://dx.doi.org/10.1080/10937404.2013.853609>. [17]
- ARUP (2017), *Cities Alive: Designing for Urban Childhoods*, <https://www.arup.com/perspectives/publications/research/section/cities-alive-designing-for-urban-childhoods>. [15]
- Brendgen, M., B. Wanner and F. Vitaro (2006), “Verbal abuse by the teacher and child adjustment from kindergarten through grade 6”, *Pediatrics*, Vol. 117/5, pp. 1585-1598, <http://dx.doi.org/10.1542/peds.2005-2050>. [63]
- Burns, T. and F. Gottschalk (eds.) (2019), *Educating 21st Century Children: Emotional Well-Being in the Digital Age*, OECD Publishing, Paris, <https://dx.doi.org/10.1787/b7f33425-en>. [1]
- Canadian Centre for Child Protection Inc. (2018), “The prevalence of sexual abuse by K-12 school personnel in Canada, 1997–2017”, *Journal of Child Sexual Abuse*, Vol. 28/1, pp. 46-66, <http://dx.doi.org/10.1080/10538712.2018.1477218>. [65]
- Carnagey, N., C. Anderson and B. Bushman (2007), “The effect of video game violence on physiological desensitization to real-life violence”, *Journal of Experimental Social Psychology*, Vol. 43/3, pp. 489-496, <http://dx.doi.org/10.1016/j.jesp.2006.05.003>. [39]
- Choi, A. (2018), “Emotional well-being of children and adolescents: Recent trends and relevant factors”, *OECD Education Working Papers*, No. 169, OECD Publishing, Paris, <https://dx.doi.org/10.1787/41576fb2-en>. [34]
- Danese, A. and B. McEwen (2012), “Adverse childhood experiences, allostasis, allostatic load, and age-related disease”, *Physiology & Behavior*, Vol. 106/1, pp. 29-39, <http://dx.doi.org/10.1016/j.physbeh.2011.08.019>. [30]
- Devries, K. et al. (2018), “Who perpetrates violence against children? A systematic analysis of age-specific and sex-specific data”, *BMJ Paediatrics Open*, Vol. 2/1, p. e000180, <http://dx.doi.org/10.1136/bmjpo-2017-000180>. [22]
- Dillio, R. (2014), “A critical miss: Video games, violence, and ineffective legislation”, *First Amendment Studies*, Vol. 48/2, pp. 110-130, <http://dx.doi.org/10.1080/21689725.2014.950496>. [40]
- Disaster Preparedness advisory council/committee on pediatric emergency medicine (2015), “Ensuring the health of children in disasters”, *Pediatrics*, Vol. 136/5, pp. e1407-e1417, <http://dx.doi.org/10.1542/peds.2015-3112>. [49]
- Emerson, E. (2012), “Understanding disabled childhoods: What can we learn from population-based studies?”, *Children & Society*, Vol. 26/3, pp. 214-222, <http://dx.doi.org/10.1111/j.1099-0860.2012.00434.x>. [25]

- Europol (2020), *Pandemic Profiteering: How Criminals Exploit the COVID-19 Crisis*, [48]
<https://www.europol.europa.eu/publications-documents/pandemic-profiteering-how-criminals-exploit-covid-19-crisis>.
- Fromuth, M. et al. (2015), "Descriptive features of student psychological maltreatment by teachers", *Journal of Child & Adolescent Trauma*, Vol. 8/2, pp. 127-135, [62]
<http://dx.doi.org/10.1007/s40653-015-0042-3>.
- Gill, T. (2017), *Building Cities Fit for Children: Case Studies of Child-Friendly Urban Planning and Design in Europe and Canada*, https://www.wcmt.org.uk/sites/default/files/report-documents/Gill%20T%20Report%202017%20Final_0.pdf. [14]
- Global Initiative (2020), *Global Initiative to End All Corporal Punishment of Children*, [33]
<https://endcorporalpunishment.org/countdown/>.
- Gottschalk, F. (2019), "Impacts of technology use on children: Exploring literature on the brain, cognition and well-being", *OECD Education Working Papers*, No. 195, OECD Publishing, Paris, [29]
<https://dx.doi.org/10.1787/8296464e-en>.
- Graham, A. et al. (2011), "Supporting children's mental health in schools: Teacher views", [53]
Teachers and Teaching, Vol. 17/4, pp. 479-496,
<http://dx.doi.org/10.1080/13540602.2011.580525>.
- Granic, I., A. Lobel and R. Engels (2013), "The benefits of playing video games", *American Psychologist*, Vol. 69/1, pp. 66-78, [38]
<http://dx.doi.org/10.1037/a0034857>.
- Guedes, A. et al. (2016), "Bridging the gaps: A global review of intersections of violence against women and violence against children", *Global Health Action*, Vol. 9/1, p. 31516, [45]
<http://dx.doi.org/10.3402/gha.v9.31516>.
- Hamby, S. et al. (2010), "The overlap of witnessing partner violence with child maltreatment and other victimizations in a nationally representative survey of youth", *Child Abuse & Neglect*, Vol. 34/10, pp. 734-741, [44]
<http://dx.doi.org/10.1016/j.chiabu.2010.03.001>.
- Hillis, S. et al. (2016), "Global prevalence of past-year violence against children: A systematic review and minimum estimates", *Pediatrics*, Vol. 137/3, p. e20154079, [19]
<http://dx.doi.org/10.1542/peds.2015-4079>.
- Hooft Graafland, J. (2018), "New technologies and 21st century children: Recent trends and outcomes", *OECD Education Working Papers*, No. 179, OECD Publishing, Paris, [6]
<https://dx.doi.org/10.1787/e071a505-en>.
- Huang, K., S. Cheng and R. Theise (2013), "School contexts as social determinants of child health: Current practices and implications for future public health practice", *Public Health Reports*, Vol. 128/6, pp. 21-28. [54]
- Humphreys, K., M. Myint and C. Zeanah (2020), "Increased risk for family violence during the COVID-19 pandemic", *Pediatrics*, Vol. 146/1, p. e20200982, [46]
<http://dx.doi.org/10.1542/peds.2020-0982>.
- Inchley, J. et al. (eds.) (2020), *Spotlight on Adolescent Health and Well-Being, Findings from the 2017/2018 Health Behaviour in School-aged Children (HBSC) survey in Europe and Canada*, WHO Regional Office for Europe, Copenhagen. [23]

- Jones, L. et al. (2012), "Prevalence and risk of violence against children with disabilities: A systematic review and meta-analysis of observational studies", *The Lancet*, Vol. 380/9845, pp. 899-907, [http://dx.doi.org/10.1016/s0140-6736\(12\)60692-8](http://dx.doi.org/10.1016/s0140-6736(12)60692-8). [26]
- Jorm, A. et al. (2010), "Mental health first aid training for high school teachers: A cluster randomized trial", *BMC Psychiatry*, Vol. 10/1, <http://dx.doi.org/10.1186/1471-244x-10-51>. [50]
- Kang, D. and J. Kim (2014), *Fine, Ultrafine, and Yellow Dust: Emerging Health Problems in Korea*, Korean Academy of Medical Science, <http://dx.doi.org/10.3346/jkms.2014.29.5.621>. [13]
- Kieling, C. et al. (2011), "Child and adolescent mental health worldwide: Evidence for action", *The Lancet*, Vol. 378/9801, pp. 1515-1525, [http://dx.doi.org/10.1016/s0140-6736\(11\)60827-1](http://dx.doi.org/10.1016/s0140-6736(11)60827-1). [52]
- LaRusso, M., D. Romer and R. Selman (2007), "Teachers as builders of respectful school climates: Implications for adolescent drug use norms and depressive symptoms in high school", *Journal of Youth and Adolescence*, Vol. 37/4, pp. 386-398, <http://dx.doi.org/10.1007/s10964-007-9212-4>. [56]
- Lee, J. (2015), "Prevalence and predictors of self-reported student maltreatment by teachers in South Korea", *Child Abuse & Neglect*, Vol. 46, pp. 113-120, <http://dx.doi.org/10.1016/j.chiabu.2015.03.009>. [61]
- Lee, S. (2018), *Korea's New Comprehensive Plan on Fine Dust and Its Implications for Policy and Research*, Kihasa. [12]
- Lenhart, A. et al. (2015), *Teens, technology and friendships*, Pew Research Center, <http://www.pewinternet.org/2015/08/06/teens-technology-and-friendships/>. [36]
- Litwiller, B. and A. Brausch (2013), "Cyber bullying and physical bullying in adolescent suicide: The role of violent behavior and substance use", *Journal of Youth and Adolescence*, Vol. 42/5, pp. 675-684, <http://dx.doi.org/10.1007/s10964-013-9925-5>. [35]
- Maternowska, M., A. Potts and D. Fry (2016), *The multi-country study on the drivers of violence affecting children*. [20]
- McCarthy, R. et al. (2016), "Does playing video games with violent content temporarily increase aggressive inclinations? A pre-registered experimental study", *Journal of Experimental Social Psychology*, Vol. 67, pp. 13-19, <http://dx.doi.org/10.1016/j.jesp.2015.10.009>. [41]
- McEachern, A., O. Aluede and M. Kenny (2008), "Emotional abuse in the classroom: Implications and interventions for counselors", *Journal of Counseling & Development*, Vol. 86/1, pp. 3-10, <http://dx.doi.org/10.1002/j.1556-6678.2008.tb00619.x>. [60]
- National Scientific Council on the Developing Child (2020), *Connecting the Brain to the Rest of the Body: Early Childhood Development and Lifelong Health are Deeply Intertwined*, <http://www.developingchild.harvard.edu/>. [31]
- OECD (2020), "Coronavirus special edition: Back to school", *Trends Shaping Education Spotlights*, No. 21, OECD Publishing, Paris, <https://dx.doi.org/10.1787/339780fd-en>. [47]
- OECD (2020), *Growing up Online: Addressing the Needs of Children in the Digital Environment*, <https://www.oecd.org/sti/ieconomy/growing-up-online.pdf>. [5]

- OECD (2020), "Protecting children online: An overview of recent developments in legal frameworks and policies", *OECD Digital Economy Papers*, No. 295, OECD Publishing, Paris, <https://dx.doi.org/10.1787/9e0e49a9-en>. [10]
- OECD (2019), *Changing the Odds for Vulnerable Children: Building Opportunities and Resilience*, OECD Publishing, Paris, <https://dx.doi.org/10.1787/a2e8796c-en>. [21]
- OECD (2019), *OECD Future of Education 2030: Making Physical Education Dynamic and Inclusive for 2030 International Curriculum Analysis*, OECD Publishing, Paris, https://www.oecd.org/education/2030-project/contact/OECD_FUTURE_OF_EDUCATION_2030_MAKING_PHYSICAL_DYNAMIC_AND_INCLUSIVE_FOR_2030.pdf. [58]
- OECD (2019), *PISA 2018 results (Volume III): What school life means for students' lives*, PISA, OECD Publishing, Paris, <https://dx.doi.org/10.1787/acd78851-en>. [24]
- OECD (2016), *Trends Shaping Education 2016*, OECD Publishing, Paris, https://dx.doi.org/10.1787/trends_edu-2016-en. [11]
- OECD (2015), *Skills for Social Progress: The Power of Social and Emotional Skills*, OECD Publishing, Paris, <https://dx.doi.org/10.1787/9789264226159-en>. [55]
- Przybylski, A. and N. Weinstein (2019), "Violent video game engagement is not associated with adolescents' aggressive behaviour: Evidence from a registered report", *Royal Society Open Science*, Vol. 6/2, p. 171474, <http://dx.doi.org/10.1098/rsos.171474>. [42]
- Przybylski, A. and N. Weinstein (2017), "A large-scale test of the goldilocks hypothesis", *Psychological Science*, Vol. 28/2, pp. 204-215, <http://dx.doi.org/10.1177/0956797616678438>. [37]
- RCPCH (2020), *The Inside Story: Health Effects of Indoor Air Quality on Children and Young People*, <https://www.rcpch.ac.uk/resources/inside-story-health-effects-indoor-air-quality-children-young-people>. [16]
- Révai, N. (2018), "What difference do standards make to educating teachers?: A review with case studies on Australia, Estonia and Singapore", *OECD Education Working Papers*, No. 174, OECD Publishing, Paris, <https://dx.doi.org/10.1787/f1cb24d5-en>. [59]
- Ronchi, E. and L. Robinson (2019), "Child protection online", in *Educating 21st Century Children: Emotional Well-being in the Digital Age*, OECD Publishing, Paris, <https://dx.doi.org/10.1787/796ac574-en>. [7]
- Siibak, A. (2019), "Digital parenting and the datafied child", in *Educating 21st Century Children: Emotional Well-being in the Digital Age*, OECD Publishing, Paris, <https://dx.doi.org/10.1787/313a9b21-en>. [8]
- Smith, K. (2014), "Discourses of childhood safety: What do children say?", *European Early Childhood Education Research Journal*, Vol. 22/4, pp. 525-537, <http://dx.doi.org/10.1080/1350293x.2014.947834>. [4]
- Stevens, G. et al. (2020), "Immigration status and bullying victimization: Associations across national and school contexts", *Journal of Applied Developmental Psychology*, Vol. 66, p. 101075, <http://dx.doi.org/10.1016/j.appdev.2019.101075>. [27]

