

Digital Competence is Core to Equity, Wellbeing, and Resilience of Digital Citizens

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Post-digital humans



Overview (Digital Competence is Core to Equity, Wellbeing, and Resilience of Digital Citizens)

- What is digital competence? How is it measured?
- Equity: digital competence divide
- Wellbeing of students:
 - Online learning participation efficacy
 - Internet addiction
 - Game addiction
 - Cyberbullying experience
 - Ability to handle cyber-risks
- How is digital competence related to students' wellbeing?
- What is digital resilience? Why is it important?
- How is digital competence related to students' digital resilience?

What is digital competence?
How is it measured?

What is Digital Competence?



Digital Competence Framework developed by European Commission Joint Research Centre

Competence Area Dimension 1	Competences Dimension 2
Information and data literacy	<ul style="list-style-type: none"> 1.1. Browsing, searching and filtering data, information and digital content 1.2. Evaluating data, information and digital content 1.3. Managing data, information and digital content
Communication and collaboration	<ul style="list-style-type: none"> 2.1. Interacting through digital technologies 2.2. Sharing information and content through digital technologies 2.3. Engaging in citizenship through digital technologies 2.4. Collaborating through digital technologies 2.5. Netiquette 2.6. Managing digital identity
Digital content creation	<ul style="list-style-type: none"> 3.1. Developing digital content 3.2. Integrating and re-elaborating digital content 3.3. Copyright and licences 3.4. Programming
Safety	<ul style="list-style-type: none"> 4.1. Protecting devices 4.2. Protecting personal data and privacy 4.3. Protecting health and well-being 4.4. Protecting the environment
Problem solving	<ul style="list-style-type: none"> 5.1. Solving technical problems 5.2. Identifying needs and technological responses 5.3. Creatively using digital technologies 5.4. Identifying digital competence gaps