- Stoilova, M., R. Nandagiri and S. Livingstone (2019), “Children’s understanding of personal data and privacy online: A systematic evidence mapping”, *Information, Communication & Society*, pp. 1-19, <http://dx.doi.org/10.1080/1369118x.2019.1657164>. [9]
- Stoltenborgh, M. et al. (2013), “Cultural–geographical differences in the occurrence of child physical abuse? A meta-analysis of global prevalence”, *International Journal of Psychology*, Vol. 48/2, pp. 81-94, <http://dx.doi.org/10.1080/00207594.2012.697165>. [51]
- Ulferts, H. (2020), “Why parenting matters for children in the 21st century: An evidence-based framework for understanding parenting and its impact on child development”, *OECD Education Working Papers*, No. 222, OECD Publishing, Paris, <https://dx.doi.org/10.1787/129a1a59-en>. [3]
- UNESCO (2019), *Behind the Numbers: Ending School Violence and Bullying*, <https://unesdoc.unesco.org/ark:/48223/pf0000366483>. [32]
- UNICEF (2017), *A Familiar Face: Violence in the Lives of Children and Adolescents*, UNICEF, https://www.unicef.org/publications/index_101397.html. [43]
- United Nations Assembly (1989), *Convention on the Rights of the Child*, United Nations Human Rights Office of the High Commissioner, New York, NY, <https://digitalcommons.ilr.cornell.edu/cgi/viewcontent.cgi?article=1007&context=child> (accessed on 15 May 2019). [18]
- Williams, J. et al. (2007), “Teachers’ perspectives of children’s mental health service needs in urban elementary schools”, *Children & Schools*, Vol. 29/2, pp. 95-107, <http://dx.doi.org/10.1093/cs/29.2.95>. [57]
- Wurtele, S., B. Mathews and M. Kenny (2018), “Keeping students out of harm’s way: Reducing risks of educator sexual misconduct”, *Journal of Child Sexual Abuse*, Vol. 28/2, pp. 160-186, <http://dx.doi.org/10.1080/10538712.2018.1486933>. [64]
- Wyver, S. et al. (2010), “Ten ways to restrict children’s freedom to play: The problem of surplus safety”, *Contemporary Issues in Early Childhood*, Vol. 11/3, pp. 263-277, <http://dx.doi.org/10.2304/ciec.2010.11.3.263>. [2]

12 Building capacity: Teacher education and partnerships

Kristen Weatherby, Weatherby Education Studies, Ltd., United Kingdom

Tracey Burns, OECD Directorate for Education and Skills, France

As the needs of countries' youngest citizens change, so do policy priorities developed to address these needs. A country's schools are often charged with supporting these changes, in partnership with a spectrum of actors, including families, community organisations and private sector entities, and within schools, the responsibility lies with teachers. This chapter focuses on two specific elements that are crucial to effective delivery of policy and practice: teacher education and partnerships. It provides a rich set of examples of policies aimed at building teacher skills, as well as innovative cases of partnerships, both focusing on the digital skills and the physical well-being of students. The chapter ends with a discussion of the preparedness of countries to face rapid changes, the importance of which was underscored by the COVID-19 pandemic.

Introduction

As education systems increasingly respond to new societal, economic and digital needs, implementation of policies takes on new importance. A key element of successful implementation of policy reform is ensuring that local stakeholders have sufficient capacity to meet this challenge. In particular, they need adequate knowledge of educational policy goals and consequences, the ownership and willingness to make the change, and the tools to implement the reform as planned. Without these, the best policy reforms risk being derailed at the level where it counts most: the classroom. It is at this level that education policies must be implemented, and it is here that they succeed or fail (Burns and Köster, 2016^[1]).

This chapter takes a closer look at teacher preparation and partnerships, both of which are crucial to effective delivery of policy and practice. It focuses specifically on two areas brought into sharp relief during the COVID-19 pandemic in 2020: supporting teachers to teach with technology and working to ensure students' physical and mental well-being.

In the middle of March, 2020, the OECD reported that 102 countries around the world had closed all of their nation's schools, leaving nearly 900 million children – and their teachers and parents – trying to determine how to continue formal schooling from home (Burns, 2020^[2]). Teachers and schools worldwide turned to some form of distance learning, which itself is reliant on adequate technology resources and Internet connectivity, as well as the technical skills of teachers, student and parents.

In terms of access to technology, PISA 2018 data shows that in wealthy European countries, more than 95% of students report they have access to a computer for working at home. However, only 34% of students report the same in Indonesia, making distance learning all but impossible for nearly two-thirds of Indonesian students (OECD, 2020^[3]). Even in wealthier countries, there is variation in access to computers at home based on students' socio-economic background. In the United States, nearly every 15-year-old in socio-economically advantaged schools reported having access to a computer at home, while only three out of four students in disadvantaged schools reported having one. In Peru, the differences are even starker: 88% of students in more advantaged schools report having their own computer at home, as opposed to only 17% in disadvantaged schools.

It should be noted that these results were reported in 2018. The 15-year-olds surveyed by PISA might have access to a computer, but this does not mean that it was the level and intensity of access required for the full shift to digital learning that took place during school lockdowns in 2020. For successful schooling during the pandemic, families were often required to provide access to technology for every child in their household, as well as adequate broadband capacity to allow for streaming of multiple lessons at once – all while parents were also trying to work remotely using the same Internet access. In some countries Internet access at home is universal, while in others it is only available to about half of 15-year-olds. In Mexico, nearly all students (94%) from families with high socio-economic status reported having Internet access at home, versus only 29% of disadvantaged students. The same patterns play out for access to a quiet space to study and other factors required for learning.

Policymakers, social workers, medical professionals and educationalists also worried about the physical well-being of students during the COVID-19 crisis. Thousands of students across countries receive one or more free meals at school each day, which were suddenly no longer available when schools closed. Governments had to quickly arrange schemes to provide food or vouchers to families who relied on this kind of support to feed their children. Vulnerable or at-risk students also became a concern for schools that no longer had a reliable way to monitor students' physical well-being on a daily basis. Teachers and school leaders organised home visits or online daily attendance taking, where possible, so that they could see students and attempt to ascertain whether there were any physical or emotional concerns. As many social services were no longer available due to nationwide lockdowns, schools also had to step in; as they were in regular contact with families, teachers and leaders became social workers as well.

While the situation experienced during school closures was extreme, it highlighted deficiencies in skills, capacity and resources in education that need to be addressed by policymakers around the world. It also emphasised the ongoing change in the roles of teachers from primarily academic provision to a more holistic well-being role in supporting students. This only serves to highlight the importance of strong partnerships with parents as schools and teachers tried to support families in issues of access, technical skills, pedagogy and well-being.

Supporting teachers for modern classrooms

To tackle some of the global issues around recruitment and retention of high quality candidates into the teaching profession, it is often said that teaching today should be considered a knowledge worker profession (Schleicher, 2012^[4]). A knowledge worker is someone who uses high-level knowledge, gained from either formal education or workplace experience, to create new knowledge and share it back with the profession (Ramírez and Nembhard, 2004^[5]). One of the four key domains of knowledge work is professional discretion, which involves giving knowledge workers the autonomy to make workplace decisions based on their own expertise and experience (Price and Weatherby, 2017^[6]). Professional discretion also implies freedom of knowledge workers to collaborate with colleagues to share and develop knowledge. Yet this key component of professions is not always present in teaching (Guerriero, 2017^[7]).

In TALIS 2018, 78% percent of teachers across 48 countries and systems reported that they participated in school-level decision making. However, while they were fairly likely to collaborate with colleagues on a surface level by discussing specific students (61% of teachers across OECD systems report this, on average) or exchanging teaching materials with colleagues (47%), they were far less likely to engage in deeper forms of collaboration. Only 9% of teachers reported providing observation-based feedback to colleagues and only 21% engaged in collaborative professional learning at least once a month (OECD, 2020^[8]). Both of these more in-depth collaboration activities would have been rendered all but impossible during COVID-19-related school closures in 2020.

In addition to professional autonomy, teachers need ongoing professional development. The beginning of a teacher's career-long journey of professional development should start with their initial teacher education (OECD, 2019^[9]). It involves partnerships (with government, schools and unions), curriculum (for both new teacher candidates and the students they are teaching), and a system of teaching standards, accreditation and certification that needs to be continually reviewed and adapted (OECD, 2019^[9]).

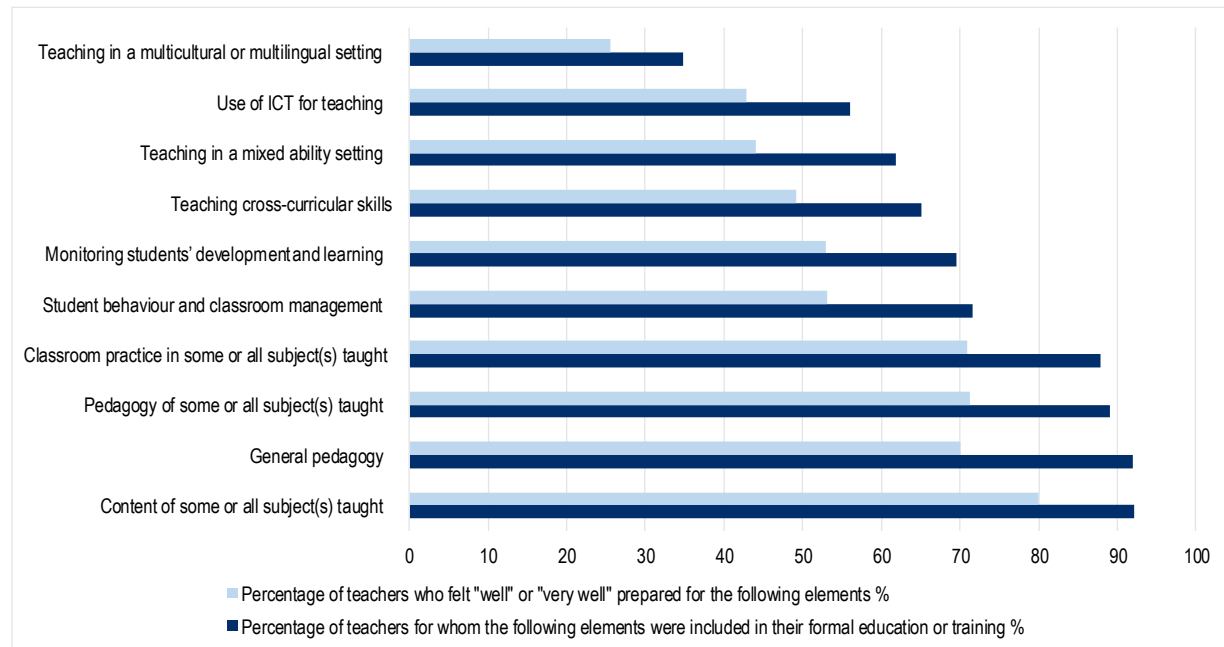
In addition, the content of a teacher's initial education is important in terms how prepared they feel for teaching and how effective they are as teachers. Research into initial teacher education indicates student achievement is higher when initial teacher training includes a combination of subject matter content, pedagogy and teaching practice (Guerriero, 2017^[7]; Clotfelter, Ladd and Vigdor, 2007^[10]).

Across OECD countries, nearly all teachers (92%) reported that their initial teacher education or training included the content of some or all of the subjects that they teach, as well as general pedagogical knowledge. Slightly fewer teachers (89%) across OECD countries reported that their initial teacher education included coursework or training in the pedagogy needed for teaching some or all of the subjects that they teach. Finally, a teaching practicum, giving teachers the chance to apply their learning in a classroom under the supervision of an experienced teacher, was included in an average of 90% of teachers' initial training across OECD countries (OECD, 2019^[11]).

While these overall averages seem encouraging, TALIS data also explores other elements of teachers' initial training that are relevant to their work in modern classrooms. As seen in Figure 12.1 across OECD countries, only 54% of teachers reported that using information and communication technology (ICT) in teaching was covered in their initial teacher education, and only 43% of teachers reported that they felt well or very well prepared for teaching with ICT when they finished their formal training.

Figure 12.1. Content of teacher education and sense of preparedness for teaching

Results based on responses of lower secondary teachers



Note: Values are ranked in descending order of the percentage of lower secondary teachers for whom the following elements were included in their formal education or training.

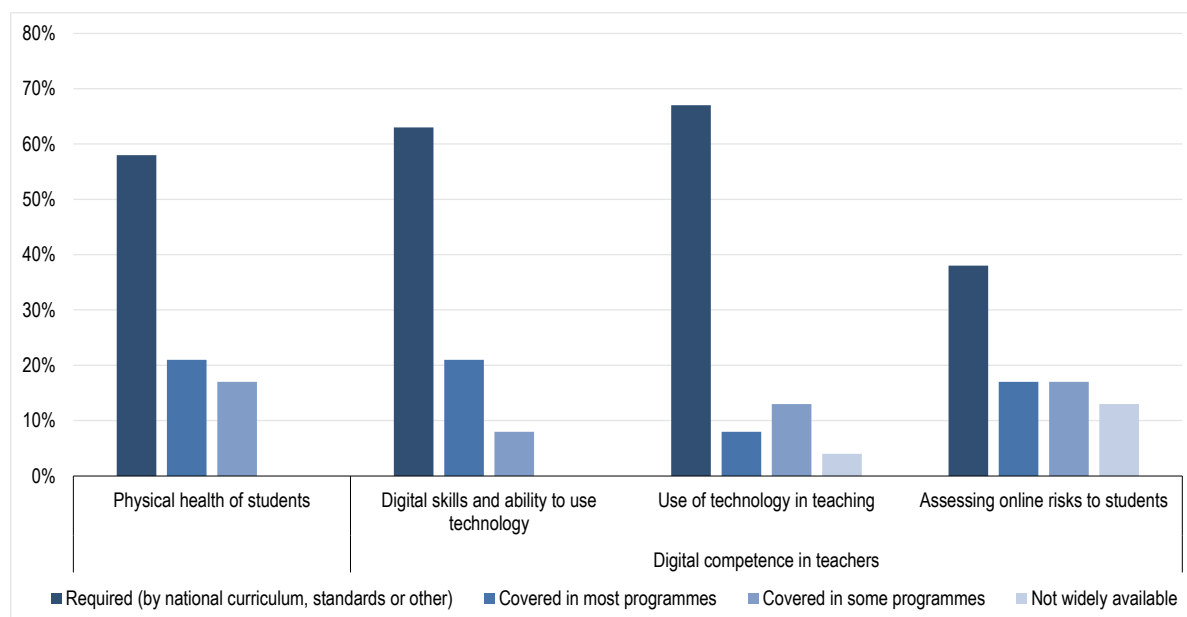
Source: OECD, TALIS 2018 Database, Tables I.4.13 and I.4.20

In fact, teaching with ICTs was consistently one of the highest areas of need for professional development across the TALIS 2008, 2013 and 2018 surveys (OECD, 2019^[11]; OECD, 2014^[12]; OECD, 2010^[13]). These results suggest that the professional development offer could be improved. Indeed, while the majority of teachers (94%) surveyed across OECD countries and economies reported having participated in some form of continuing professional development during the year prior to the survey, not all teachers found it effective. On average, 82% of teachers across OECD countries reported that the professional development in which they participated had a positive impact on their teaching. The most effective types connected to their subject or curriculum, built on their own prior knowledge, provided opportunities to practice or apply new ideas to their own classroom and included collaboration with peers or active learning.

As the experience with the COVID-19 pandemic revealed, it would be important to drill down more into these findings. Although TALIS did not cover in detail support for emotional and physical well-being and use of digital technologies, the 21st Century Children Policy Questionnaire gives some hints.

Physical health of students

According to the data, in 14 of 24 countries and systems surveyed, the physical health of students is required by national curriculum or other regulation to be covered in teacher education, whether this is in their initial training or continuing professional development. In five countries, the physical health of students is covered in most programmes, while in four countries it is covered in some programmes. Chapter 2 of this volume explores the connections between policy challenges and trends in physical health in more detail.

Figure 12.2. Topics covered in teacher education (initial and continuing professional development)

Note: 24 countries and systems responded to this question.

Source: 21st Century Children Policy Questionnaire

Digital competence in teachers

Countries generally provide support to teachers to acquire digital skills. 20 of the 24 systems responding to this question indicated that digital skills and ability to use technology were required (by national curriculum, standards or other) or covered in most programmes. Similarly, 18 of the 24 systems indicated that the skills to use technology in teaching were required or covered in most programmes. However, there was far less training available for assessing digital risks to students, with 30% of systems reporting that it was covered only in some programmes or not at all. This is surprising considering the attention to digital risks such as cyberbullying.

In many systems, the teaching of digital technology in schools is moving beyond how to use computers and the Internet safely and responsibly. Increasingly, education systems are focusing on developing students' understanding of how technology works and how to develop it themselves. Systems are seeing economic, cultural and social rationales for developing computer science education in schools, from primary education onwards (Fluck et al., 2016^[14]). As children increasingly become consumers of technology at younger ages, they need to understand the principles of how things work so that they can be better informed to make decisions about complex issues surrounding technology. Across many systems, computational thinking, algorithms, programming and artificial intelligence are being integrated across existing curricula in subjects such as mathematics, science and the arts, or are being added as part of separate computer science or computing courses throughout primary and secondary school (Bocconi et al., 2016^[15]). Increasingly, coursework also includes work on neural networks and robotics. This naturally has implications for teacher training and ongoing professional development.

Teachers have consistently been expressing high levels of need for training around teaching with technology for more than a decade, and this was only underlined during school closures due to the COVID-19 pandemic. Box 12.1 discusses the inequity in provision that resulted from lack of skill, equipment, and other circumstances within countries.

Box 12.1. Inequality in distance learning provision between and within countries

As schools shut down during the COVID-19 pandemic, school leaders and teachers often had very little notice to develop a plan for distance learning for their pupils. In areas in which there was limited Internet connectivity or available devices for students, this was especially challenging.

In Brazil, for example, the government of the state of São Paulo made a series of quick policy decisions, the first to move the school holidays forward so that educators had time to plan for distance learning. They then held meetings open to all of the region's 54 000 teachers every day, to help them prepare and develop their distance provision. They also made an agreement with local telecom companies to provide free data on mobile phones for students and developed an app for students to access classes developed by their teachers. In addition, as not all students had access to computers, two national television channels broadcast two hours of education content every day. These will continue to be offered to augment the educational provision in São Paulo (Dellagnelo and Reimers, 2020^[16]).

Even in countries with widespread connectivity, there was still variation across regions and families, and systems often loaned devices to students to ensure access. But that was not enough: In a representative survey of Irish school leaders conducted two months into lockdown, for example, researchers found that in areas of the country with better broadband access, 90% of schools reported delivering all or most of their classes live online. This was compared to only 62% in areas with low broadband access (Mohan et al., 2020^[17]).

These examples highlight the need for diverse and multifaceted strategies from systems, schools and teachers to provide equal access to high quality learning experiences for all children. As countries increasingly move towards a hybrid model of face-to-face and digital learning, there are additional challenges for teachers in terms of developing content, delivering lessons, and evaluating student learning using multiple methods and tools. All of this will take specific support and preparation for teachers as well as additional time. Making use of digital communities and other networks of teachers for support, collaboration, professional development and resource sharing can address some of these issues and help prevent individual teachers from replicating work that others have already done.

Policies and practices to support teachers

As laid out in the previous sections, new expectations for teachers require building new skills and capacity for the teaching workforce. A number of interesting measures have been uncovered, which can be broadly grouped into three approaches:

1. curriculum reform and extension
2. formal teacher education and training
3. guidelines, recommendations or regulations that are instituted at a national level by a central government body or partner.

Curriculum reform and extension

In the Policy Questionnaire, policy makers often referred to a new or updated national curriculum as a key resource for improving the use of technology in the classroom, fostering the teaching of digital skills and supporting the physical health of students. In some cases, policy makers mentioned that the curriculum currently recognises the central importance of pupils' mental, emotional and social well-being, as is the case of the [Curriculum for Excellence](#) in Scotland (United Kingdom), or the skills that are required to fulfil

these goals, as in the competences of the Finnish [National Core Curriculum for Basic Education](#). In other cases, emphasis is placed on the way the curriculum provides models of how to use technology in the classroom or what should be the ideal conditions for students to develop skills critical in that area, as in the new [Basic Education Curriculum](#) in Mexico.

In addition to reforming the curriculum, another approach used by education systems is to take certain curricular development measures to help extend the existing curriculum. Examples that focus on the importance of the social and physical environment of students include New Brunswick's (Canada) Comprehensive School Health (CSH) Model. In Ireland, an extension to the curriculum around physical health is part of a larger commitment to promote increased physical activity levels across the population. As part of this initiative, a framework has been provided for schools to assess health needs of students and develop programmes to address them within the curriculum. One such programme, [Move well, Move often](#), has been designed to complement the teaching of the Irish Primary School Physical Education (PE) curriculum and aims to provide a range of tools to support the teacher in teaching fundamental movement skills throughout primary school. Similar resources are provided for teachers of students in the junior and senior cycles of Irish education.

Formal teacher education and training

Overall, the majority of the responses to the 21st Century Children Policy Questionnaire concentrated on professional development programmes to address both technological issues in the classroom and the social and emotional development of students. Sometimes the support is embedded within the school through the creation of teams with specialised roles. Examples include the [Digital Technologies in Focus](#), delivered by the Australian Curriculum, Assessment and Reporting Authority (ACARA), which provides support to 160 disadvantaged schools with digital technologies curriculum officers.

On-site initiatives such as these provide opportunities for teachers at the same school to engage in active learning and experimentation. This allows for collective participation and sharing reflections (Bautista and Oretga-Ruiz, 2015^[18]). In addition, carefully developed online learning resources can also offer dynamic and flexible opportunities for teacher professional development. In particular, when resources are sustained, intense and backed by a dedicated training programme over time, they are more likely to have a bigger impact on the professional development of teachers (Garet et al., 2001^[19]).

Massive Open Online Courses (MOOCs) also provide ongoing professional development in digital skills. An example is [Webwise](#) in Ireland, which helps integrate Internet safety into teaching and learning. Innovative approaches to online learning are included as well. In Portugal, blended learning training courses are being introduced to help psychologists develop attitudes and skills to support teachers in adopting intervention strategies in the classroom to prevent and inhibit disruptive and bullying behaviours.

The Australian government has developed two comprehensive portals, the [Digital Technologies Hub](#) and the [Student Well-being Hub](#), to provide quality-assured learning resources and activities to support implementation of the Australian Curriculum. Both initiatives target students, parents and school leaders, provide activities and events, and host new content and resources as they are developed. The [Student Well-being Hub](#) also links to the [Bullying. No Way!](#) website, discussed further in Box 12.3.

Guidelines, recommendations or regulations

Responses to the Policy Questionnaire regarding the physical health of children often discussed guidelines, recommendations or regulations around particular physical health objectives or practices which are to be followed by schools or are suggested to parents. In some cases, government inspections of schools include the evaluation of specific physical health targets that are included in the regular inspection of school quality. In relation to use of digital technologies in school, some countries also issued regulations or guidelines regarding the appropriate length of time students – especially young children – should be

exposed to screens at school or at home. These guidelines, recommendations or regulations are imposed from the top down, and although schools have no choice as to whether to implement them, they are often left to decide how to best implement them, given their individual context and resources.

In Canada, a number of provinces have published guidelines and recommendations on a variety of aspects of physical health. [Better Nights, Better Days](#) is a digital behavioural programme designed to help parents who have children aged 1-10 years with sleep problems. Providing tools in both English and French, the interactive program is tailored to individual families to support implementing behavioural strategies for better sleep. Québec has implemented the provincial measure [À l'école, on bouge!](#) (*On the Move at School*) that supports preschools and primary schools to ensure that all of their students are physically active for at least 60 minutes of every school day. The Flemish community of Belgium has developed a statement of commitment for schools that requires them to ensure students receive healthy drinks and other refreshments at school.

Box 12.2. Evidence-informed policy for student physical health

Some governments have commissioned studies to determine how to best direct their efforts to address the challenges their young people are facing around nutrition, obesity and physical activity.

The government of Norway's School in Motion study seeks to understand the current extent of physical activity in schools and to direct future research and implementation strategies. In this study, a randomised controlled trial investigated the effect of a one-year, school-based physical activity intervention on physical health, mental health, academic performance and aspects of the learning environment for 14 year-old boys and girls in lower-secondary education in Norway. Students in the intervention group received 2 hours of extra physical activity during the school day, as well as increased physical education. The results of the study found numerous positive effects on the physical activity level and endurance of both boys and girls who received the intervention, as well as improvements to their academic performance in numeracy and reading compared to students in the control group (Kolle et al., 2019^[20]).

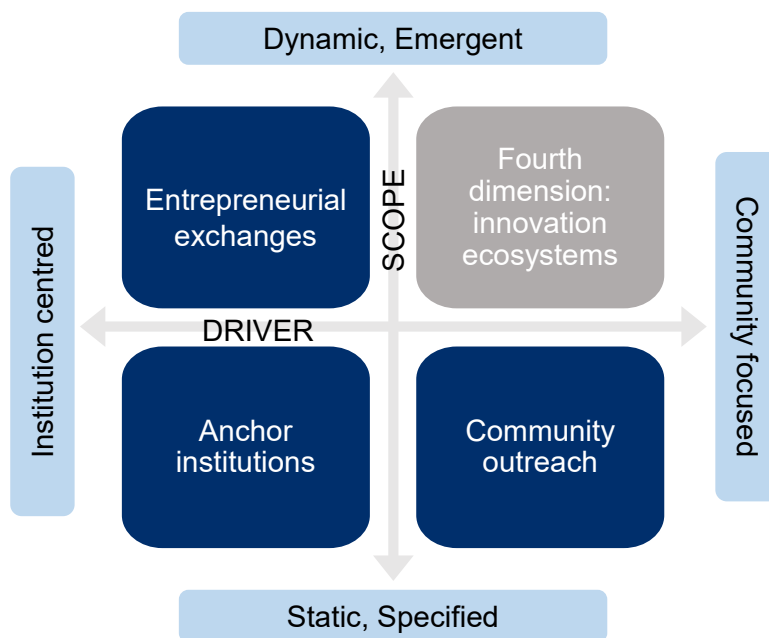
The Ministry of Health, Labour and Welfare in Japan developed a national campaign called Healthy Parents and Children 21, which aims to realise a society in which all children grow up healthy. The campaign provides indices for improving physical health which are based on research and influence activities that are developed for schools. To understand the level of physical activity of Japanese children prior to entering school, the Japan Sports Agency ran a survey on Outside Play Prior to Entering Elementary School. By analysing the relationship between children's physical activity practices, stamina and physical abilities, the study confirmed that those elementary school pupils who had frequently played outside as toddlers continued to be active on a daily basis in elementary school and had high levels of physical strength.

The Education Review Office in New Zealand worked with the Ministry of Health and other ministries to assess the current state of food, nutrition and physical activity across all levels of schooling in New Zealand. They gathered evidence on how well schools promote positive attitudes among students as to the benefits of physical activity, food and nutrition. The resulting report provided best practice examples from schools around supporting students' learning about food, nutrition and physical activity, as well as examples of common challenges facing schools and other educational services and how those challenges are being addressed.

Cross-sectoral collaboration and partnerships

As many challenges go beyond the walls of school settings, parental and wider community involvement play a critical role in addressing the challenges of digital and emotional well-being. Collaboration between schools and their communities can take different forms, as set out in Figure 12.3.

Figure 12.3. Dimensions of school/community engagement



Source: OECD (2017^[21]), adapted from Stevenson and Boxall (2015^[22])

This framework captures three main spaces:

- *Schools as anchor institutions in their communities*: partnerships likely basic and collaboration limited.
- *Schools' entrepreneurial relationships*, transferring knowledge-based expertise to policy makers and public services. Partnerships are more collaborative and dynamic.
- *Involvement of schools in the life of the wider community*, ranging from outreach programmes with community groups to opening facilities to public users. Reaching other agents is a joint effort of schools and their communities.

In addition, there is a fourth space of open and collaborative partnerships in which schools and communities work together to create collective economic and social benefits. This mode of engagement goes well beyond institution-centred interactions and can help develop local or regional responses to educational and social challenges.

School/community partnerships are often strategic collaborations aimed at expanding the capacity of schools to improve the way they build and reinforce digital skills (e.g. helping teachers to apply technology in the classrooms and develop new pedagogical approaches) and reinforce well-being (e.g. addressing bullying and fostering healthy habits). The following section will look at the types and forms of partnerships that have been reported across OECD countries and systems, with a special focus on those addressing digital skills and physical health.

Types of partnerships between schools and other actors

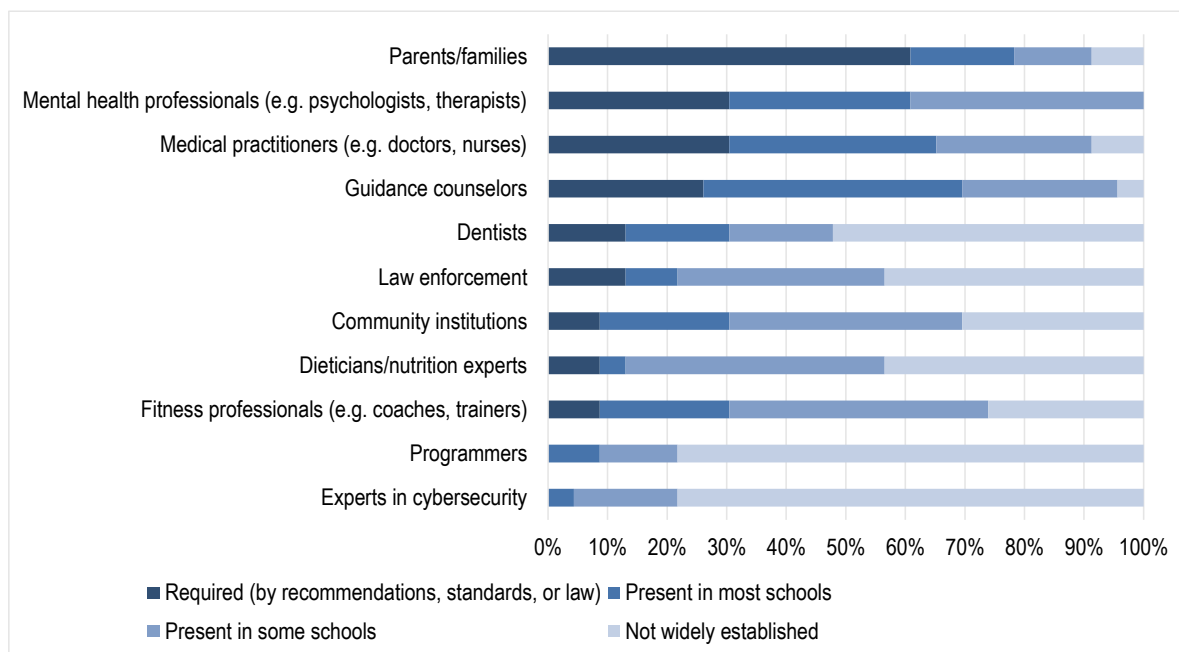
While policy makers have been incorporating new competences for teachers into national curricula and standards, they are also mindful that they should avoid increasing the burden on teachers that may come along with these often complex demands. They also work to avoid diluting the role of teachers, or creating overlapping competences with professionals from other areas. Teachers, first and foremost, are not seen as specialists for health or well-being issues, but as key players to connect and collaborate with other specialists and services (see also Chapter 11).

Partnerships can range from ad hoc discussions between different actors to designing, evaluating and improving programmes together. The nature of partnerships is strongly dependent on the authority and expertise of the actors involved and on the resources mobilised to make it happen. Mechanisms to support the collaboration of different partners and institutions include (Toon and Jensen, 2017^[23]):

- establishing formal feedback loops or accountability measures
- collaborative learning practices
- dedicated time and ongoing funding
- developing professional responsibility, agency and trust.

Countries reported a range of partnerships between their schools and external actors (see Figure 12.4)

Figure 12.4. Partnerships between schools and external actors



Note: 23 countries and systems answered this question

Source: 21st Century Children Policy Questionnaire

Partnerships with parents and families

The most common type of partnership reported in the Policy Questionnaire was with parents and families. Almost two-thirds of the systems that responded to this question reported that family partnerships are required in schools, and only two commented that these types of partnerships are not widely established in their systems.

While policy makers and schools have long understood the importance of partnering with families to protect children and support their learning, this partnership became especially important during the COVID-19 pandemic, when families were required to support schooling from home over a period of many months in some countries. However, the international research literature highlights the challenges many schools can experience in collaborating with parents and families, especially when trying to involve parents who are hard to reach or may not have had a positive schooling experience themselves (see Box 12.3).

Box 12.3. The key role of school-family partnerships

The COVID-19 pandemic forcefully reminded us of the importance of involving parents in the education of their children. This was not a new lesson: since the mid-1960s there has been a growing wave of evidence that the education level of parents, their financial resources and attitudes, and the overall influence of the home environment are among the best predictors of young people's academic achievement (Coleman, 1966^[24]; Plowden, 1967^[25]; OECD, 2018^[26]).

On average across the OECD, 77% of teachers indicated that their school provides parents with opportunities to actively participate in school decisions, a significant increase since 2013 in 13 countries and economies (OECD, 2020^[3]). However, while participation in school activities and governance seems to work well for those families that know how to 'work and navigate' the school system, it is more difficult to induce participation among families from vulnerable groups who are more at risk of education inequalities (Corter and Pelletier, 2005^[27]; Furstenberg, 2011^[28]; Gordon and Cui, 2014^[29]).

This can be particularly true in the digital space, as shown clearly during the first phase of school closures during the pandemic. Disadvantaged families were less likely to have Internet access and the devices needed for online education. In addition, disadvantaged parents were less likely to have the digital skills and knowledge required to effectively support their children with their learning (OECD, 2020^[30]). Studies in the United Kingdom and the Netherlands showed that the overall education level of parents was also related to the amount of time that students spent on schoolwork during the period of school closures. Students from families with lower-educated parents spent significantly less time on schoolwork than their peers from families with higher levels of education, as their parents might not speak the same language as the language of instruction, might have limited literacy or numeracy skills, and might not understand the work that schools were sending home for their children (Bayrakdar and Guveli, 2020^[31]; Bol, 2020^[32]).

Although this is not a pandemic-specific issue, in the immediate term schools will need to work jointly with families and the broader community on three crucial areas: 1) reinforcing safety and trust; 2) ensuring student well-being and learning continuity; and 3) building resilience through collective reflection, enhanced collaboration and distributed leadership (OECD, 2020^[33]). One very immediate concrete example could be involving parents in the creation or revision of a schools' emergency plan, which can boost emergency preparedness (WHO, 2009^[34]) while contributing to increase families' own emergency preparedness.

In the longer term, schools will need to continue to find creative and authentic ways to involve all parents, especially those who are most disadvantaged, in the school community.

Partnerships with medical and mental health professionals

After partnerships with parents and families, mental health professionals and medical practitioners are the next set of commonly reported school partnerships. These professionals are required in almost a third of the countries and are widely present in another third. Several responses to the Policy Questionnaire described the way education and health networks and ministries work together to promote a joint vision

and reinforce the coherence of actions. The mental health and emotional well-being of children is a focus of Chapter 13 in the companion volume to this one (Burns and Gottschalk, 2019^[35]).

Partnerships for physical health

Since a majority of governments surveyed expressed that their biggest challenges regarding students' physical health were around exercise, weight and nutrition, it is surprising that school partnerships in this area are not required or observed in most countries. Partnerships between dietitians or nutrition experts and fitness professionals (e.g. coaches or trainers) are only required in two of the 25 countries that responded to the survey. Policy makers in 15 systems reported that partnerships between schools and fitness professionals are present in some or most schools, while in only 11 systems are partnerships with dietitians or nutrition experts present in some or most schools. This aligns with the finding on the requirement for teacher training in this area and could perhaps indicate that governments tend to provide regulations or guidelines for schools while providing advice, resources and possible partnerships to parents instead.

Nonetheless there are some countries with interesting policy examples in these areas. The Latvian Ministry of Education and Science has partnered with the Latvian Olympic committee and various enterprises to develop a school initiative called [Everyone Exercises](#). The objectives of this programme are to strengthen the role of sports in society and inspire children to engage in regular physical activity and to monitor the effects of physical activity on their health. As part of this programme, primary students are given two mandatory physical education lessons and three additional optional lessons per week, covering general physical fitness, football skills, and swimming or other outdoor activities. Participants in the programme are monitored in terms of their diet, sleep, motivation, learning achievements and any changes to height, weight and muscle gain.

The government of Switzerland also partners with the Swiss Olympic committee to provide resources and guidelines to schools to promote increased physical activity among its students. During school closures as a result of the COVID-19 pandemic, the *School Moves* programme provided videos, activities and exercises for students to complete at home in order to keep their level of physical activity. The programme website provided ideas for “soothing” or “activating” breaks from students' academic studies, as well as a variety of movement tasks for students to complete alone or in groups. Some of these movement tasks taught fundamental sports skills, and others allowed students to move while learning academic content.

Partnerships with digital experts: Creating the conditions for using technology in schools

Fostering digital skills and incorporating digital technology in the classroom involves more than simply trading textbooks for tablets. It raises the challenge of unprecedented investment in education technology and professional development to build the capacity of teachers for understanding the use, content and pedagogical implications of technology. Further, it also implies establishing stronger connections with the whole community, for most of the opportunities and challenges that come with the use of technology lie both inside and outside the schools. Therefore, comprehensive efforts to bring families and community organisations together are needed to ensure digital learning does not become another source of disadvantage (Hooft Graafland, 2018^[36]).

Despite the growing emphasis on equipping teachers with digital competences, countries reported a low rate of partnerships with programmers and experts in cybersecurity. This is potentially due to a number of factors. Firstly, areas of programming or coding and cybersecurity are not among the key priorities of policy makers regarding technology and schools, despite the attention paid to protecting children from digital risks. Furthermore, teachers are often expected to integrate digital skills into existing subjects – which would be a powerful way forward as long as they are proficient in these skills. As highlighted earlier in the chapter, it is still not clear that teachers are confident in their abilities to do this.

Many countries mentioned partnerships or initiatives based around providing devices or technical equipment or content into schools. According to TALIS 2018 data, 25% of lower secondary principals reported that a shortage or inadequacy of digital technology for instruction hindered the school's capacity to provide quality instruction by quite a bit or a lot (OECD, 2019^[11]). A further one in five school principals said that their schools had insufficient Internet access to provide quality instruction.

The digital equipment or content access programmes mentioned by systems in the Policy Questionnaire would provide their teachers and learners access to interactive whiteboards, tablets or PCs and labs providing access to equipment that would allow students to build skills in robotics, programming, making and other digital skills and competencies using a variety of methods. Glasgow City Council had plans to roll out 55 000 tablets and other technology as part of a 1-to-1 computing initiative for all pupils and staff. In Korea and the Russian Federation digital textbooks for a variety of subjects were being implemented across schools, and Sweden is in the process of developing digitalised national exams. The Greek Ministry of Education has implemented a network of 145 open technology laboratories across the country in partnership with Building Infrastructure and the National Banks's i-bank. The labs consist of a network of workstations with Raspberry PI, robotics kit, 3D printers and scanners, interactive projectors, multifunction peripherals and various sensors. The aim is that the network will develop into a broader professional community of practice around the effective use of digital technologies.

Countries are also entering into partnerships dedicated to providing more evidence-based, tried and tested education-specific technology into schools. In the United States, Digital Promise is a foundation dedicated to research, programme and practice development around furthering the use of technology in schools. Their [League of Innovative Schools](#) is a community of over 100 forward-thinking US school districts that receive support from Digital Promise in using technology to address key education challenges.

In Finland, the [Smart Learning Environments of the Future](#) project involves the six largest cities in Finland and multiple universities, who are working together with schools and edtech startups to co-develop edtech that better meets the needs of the education sector. In this project, schools not only become test beds for edtech, but students and teachers are able to participate in companies' product development processes and influence the how the products are developed. Edtech companies embed the process of piloting and evaluation in schools into their development process and using this feedback to improve their products.

Founded by the Center for Education Technology in Israel, [MindCet](#) aims to engage with creators of educational technology, schools and teachers to create innovative new models for learning with technology. Among the MindCet offerings are opportunities for teachers to become edtech entrepreneurs or pilot innovative new pedagogies in their schools.

In Estonia, the [Edulabs](#) programme partners schools and researchers to pilot educational technologies and develop innovative pedagogies to use the edtech with learners. It aims to develop research skills in teachers so that they can reflect on and improve their own practice, and further supports teachers with an online community of their peers which they can consults for resources or help.

Partnerships with community institutions and law enforcement

Community involvement is one of the key factors for effective intervention design (Aston, 2018^[37]). By involving the community in intervention design and implementation, there is often an opportunity to make use of existing infrastructure and build on the strengths in the community (Hooft Graafland, 2018^[36]). Over two-thirds of the countries and systems that responded to the Policy Questionnaire confirmed that partnerships with community organisations are required, present in all schools or present in some schools. One example of a partnership with a community institution example comes from Latvia, where the Ministry of Education invited vocational cultural education institutions to carry out the [RaPaPro Creative Partnership Programme](#). Schools had to open their doors to the public and look for partners among businesses and within the social sphere, which also included neighbouring schools and local residents.

Many social services also liaise between schools and families to help support vulnerable children. Often schools and teachers identify or are notified by social services of children who are being harmed or at risk of harm outside of school and are able to monitor their health and behaviour in school on a daily basis, reporting back to social services when needed (for more see Chapter 11). During the COVID-19 pandemic, the daily, in-person contact with these vulnerable children was removed, and keeping a close watch on vulnerable children became a particular concern for schools and social workers.

In Ireland, a survey of school leaders found that pastoral care (supporting the social and emotional well-being) of students was the most difficult school service to replicate remotely (Mohan et al., 2020^[17]). Indeed, in many countries, schools were kept open during lockdown so that vulnerable children could attend in-person. However, in the United Kingdom, the Early Intervention Foundation reported that often parents of these children would not send them to school, thus making the process of monitoring them much more challenging for schools and social services (Wilson and Waddell, 2020^[38]).

In the case of law enforcement, given that schooling includes a diverse range of actions that are mandatory by law, it is likely that most schools – and in particular those working with students more likely to suffer from educational inequalities – are in constant contact with law enforcement services. This continuous contact might be considered a form of partnership by some countries – even if these are singular collaborations to address specific targets – while others might consider this continuous contact as a form of routine process or protocol that does not match the idea of partnership. No specific examples of effective partnerships with law enforcement were provided by respondents to the Policy Questionnaire.

Box 12.4. Partnerships to address bullying

No one entity or individual involved in supporting or educating young people can tackle the issues of bullying or cyberbullying alone, and there is no one solution to preventing it. Teachers and schools have a role to play in helping to identify and stem bullying behaviours that are observed at school, by making sure the school environment is safe and improving classroom management and communication with parents and between students. Training parents about bullying and the negative social, emotional and behavioural issues it can manifest, as well as involving them in looking out for symptoms are features of successful anti-bullying programmes (Choi, 2018^[39]).

When bullying persists, turns violent or moves to the digital sphere, it becomes necessary to involve mental health professionals, law enforcement and others in the community, such as the private sector providers of digital platforms on which bullying can occur. Local police and community organisations often post guidance for schools, parents and the communities that describe how to handle issues of bullying and when to involve law enforcement. Social media platforms also work to address bullying: Facebook has developed a [Bullying Prevention Hub](#) in conjunction with the Yale University Centre for Emotional Intelligence, and Instagram introduced a “[Restrict](#)” feature to prevent bullying. However, young people need to be educated as to the severe and lasting effects of cyberbullying.

It is only by all of these actors working together that the complex and damaging challenge of bullying and cyberbullying – and their myriad negative effects on students’ well-being -- can be addressed and minimised.

In sum: Working together towards a changing landscape of education

As education systems increasingly respond to new societal, economic and digital needs, schools are on the front line of change. Communities depend on educators to help integrate students of different languages and backgrounds, to encourage tolerance and cohesion, and to respond effectively to the needs

of all students, including supporting their well-being. Teachers are also expected to prepare students for the digital world – to help them learn how to use new technologies and to keep up with new and rapidly developing fields of knowledge (OECD, 2010^[40]).

Yet change in schools has been compared to turning an oil tanker (Gardner and Ollis, 2015^[41]): it's slow and laborious, and once you have committed to the change, it is difficult to turn back – even if you realise you are headed in the wrong direction. It can be difficult to convince key stakeholders in education – government, parents, teachers and the community – that the system of schooling in which they themselves took part should be radically altered.

With the ever increasing challenges facing our youngest members of society, education systems need to be agile enough to respond to the threats our children confront from society (bullying, alcohol, drug and tobacco use), the Internet (online predators, securing personal data, cyberbullying) and their own healthy living habits (obesity, lack of physical activity, poor diet and nutrition). Teachers and schools need to be confident that they have the knowledge and resources necessary to address these challenges, and many others, on a daily basis.

Responding to these challenges, systems across the OECD have focused on equipping their teachers with new skills through their initial teacher education and continuing professional development. There are numerous examples of policy initiatives supporting the well-being of students, as well as training teachers to develop digital skills in their students. Somewhat surprisingly, there are fewer examples of initiatives to train teachers to educate their students about digital risks, despite the high priority of these issues.

In terms of partnerships, countries reported extensive partnerships with families and parents, and increasingly also with other sectors such as health providers and mental health professionals. Less common were initiatives with programmers and cybersecurity experts, although many other initiatives to provide equipment to schools and build skills among teaching staff and learners have been implemented.

More than any other time in recent history, the challenges faced during the COVID-19 crisis of 2020 showcased just how important partnerships and professional development are for teachers. Schools and teachers struggled to transition from the traditional face-to-face learning environment to one managed virtually, using a mixture of digital resources accessed via computer, mobile phone or television, and traditional books, pens and paper worksheets. While teachers laboured to quickly solve the technical issues necessary to put their learning materials online, they also found creative ways to monitor their students' physical and mental well-being on a daily basis. Governments and schools had to rapidly develop solutions for providing free school meals to those students who regularly received them at school, as well as hand-delivering laptops, books and printed worksheets to families in need of those resources. In many instances, these vital resources were not provided soon enough, and after six months of the pandemic, countries wondered just how many students would be left behind. It is up to all of us -- policy makers, school leaders, teachers, parents and members of the community – to work together in supporting schools to care for and develop our nations' children.

References

- Aston, R. (2018), "Physical health and well-being in children and youth: Review of the literature", [37]
OECD Education Working Papers, No. 170, OECD Publishing, Paris,
<https://dx.doi.org/10.1787/102456c7-en>.
- Bautista, A. and R. Oretga-Ruiz (2015), "Teacher professional development: International [18]
 perspectives and approaches", *Psychology, Society, & Education*, Vol. 7/3,
<http://dx.doi.org/10.25115/psyse.v7i3.1020>.

- Bayrakdar, S. and A. Guveli (2020), "Inequalities in home learning and schools' provision of distance teaching during school closure of COVID-19 lockdown in the UK", *ISER Working Paper Series*, University of Essex. [31]
- Bocconi et al. (2016), *Developing Computational Thinking in Compulsory Education: Implications for Policy and Practice*, <http://dx.doi.org/10.2791/792158>. [15]
- Bol, T. (2020), *Inequality in Homeschooling during the Corona Crisis in the Netherlands: First Results from the LISS Panel*, Center for Open Science, <http://dx.doi.org/10.31235/osf.io/hf32q>. [32]
- Burns, T. (2020), "A helping hand: Education responding to the coronavirus pandemic", *OECD Education and Skills Today blog*, <https://oecdeditoday.com/education-responding-coronavirus-pandemic/>. [2]
- Burns, T. and F. Gottschalk (eds.) (2019), *Educating 21st Century Children: Emotional Well-being in the Digital Age*, Educational Research and Innovation, OECD Publishing, Paris, <https://dx.doi.org/10.1787/b7f33425-en>. [35]
- Burns, T. and F. Köster (eds.) (2016), *Governing Education in a Complex World*, Educational Research and Innovation, OECD Publishing, Paris, <https://dx.doi.org/10.1787/9789264255364-en>. [1]
- Choi, A. (2018), "Emotional well-being of children and adolescents: Recent trends and relevant factors", *OECD Education Working Papers*, No. 169, OECD Publishing, Paris, <https://dx.doi.org/10.1787/41576fb2-en>. [39]
- Clotfelter, C., H. Ladd and J. Vigdor (2007), "Teacher credentials and student achievement: Longitudinal analysis with student fixed effects", *Economics of Education Review*, Vol. 26/6, pp. 673-682, <http://dx.doi.org/10.1016/j.econedurev.2007.10.002>. [10]
- Coleman, J. (1966), *Equality of Educational Opportunity*, U.S. Dept. of Health, Education, and Welfare, Office of Education, Washington D. C. [24]
- Corter, C. and J. Pelletier (2005), "Parent and Community Involvement in Schools: Policy Panacea or Pandemic?", in *International Handbook of Educational Policy*, Springer *International Handbooks of Education*, Springer Netherlands, Dordrecht, http://dx.doi.org/10.1007/1-4020-3201-3_15. [27]
- Dellagnelo, L. and F. Reimers (2020), *Brazil: Secretaria Estadual de Educação de São Paulo (São Paulo State Department of Education)*, <https://oecdeditoday.com/wp-content/uploads/2020/05/Brazil-S%C3%A3o-Paulo-State-Department-of-Education.pdf>. [16]
- Fluck, A. et al. (2016), "Arguing for computer science in the school curriculum", *Journal of educational technology and society*, Vol. 19/3, pp. 38-46. [14]
- Furstenberg, F. (2011), "The challenges of finding causal links between family educational practices and schooling outcomes", in Duncan, G. D; Murnane, R. and Richard J. Murnane (eds.), *Whither Opportunity?: Rising Inequality, Schools, and Children's Life Chances*, Russell Sage Foundation, <http://www.jstor.org/stable/10.7758/9781610447515>. [28]
- Gardner, B. and D. Ollis (2015), "Change in schools it's more like sort of turning an oil tanker", *Health Education*, Vol. 115/3/4, pp. 377-391, <http://dx.doi.org/10.1108/he-03-2014-0037>. [41]

- Garet, M. et al. (2001), "What makes professional development effective? Results from a national sample of teachers", *American Educational Research Journal*, Vol. 38/4, pp. 915-945, <http://dx.doi.org/10.3102/00028312038004915>. [19]
- Gordon, M. and M. Cui (2014), "School-related parental involvement and adolescent academic achievement: The role of community poverty", *Family Relations*, Vol. 63/5, pp. 616-626, <http://dx.doi.org/10.1111/fare.12090>. [29]
- Guerriero, S. (ed.) (2017), *Pedagogical Knowledge and the Changing Nature of the Teaching Profession*, Educational Research and Innovation, OECD Publishing, Paris, <https://dx.doi.org/10.1787/9789264270695-en>. [7]
- Hooft Graafland, J. (2018), "New technologies and 21st century children: Recent trends and outcomes", *OECD Education Working Papers*, No. 179, OECD Publishing, Paris, <https://dx.doi.org/10.1787/e071a505-en>. [36]
- Kolle, E. et al. (2019), *Evaluating the Implementation of a School Based Physical Activity Intervention in High School: The School in Motion study*, Nowegian Sports Academy, <https://www.udir.no/contentassets/00554e6be9104daeb387287132cef1e0/sluttrapport-scim.pdf>. [20]
- Mohan, G. et al. (2020), *Learning for all? Second-level education in Ireland during COVID-19*, ESRI, <http://dx.doi.org/10.26504/sustat92.pdf>. [17]
- OECD (2020), "Coronavirus special edition: Back to school", *Trends Shaping Education Spotlights*, No. 21, OECD Publishing, Paris, <https://dx.doi.org/10.1787/339780fd-en>. [33]
- OECD (2020), *Education responses to COVID-19: Embracing digital learning and collaboration*, OECD Publishing, Paris, <http://www.oecd.org/coronavirus/en/>. [3]
- OECD (2020), "Learning remotely when schools close: How well are students and schools prepared? Insights from PISA", <https://www.oecd.org/coronavirus/policy-responses/learning-remotely-when-schools-close-how-well-are-students-and-schools-prepared-insights-from-pisa-3bfd1f7/>. [30]
- OECD (2020), *TALIS 2018 Results (Volume II): Teachers and School Leaders as Valued Professionals*, TALIS, OECD Publishing, Paris, <https://dx.doi.org/10.1787/19cf08df-en>. [8]
- OECD (2019), *A Flying Start: Improving Initial Teacher Preparation Systems*, OECD Publishing, Paris, <https://dx.doi.org/10.1787/cf74e549-en>. [9]
- OECD (2019), *TALIS 2018 Results (Volume I): Teachers and School Leaders as Lifelong Learners*, TALIS, OECD Publishing, Paris, <https://dx.doi.org/10.1787/1d0bc92a-en>. [11]
- OECD (2018), *Teaching for the Future: Effective Classroom Practices To Transform Education*, OECD Publishing, Paris, <https://dx.doi.org/10.1787/9789264293243-en>. [26]
- OECD (2017), *Schools at the Crossroads of Innovation in Cities and Regions*, Educational Research and Innovation, OECD Publishing, Paris, <https://dx.doi.org/10.1787/9789264282766-en>. [21]
- OECD (2014), *TALIS 2013 Results: An International Perspective on Teaching and Learning*, TALIS, OECD Publishing, Paris, <https://dx.doi.org/10.1787/9789264196261-en>. [12]

- OECD (2010), *Educating Teachers for Diversity: Meeting the Challenge*, OECD Publishing, Paris, <https://doi.org/10.1787/9789264079731-en>. [40]
- OECD (2010), *TALIS 2008 Technical Report*, TALIS, OECD Publishing, Paris, <https://dx.doi.org/10.1787/9789264079861-en>. [13]
- Plowden, B. (1967), *Children and Their Primary Schools: A Report of the Control Advisory Council for Education (England)*, HMSO, London. [25]
- Price, H. and K. Weatherby (2017), “The global teaching profession: How treating teachers as knowledge workers improves the esteem of the teaching profession”, *School Effectiveness and School Improvement*, Vol. 29/1, pp. 113-149, <http://dx.doi.org/10.1080/09243453.2017.1394882>. [6]
- Ramírez, Y. and D. Nembhard (2004), “Measuring knowledge worker productivity”, *Journal of Intellectual Capital*, Vol. 5/4, pp. 602-628, <http://dx.doi.org/10.1108/14691930410567040>. [5]
- Schleicher, A. (ed.) (2012), *Preparing Teachers and Developing School Leaders for the 21st Century: Lessons from around the World*, International Summit on the Teaching Profession, OECD Publishing, Paris, <https://dx.doi.org/10.1787/9789264174559-en>. [4]
- Stevenson, M. and M. Boxall (2015), *Communities of Talent: Universities in Local Learning and Innovation Ecosystems*, PA Consulting, London UK, <http://www.paconsulting.com/insights/how-can-local-learning-partnerships-overcome-our-national-skills-deficit/>. [22]
- Toon, D. and B. Jensen (2017), *Teaching our Teachers: A Better Way - Developing Partnerships to Improve Teacher Preparation*, Learning First, Melbourne, <http://learningfirst.com/wp-content/uploads/2018/03/2columnsITECoPPaper2PartnershipsFINAL17Nov17.pdf>. [23]
- WHO (2009), *Pandemic influenza preparedness and response: A WHO guidance*, World Health Organisation Global Influenza Programme, Geneva, https://www.who.int/influenza/resources/documents/pandemic_guidance_04_2009/en/. [34]
- Wilson, H. and S. Waddell (2020), *Covid-19 and Early Intervention: Understanding the Impact, Preparing for Recovery*, Early Intervention Foundation, London, <https://www.eif.org.uk/report/covid-19-and-early-intervention-understanding-the-impact-preparing-for-recovery>. [38]

13 The pending agenda

In addition to academic learning, supporting children to be happy, healthy and empowered is an important educational goal. As the culmination of this volume, this chapter highlights a number of transversal themes that have emerged through work with countries, including the delicate question of risk-taking and the increasing societal expectations of perfection. The pressures these both exert on children, parents and schools must be discussed and considered thoroughly. This chapter also identifies gaps in our knowledge and areas for improvement in both policy and research. The work for education systems around the world is to try to stay ahead of, or at least on top of, the curve.

Introduction

The COVID-19 pandemic has reminded us that schools are not just places of academic learning. They are part of the social fabric of our communities, and they are increasingly expected to help children—especially the most vulnerable—thrive academically, physically and psychologically. Balancing these different elements has long been a challenge; doing so well in the digital world even more so.

One of the challenges is that while education is increasingly playing a role in supporting and developing children on these various outcomes, much of the specific expertise lies outside of the education sector. In the case of physical health and well-being, the medical profession and associated ministries and professional bodies have long taken the lead. In the case of digital technologies, expertise is often concentrated in private companies, and ministries of science and technology on the public policy front. This is not problematic per se: in fact, it would be unrealistic (and inefficient) to expect the education sector to take on these elements in addition to their traditional responsibilities. However, it does create two separate challenges for the education sector 1) forging the connections and partnerships required to access the relevant expertise and knowledge from other sectors; and 2) understanding how best to design and deliver policy and practice informed by a research base which may not address the primary concerns of education and educators.

The difficulty in connecting research to policy and practice is not specific to education. Particularly when looking at a complex intersection of domains, such as education, medicine, media studies, neuroscience, economics, sociology and psychology to name just a few, there is a lack of connection among the various research disciplines. Importantly, there is also a paucity of work looking at multidimensional trends and outcomes within the fields themselves. This volume, along with its sister volume on emotional well-being in the digital age (Burns and Gottschalk, 2019^[1]), aims to help identify some key gaps in our knowledge that should be filled as a priority to help inform educational policy and practice.

This chapter looks first at a number of cross-cutting themes that have emerged across the research reviews, OECD work with countries and discussions of this publication. It then highlights orientations for policy, research and practice. It ends with gaps in our knowledge and areas for improvement.

Emerging cross-cutting themes

Throughout the chapters in this volume and the companion volume on emotional well-being (Burns and Gottschalk, 2019^[1]), a number of themes emerged that cut across different areas and discussions.

Multiple goals for education require a focus on interconnections

Supporting children to thrive academically, physically and psychologically in a digital world requires focusing on each element as well as the intersections and interconnections between them. This requires us to address existing barriers in policy, practice and research. These include:

- Governing authorities, from ministries to local administrations, tend to work in silos, and areas of overlapping responsibility are not always clearly delineated or aligned. Even when seated at the same table, there are difficult questions about whose voice counts, and when.
- Schools must work in partnership with multiple other actors, and the responsibility and accountability for non-academic educational goals (e.g., well-being, social and emotional skills) is again overlapping and unclear. Forging strong and mutually beneficial partnerships with diverse actors is necessary; but the capacity to do this is not a given, particularly for smaller regions and schools.

- Research is also defined by traditional fields and academic disciplines, influencing posts in research institutions as well as funding streams and grants. “Interdisciplinary” research is often considered less prestigious than “pure” research, relegated to specific journals and a subset of grants and awards.

Supporting children’s resilience requires managing, not eliminating, risk

In many ways our current society has been described as having zero tolerance for risk, particularly when it comes to developing minds and bodies. This has an impact on how schools function, from the design of playgrounds and physical spaces to accountability and governance structures. And indeed, no one wants children to be harmed. Yet overprotective parenting is linked to a set of negative outcomes for children, including greater anxiety and other mental health challenges (Ulferts, 2020^[2]). In addition, as pointed out in Chapter 4, risky outdoor play is important not only for the development of physical skills, but also to learn how to manage and judge risk, and learn from peers as they in turn navigate their own choices. Similarly, research on digital risks demonstrates that children who are taught to manage risk (rather than risk being minimised or removed for them) are more able to identify cyber risks and know what to do and who to talk to if they are exposed.

In fact, supporting children to “manage” risk rather than parents or schools eliminating it is part of recognising children as active agents rather than victims and vulnerable individuals. However, despite the growing awareness of the importance of resilience and being able to manage risk, as well as the potential negative repercussions from over-protection, many parents and schools still prefer a zero tolerance to risk approach. Working to change this is delicate and must address two issues simultaneously: a) the actual level of risk for the child; and b) the perceived risk (both to the child as well as the parent and/or school). This last element is crucial: Perceived disapproval of others (e.g., being considered a bad parent) is a key influence of parental fear (Bennetts et al., 2018^[3]). Teachers and schools also fear being blamed or criticised if an activity or policy deviates from a zero-risk approach. Designing practices and policies to help schools, teacher, parents and students learn to manage risk have to thus take both actual risk and perceived pressure/judgement into account.

These are important distinctions. Addressing the first part of the equation requires answering the question “what is the best way to build children’s skills as well as their resilience to risks, while still protecting them from harm?” This necessitates, for example, designing school policies around play spaces that include a risk assessment of the likelihood of potential injury and the trade-offs with actual harm. It would include the voices of the children and allow them to also weigh in on the level of acceptable risk. Similarly for digital security, a risk assessment of the potential exposure to inappropriate content would indicate how and when that might be most likely to happen, involve the voices of children, and flag the kinds and timing of interventions that would minimise trauma or other impact of having been exposed to harmful content. Important features for risk assessments thus include type of risk (risky outdoor play, for example, or cyber risks or risks associated with innovation and trying new things), as well as characteristics of the individual family, school or regional regulatory body.

Addressing perceived risk and disapproval/judgement of others is even more difficult, as it requires challenging the increasingly prevailing attitude that children are vulnerable and must be protected from all of life’s threats. The persistence of this attitude, despite a concurrent discussion of child and youth empowerment, speaks to how deeply it has become entrenched in our thinking. Clear frameworks, such as the dynamic risk benefit assessment outlined in Chapter 4, are necessary, but it will not be easy. No one wants to be in the position of seeming to advocate harm to children, or looking like a parent who is careless. Even the increasing popularity of “free-range parenting” is experiencing some backlash.

Assuming this attitude change is possible, making “managing risk” policies and practice work depends heavily on the skills of teachers and parents. For example, in terms of digital risks, those teachers and parents who are less confident of their own or their child’s digital skills tend to take a more restrictive

approach to risk, and vice versa (Livingstone and Third, 2017^[4]). This suggests that interventions targeting the level of skills of teachers, parents and children have the potential to increase children's resilience to risks while expanding opportunities of digital engagement. The same patterns play out in other sectors and challenges. Teacher education (both initial and continuing professional development) will need to systematically address these issues in an ongoing manner, adapting and updating along with emerging research, tools and ecosystems.

New stresses and the pursuit of perfection

Over the last almost 30 years there has been an increase in socially prescribed expectations for perfection, exacerbated by social media and the success culture that drives it. In particular, young people report that they feel increased pressure to be perfect to gain social approval (Curran and Hill, 2017^[5]). This is related but distinct from the risk-taking discussion laid out above. This volume has looked at this from three different dimensions: the physical (body image), the cognitive (use of smart drugs) and the digital (pressures from the myth of the digital native). Other dimensions could be added: there are increasingly unrealistic expectations of relationships, for example.

Many of these pressures are prevalent from a young age. Body image concerns, for example, can be measured from 3.5 years old and tend to increase throughout adolescence and early adulthood. It is thus surprising that the discussion tends to be trivialised despite potential far-reaching consequences on behaviour, academic success and relationships. There is a clear role for education here, not only in addressing these issues and challenging the pressure, but also reflecting critically on how it is contributing to the problem. From a student perspective, for example, feeling unable to take a risk and potentially make a mistake is stressful and can result in less, not more, innovation and creativity. The same is true for teachers.

So what is driving the pursuit of perfection? As Chapter 7 highlights, media, particularly social media, are an important socialisation agent. Focusing on media is useful because they are a modifiable risk factor, one that can be addressed and actioned in policy and practice. Yet social media are not the only drivers of the pursuit of perfection. As tempting as it might be to put the burden on “new” technology, the biggest driver is social comparison itself, not the tools used for that comparison. Perfectionism itself is also a driver: achieving or approaching perfection provides or reinforces social status. We live in a success culture, where ethics about what counts as perfection – and the acceptable paths to it – are changing.

This may seem like an academic argument, touching on ethics and philosophy. Yet it is also a very concrete and pressing issue for students, families and schools. Schools are a microcosm of the various societal drivers and expectations, and they are often unprepared to deal with these issues. Addressing and challenging the pressure for perfection requires a focus on multiple levels:

- the individual: learning how to engage critically with “perfect” media messaging and images, using techniques to address stress, anxiety and mental health issues, understanding (and believing) that no one is perfect and that mistakes are normal;
- the system: balancing creativity and innovation, which require risk-taking and the potential for mistakes, with accountability structures for students, teachers and schools;
- the broader society: openly addressing this pursuit of perfection, already happening on social media with myth-busting and tools to show how images are enhanced, the embracing of different and diverse bodies and types of beauty, etc.

This discussion also raises uncomfortable questions about the goals of education as it too comes under increasing pressure to be perfect. Increasingly active parents are advocating for their children and insisting on certain standards and success. Who is the client: The parent, or the child? The goals and desired

outcomes change depending on who you are serving (as a teacher and educator, but also as a doctor, psychologist, and all of the other actors with whom schools increasingly partner).

A similar argument can be made about empowerment. Student agency is increasingly becoming an important goal for systems, both from an instructional point of view and a governance point of view. So too is encouraging the active involvement of parents in the education of their children. Additionally, teachers and school leaders are increasingly positioned as autonomous actors, particularly in decentralised systems. Yet different forms of empowerment can be at odds with each other. Whose voice counts (the student? parent? teacher?) if they are not aligned? We will return to this discussion in the section below.

Policy orientations and gaps in our knowledge

The following orientations are general in nature, as meeting challenges with policy solutions is often context-dependent. Devising a “one size fits all” response to an inherently multifaceted issue is thus neither possible nor desirable.

System-wide challenges

A number of system-wide challenges were highlighted across this volume and in the work of the companion volume (Burns and Gottschalk, 2019^[1]).

We need to address policy fragmentation

There is a longstanding debate on the role of education in strengthening child well-being and health, and the relative responsibilities of families, education and other professionals and ministries. One difficulty is the intersectoral nature of these issues, which makes ownership and responsibility difficult to determine, particularly in the decentralised context of education in many countries. Although strategies for harmonised policy responses across ministries and levels of government are becoming more common, co-ordination of actors and roles requires careful attention to be effective. In addition, developing a local or even national policy response is necessary but may not be sufficient. In a borderless digital environment, responsible parties might be in another jurisdiction and enforcement options are currently limited or even non-existent.

We need to include the voices of children

Children are active users of digital technologies, and one of their preferred activities is information seeking, whether for socialisation, searching for health information or schoolwork. In respecting student rights and agency, education supports the development of strong critical thinking and media literacy skills that empower children to be well-informed agents of change. We have seen the impact of organised youth activism in terms of the global climate change protests. Student voices focus attention on the positive opportunities digital technologies afford (rather than risks, which is common in the current adult-centred research and policy discourse). These are just some of the ways in which empowered children and youth contribute to shaping the world they will inherit.

Children and youth tend to be early adopters of new digital technologies and they are also the most targeted group by digital software developers and platforms. Although it is often assumed that children and youth do not understand or do not care about their digital privacy, recent research indicates that they have a fluid understanding of their privacy, valuing specific elements over others and choosing when and where to reveal data about themselves. They may also sometimes choose to prioritise popularity (measured by the number of likes or shares on certain apps, for example) over privacy. In general, children and youth are becoming more critical and shrewder about what they see in the digital environment. This does not mean that they do not need protection or help with cyber risks, especially the youngest children. But it does imply that the type of help needed could be adapted and targeted better, taking children’s own agency into

account. This also extends to the physical environment, where children are for example increasingly included in discussions of play space design and broader urban planning discussions, as well as the development of inclusive health and well-being education programmes.

We need to adequately support our teachers

Teachers are increasingly expected to help integrate students of different backgrounds, to be sensitive to cultural, linguistic and gender issues, to encourage tolerance and cohesion, to respond effectively to the needs of all students and at the same time to encourage them to be self-directed learners. Teachers are also expected to prepare students for the digital world and accompanying (and rapidly evolving) knowledge and skill sets. As highlighted by the COVID-19 pandemic, they are also increasingly expected to help develop healthy habits and monitor physical and emotional well-being. All of these tasks require specific knowledge, competencies and skills. As systems increasingly recognise the need to prepare teachers for this diverse set of roles, there must be greater effort to update and ensure the quality of initial teacher education and ongoing professional development. There is also a need to better connect the stages of teacher education, improve the alignment of the various stages, and ensure that high-quality and targeted support is available when most needed.

We need to build and reinforce partnerships with other sectors

Ensuring student well-being in a digital world means that schools are increasingly expected to work in partnership with other actors. These include parents and families, but also health professionals, psychologists and law enforcement. Increasingly, they also include digital experts, cyber security professionals and programmers. Developing and maintaining partnerships with such a diverse set of actors, some of whom (for example those from the private sector) have different aims and goals, is a complex challenge. Although historically public and private partnerships have been limited in many systems, the speed of change of digital technology makes connecting to the expertise of the sector (the majority of which is concentrated in private tech firms) imperative.

This has a number of repercussions, including thinking through what this means for the protection of education as a public good and how to build capacity across the system, from the central ministry to the classroom, to continuously learn and evolve digital competencies along with technological change. In addition, as much of the directly measured digital use data and content (i.e. from user behaviour) is owned by private companies such as social media platforms and other providers, there is also a need for agreement on sharing data and measurements for policy and research purposes, as well as regulated restrictions on collecting and using such data.

We need to acknowledge the importance of culture and tradition as well as address systemic bias

Increased migration, globalisation and urbanisation are just some of the mega-trends shaping education. Delivering quality education in the 21st century requires adaptability and flexibility while still addressing sensitive topics related to national identity and values. This is a difficult and delicate conversation, and open discussion is necessary to recognise the impact of modern social, political, technological and demographic changes on schools and classrooms. It is also important to proactively address built-in systemic bias, for example through the “design for justice” initiative, which calls for ethics in design standards for digital technologies. This includes integrating diverse points of view when designing algorithms and code in an effort to reduce in-built bias. This is just one example: design justice operates in all areas, including urban development and community building more generally.

We need proactive policy and practice, informed by evidence

Fulfilling the promise of emancipation in pluralistic societies is a delicate issue, and striking a fair balance between all parties in a diverse society is not always possible. One example is vaccinations, and the

tension between individual family choices whether to vaccinate a child or not, and the collective good of requiring vaccinations to attend school. Different systems across the OECD have responded to this in different ways. Education is on the forefront of these issues, and as ever more diverse sets of actors become involved in education policy and practice, there will be more such examples.

The involvement of multiple voices is crucial, and we must strengthen transparent and respectful communication between schools, families and communities. Reaching out to diverse groups is facilitated by the immediacy of social media. However, social media also permits the amplification of certain voices pressuring for quick action to high profile incidents. This must be balanced when designing and developing effective policies, which requires identifying what works, under which conditions and for whom. Yet monitoring and evaluation are often the weakest link in the policy cycle - many of the country policy solutions provided for the 21st Century Children Policy Questionnaire did not clearly state whether or not they had been evaluated and if they were proven to be effective. Even when stakeholders are clearly convinced of the utility of suggested changes, there may be practical barriers to implementation in terms of the time and resources required. Many of these barriers can be targeted, for example, through research literacy training for policy makers and practitioners, helping researchers to speak to non-academic audiences, and translating and disseminating research findings to relevant communities.

Strengthening the knowledge base

We need to refine and harmonise our terms

There is a plethora of actors working on health and child well-being in the digital age. Many use their own definition and measurement of key concepts, including such basics as “digital literacy”, “well-being”, “screen time” and “resilience”. Without agreed and shared definitions that are nuanced and holistic, we will not be able to generate the kinds of data that are required, both to build measurements of these competencies and to build capacity of teachers and parents to help develop these skills in children.

In addition, overly broad or overly narrow definitions of key terms can lead to inaccurate assumptions and the identification of trends that do not necessarily exist and are not comparable across time and contexts. As Chapter 5 points out, terms like “Internet addiction” or “gaming disorder” are generally agreed to be misleading for multiple reasons. Not only do they potentially create social stigma that is unhelpful in supporting children and young people with “problematic interactive media use”, the term obscures the growing evidence that individuals who already suffer from anxiety or depression are more prone to engage in problematic use of technology. Causality is thus difficult to distinguish, and interventions will be most effective when addressing both virtual and physical world concerns. Incorrect or misleading definitions thus not only obscure trends; they could also lead to less effective responses from policy and practice.

We need to improve data and measurement

Surveys appear to be a common monitoring/measuring mechanism, but as self-report measures they are prone to bias. They also tend to replicate misconceptions, for example, the myth of the digital native as set out in Chapter 9. Another example is the conception of digital and technological skills as a ‘hard skill’, part of the suite of subjects in science, technology, engineering and mathematics. This is despite the body of research that demonstrates the importance of “soft” digital skills, used to communicate, interact and build social capital in the digital environment, and that it is these skills that make a difference in terms of generating positive outcomes from technology use.

In addition, as much of the directly measured digital use data (i.e. from user behaviour) is owned by private companies such as social media platforms and other providers, there is also a need for agreements on sharing data and measurements for research purposes. A need for a systemic approach to evidence-based policy making continues to be essential in determining policy priorities and in maximising protections that can be afforded by national policies.

We need to selectively target and fund high quality and rigorous research on child physical health and digital technology use

Regional, national and international policy agendas can help fill gaps by selectively funding research in priority areas.

Priority areas for digital technology:

- research on younger children (i.e. 0-8 year-olds)
- greater emphasis on how and why children use technology, including differentiating between media type, content, delivery interface, features of the interaction
- establishing causal links between technology use and child outcomes, and underlying mechanisms (e.g. what phenomena like “media multitasking” could mean for processes such as attention or working memory)
- understanding the changing landscape of digital technology use and impacts on skills. For example, smartphones and their apps are now far more common than computers or tablets. What does this mean for digital skill development? For creative self-expression and empowerment?
- understanding recovery after exposure to a cyber-risk, to identify where and how children seek help, what works in which context, and to help deliver messages on what they should they do if it happens again
- a deeper exploration of the potential benefits associated with technology use such as social capital formation, enhanced cognition (i.e. spatial processing, working memory), physical activity, and teaching and learning processes
- extending research frameworks to other technologies to better understand use, prevalence and impact, as well as opportunities and risks for education of emerging areas, including Internet of Things and Internet of Toys, as well as cognitive enhancement (smart drugs, brain stimulation etc.).

In terms of physical health, the available evidence is often not translated for an educational audience, and research results too often remain in their original field. There are also important knowledge gaps remaining.

Research priorities for physical health include:

- importance of contexts (family/neighbourhoods/communities), policies and cultures in understanding health behaviours and determinants of health
- filtering health information and where to go for help; how best to screen and identify at risk children
- intervening with younger and younger children (many prevention programmes target pre/adolescents whereas multiple concerns emerge earlier)
- explaining multiple outcomes and indicators (i.e. multidimensional trends and their intersections) to better understand what works, when and in which contexts. This includes both:
 - solving measurement challenges (e.g. the long term impacts of these trends); and
 - understanding how to embed intervention strategies in curricula for primary prevention purposes.

Research priorities for the intersection of digital technology and physical health:

- longitudinal studies
- controlled experiments with representative samples from a broad set of regions and countries, better integration of different methodologies
- working with young people

- comparable international indicators, including trend data across time that is disaggregated by age or stage of childhood/adolescence
- better use of existing big data (and data from apps, digital trace data), also in combination with other sources of information (administrative, self-reports etc.)
- real world implications of outcomes in this field, as effect sizes published in studies are often small even if statistically significant. What do these results mean for the day-to-day lives of children and their peers? Does a “large” effect size translate into functional differences in a child’s daily cognition, behaviour, social relationships and educational outcomes?
- clearly outlining the practicality of implementation in terms of costs, additional burden on teachers, and the necessary support that teachers need to carry out training and programmes to strengthen physical health and digital competence.

We need to foster dialogue and dissemination as well as improve the interdisciplinary nature of the knowledge base

The dissemination of research results should be a planned and systematic process to allow for an interdisciplinary knowledge base that can better inform practice and policy. This could be fostered through the establishment of networks to stimulate dialogue and build communities among researchers themselves. This could also include creating or supporting brokerage agencies designed to provide the required links between research and practice as well as building relevant capacity both in the system and among stakeholders.

Concluding note

Much of the discussion in this volume has necessarily used averages to generalise across countries and systems. However, averages hide important distinctions within and between countries and systems that cannot be overlooked. Inequality in opportunities are ever-present, and often widen as individuals grow older. Disparities in families’ capacity to support their children (including getting them into good schools) continue to translate into differences in children’s achievements, both in and outside of the school. This is true for educational achievement (and performance on tests, including PISA), educational attainment (children from more affluent families are less likely to drop out of school without a diploma and are more likely to complete tertiary education), labour market integration and later life success.

The discussion on social mobility and the intergenerational advantages of education is long-standing in both research and policy worlds. Behind the science are serious (and difficult) societal questions about the relative responsibilities of schools and families. Education is not a magic solution for disadvantage, and it cannot replace the formative role of parents in child development. Strong partnerships and collaboration with families and communities can contribute to better learning environments, but they cannot do it all.

This volume took a comprehensive look at physical health and digital technologies in modern childhood, and the intersections between them. Along with its companion volume on emotional well-being (Burns and Gottschalk, 2019^[1]), it identified key changes that often fall outside conventional education discourse and the challenges they could pose for education. It suggested possible solutions to these challenges, with the goal of providing research and policy options that will help countries in educating 21st century children and the opportunities and challenges they face in the modern world.

Many of these trends are a moving target, and reports such as this can become quickly outdated. The work for education systems across the OECD is to try to stay ahead of, or at least on top of, the curve. To do this, education, like all public sectors, must break down its silos and work across government departments and research disciplines. It must engage an increasingly broad variety of actors, including the private

sector. It must also evolve and grow as our societies and citizens develop, anticipating change and finding preventative solutions rather than simply reacting to problems.

By analysing the available research and data from a broad range of disciplines and linking these findings to educational policy and practice, this volume explores the potential of education systems to proactively adapt and change along with our communities and children. We owe it to our children and youth to separate fact from fiction, take risks towards ambitious but achievable goals, and help support them to get the best start in life.

References

- Bennetts, S. et al. (2018), “What influences parents’ fear about children’s independent mobility? Evidence from a state-wide survey of Australian parents”, *American Journal of Health Promotion*, Vol. 32/3, pp. 667-676, <http://dx.doi.org/10.1177/0890117117740442>. [3]
- Burns, T. and F. Gottschalk (eds.) (2019), *Educating 21st century children: Emotional well-being in the digital age*, Educational Research and Innovation, OECD Publishing, Paris, <https://dx.doi.org/10.1787/b7f33425-en>. [1]
- Curran, T. and A. Hill (2017), “Perfectionism is increasing over time: A meta-analysis of birth cohort differences from 1989 to 2016”, *Psychological Bulletin*, Vol. 145/4, pp. 410-429, <http://dx.doi.org/10.1037/bul0000138>. [5]
- Livingstone, S. and A. Third (2017), “Children and young people’s rights in the digital age: An emerging agenda”, *New Media & Society*, Vol. 19/5, pp. 657-670, <http://dx.doi.org/10.1177/1461444816686318>. [4]
- Ulferts, H. (2020), “Why parenting matters for children in the 21st century: An evidence-based framework for understanding parenting and its impact on child development”, *OECD Education Working Papers*, No. 222, OECD Publishing, Paris, <https://dx.doi.org/10.1787/129a1a59-en>. [2]

Contributors

Daphne Bavelier

Daphne Bavelier is an internationally recognised expert on how humans learn. In particular, she studies how the brain adapts to changes in experience, either by nature - for example, deafness - or by training - for example, playing video games. Her lab established that playing fast-paced, action-packed entertainment video games typically thought to be mind-numbing actually benefits several aspects of behaviour. Exploiting this counterintuitive finding, the Cognitive Neuroscience research team she now heads at the University of Geneva, Switzerland investigates how new media, such as video games, can be leveraged to foster learning and brain plasticity.

Benoit Bediou

Benoit Bediou is a Senior Research Associate at the Faculty of Psychology, University of Geneva, Switzerland. He graduated in biology and obtained a PhD in Neuroscience from the University of Lyon, France. His research interests include face and emotion processing, decision making as well as cognitive and affective neuroscience. His current research investigates the impact of video games and other digital technologies on cognitive and affective skills and processes.

Mariana Brussoni

Mariana Brussoni is an Associate Professor in the Department of Pediatrics and the School of Population and Public Health at the University of British Columbia, Canada. She is an investigator with the British Columbia Children's Hospital Research Institute and the British Columbia Injury Research & Prevention Unit. Mariana is a board member of the Child & Nature Alliance of Canada and on the leadership group for Outdoor Play Canada. Mariana's research foci include parenting attitudes related to risk and safety; developmental importance of children's risky play; design of children's communities and play spaces; and policy to support children's outdoor play. More details on her research program can be seen at <https://brussonilab.ca>.

Tracey Burns

Tracey Burns is a Senior Analyst in the OECD's Centre for Educational Research and Innovation. She heads a portfolio of projects including Trends Shaping Education, 21st Century Children and Innovative Teaching for Effective Learning. Her most recent OECD publications are [*Back to the future of education: Four OECD Scenarios for Schooling*](#) (with Marc Fuster) and [*Educating 21st Century Children: Emotional Well-Being in the Digital Age*](#) (with Francesca Gottschalk). Previous to her time at the OECD she conducted research on language acquisition in children and newborn infants. Tracey holds a B.A. from McGill University, Canada, and a PhD in experimental psychology from Northeastern University, United States.

Rebecca Eynon

Rebecca Eynon is an Associate Professor and Senior Research Fellow at the University of Oxford, where she holds a joint appointment between the Department of Education and the Oxford Internet Institute (OII). Her research examines the relationships between social inequalities, learning and technology, with a particular focus on the experiences of young people. Her work has been supported by a range of funders including the British Academy, the Economic and Social Research Council, the European Commission, Google and the NominetTrust. Her publications include: [Teenagers and Technology](#) (with Davies, 2013) and [Education and Technology: Major Themes in Education](#) (with Davies, 2015). She has been co-editor of [Learning, Media and Technology](#) since 2011.

Francesca Gottschalk

Francesca Gottschalk is an Analyst for the Centre for Educational Research and Innovation's 21st Century Children project. She is the co-editor and contributing author of [Educating 21st Century Children: Emotional Well-Being in the Digital Age](#), and also published a working paper looking at the [impacts of technology use on children](#). She previously worked on the ITTEL Teacher Knowledge Survey. Francesca holds a master's degree from the American University of Paris in Public Policy and International Affairs, and an Honours Bachelor of Science from the University of Toronto in Human biology and Psychology.

Simona Petruzzella

Simona Petruzzella is a Junior Consultant for the Centre for Educational Research and Innovation's 21st Century Children project. She holds a bachelor's degree from Luiss Guido Carli University in Rome in Politics, Philosophy and Economics and a master's degree from Sciences Po Paris School of International Affairs (PSIA) in International Public Management. Prior to working on the 21st Century Children project, Simona worked at the UNESCO World Heritage Centre on the topic of children and youth participation.

Rachel Rodgers

Rachel Rodgers is an Associate Professor of Applied Psychology at Northeastern University, and Director of the Applied Psychology Program for Appearance and Eating Research (APPEAR). Dr. Rodgers received her PhD from the University of Toulouse in France. Her research with APPEAR focuses on body image, disordered eating and other appearance-changing behaviours. Grounded in sociocultural models, this work aims to develop models of the effects of sociocultural determinants on these behaviours, with a view to preventing eating disorders and associated concerns at the individual level and also at the macro-level through public policy and industry practices. She is a Fellow of the Academy of Eating Disorders.

Michael Rich

Michael Rich, "The Mediatician", founded and directs the pioneering Center on Media and Child Health which uses science to understand how our physical, mental and social health are affected, in positive and negative ways, by the media we use and how we use them. Associate Professor of Pediatrics at Harvard Medical School and of Social and Behavioral Sciences at Harvard T.H. Chan School of Public Health, he has applied research evidence to clinical care in the Clinic for Interactive Media and Internet Disorders at Boston Children's Hospital. Understanding the power of screens to engage, connect, and change us all, he is bringing together paediatricians and software engineers, researchers and screenwriters, psychologists and product designers in the Digital Wellness Lab to synergise in researching, responding to, and innovating a digital environment in which we can be healthier, smarter, and kinder.

Sebastian Sattler

Sebastian Sattler is a Lecturer and Project-Leader at the Institute of Sociology and Social Psychology (University of Cologne) and an Associate Member of the Pragmatic Health Ethics Research Unit at the *Institut de recherches cliniques de Montréal* (Canada). He became a CGS-Thyssen PostDoc Fellow at the Cologne Graduate School in Management, Economics and Social Sciences and received an Early Career Scholarship from the John Templeton Foundation. His interdisciplinary research interests include sociological and (social) psychological theories, decision making, health-behaviour, stigma, criminology, moral judgment, and quantitative methods. His work has been published in the American Journal of Bioethics, the European Sociological Review, Frontiers in Psychology, and PLOS ONE.

Julian Sefton-Green

Julian Sefton-Green is a Professor of New Media Education at Deakin University, Melbourne, Australia. He has worked as an independent scholar and has held positions at the Department of Media and Communication, London School of Economics and Political Science and at the University of Oslo. He is currently a Visiting Professor at The Playful Learning Centre, University of Helsinki, Finland. He has researched and written widely on many aspects of media education, new technologies, creativity, digital cultures and informal learning and has authored, co-authored or edited 18 books has spoken at over 50 conferences in 20 countries <www.julianseftongreen.net>

Kristen Weatherby

Kristen Weatherby is a Researcher and Consultant helping organisations understand, measure, and communicate their impact in education. Most recently, she helped develop and launch University College London's EDUCATE accelerator supporting edtech startups in their development of world class products for education. Previous to this, she led the 2013 cycle of the Teaching and Learning International Survey (TALIS) at the OECD, working with governments to survey teachers in 34 countries. At Microsoft, she led global initiatives to support schools and teachers integrating technology into teaching. She has a PhD in education technology from the UCL Institute of Education, and a Masters in teaching from the University of Michigan.

Educational Research and Innovation

Education in the Digital Age

HEALTHY AND HAPPY CHILDREN

The COVID-19 pandemic was a forceful reminder that education plays an important role in delivering not just academic learning, but also in supporting physical and emotional well-being. Balancing traditional “book learning” with broader social and personal development means new roles for schools and education more generally.

This volume is part of a series that examines the intersections between education, well-being and digital technologies. Complementing the first volume *Educating 21st Century Children: Emotional Well-Being in the Digital Age*, this volume turns the spotlight on physical health and well-being. It explores the important role of play and risk-taking in learning. It examines the “pursuit of perfection” and the impact on children’s lives, whether it be physical, cognitive or academic. It highlights important efforts countries have made to tackle inequality and protect and empower students in both physical and digital environments. It ends with a look at the pending agenda, underscoring the role of partnerships, policy and protection.



PRINT ISBN 978-92-64-98886-6
PDF ISBN 978-92-64-70649-1



9 789264 988866