FIG.1 The DigComp conceptual reference model

Original design: Digital Citizenship Development in the Digital Age

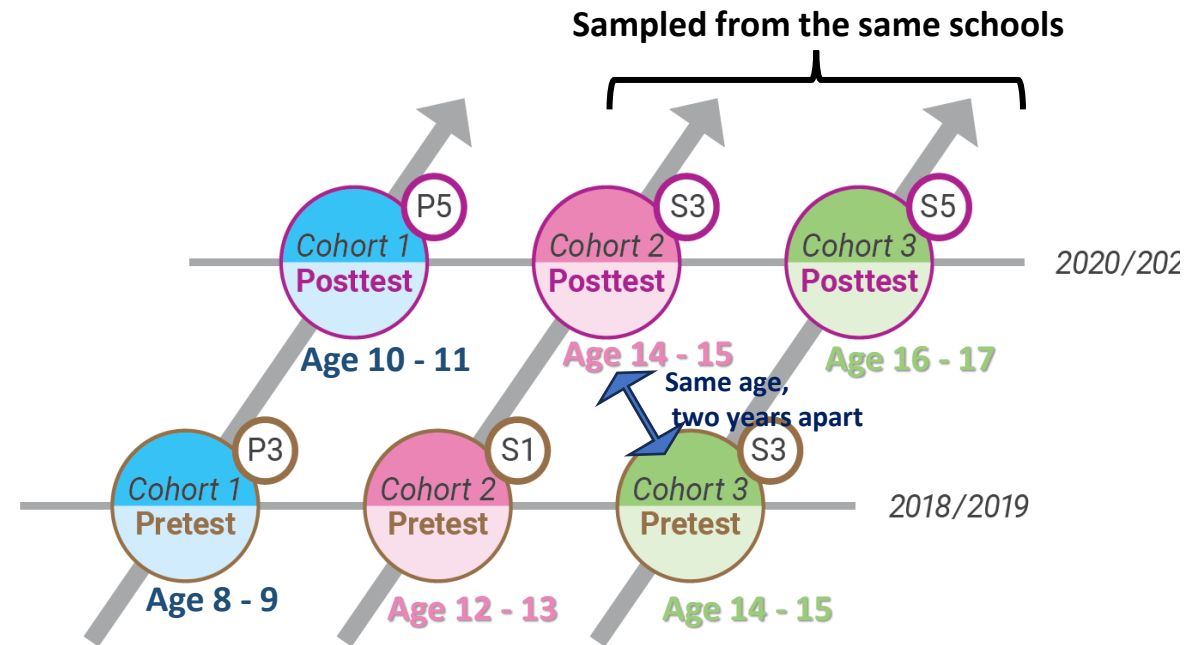


Figure 1. The Longitudinal Cross-cohort Study Design of the “eCitizenship” Project.

Cumulative effects of three types of digital divide

- * Digital literacy (DL)
- * Digital access
- * Family support (age dependent)

A robust digital literacy performance assessment instrument that can compare DL achievement from age 8 to 15 (extended to age 17)

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Measuring digital literacy across three age cohorts: Exploring test dimensionality and performance differences

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ABSTRACT

Digital literacy (DL) is an important capacity for students' learning in a rapidly changing world. However, tension exists between the theoretical conceptualizations of DL as a multidimensional construct and empirical studies reporting unidimensional DL scores. Also, little is known about how DL may vary among different age cohorts, and whether and at which age do performance gaps emerge with respect to gender. The focus of this research is to develop a test appropriate for measuring DL performance at different ages and a comprehensive DL assessment framework has been adopted for this purpose. Using data from three age cohorts of students (one from primary schools and two from secondary schools), the dimensionality of DL and performance differences are examined. Comparisons of unidimensional and multidimensional item response models suggest the measured DL to be a unidimensional construct. The results also show that secondary school students obtained higher levels of DL compared to primary school students. A gender gap in DL is found among secondary school students. There is also a need for further research to understand through longitudinal studies the emergence of the gender gap in DL performance.

1. Introduction

Digital literacy (DL) has become an essential capacity to successfully master daily tasks and routines in the 21st century as technology is ubiquitous in our daily lives and permeates all sectors of society (Siddiq, Gochyyev, & Wilson, 2017; van Laar, van Deursen,

Abbreviations: ACARA, Australian Curriculum, Assessment and Reporting Authority; AIC, Akaike information criterion; ANOVA, analysis of variance; ATC21S, Assessment and Teaching of 21st Century Skills; BIC, Bayesian information criterion; DIF, differential item functioning; DigComp, Digital Competence Framework; DL, digital literacy; EAP, expected a posteriori; ICILS, International Computer and Information Literacy Study; ICT, information and communication technologies; ISTE, International Society for Technology in Education; IRT, item response theory; M2PLM, multidimensional 2PLM; NCSL, National Conference of State Legislatures; OECD, Organisation for Economic Cooperation and Development; PIAAC, Program for the International Assessment of Adult Competencies; PS-TRE, Problem-solving in Technology-rich Environments; RQ, research question; RMSD, root mean square deviation; 2PLM, two-parameter logistic model.

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Below are three technical problems that could occur when using a mobile phone. DRAG and DROP the solutions to the appropriate boxes.

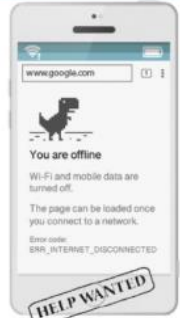
Upgrade operating system



PROBLEM

Possible solution:


Delete unnecessary software



HELP WANTED

Possible solution:

Turn on mobile data



URGENT

Possible solution:

Fig. 3. Example of a drag-and-drop item measuring “olving technical problems” under digital problem solving.

Kelly is writing her assignment on Romer’s Tree Frog. She finds a typing error in the assignment and needs to change “Romor” to “Romer”. Execute appropriate actions with the “Find and Replace” dialog box so that Kelly can achieve what she wants to do.

Romer’s Tree Frog is a species of frog native to Hong Kong and it has been observed in four islands in Hong Kong, which are Lantau, Lamma, Po Toi, and Chek Lap Kok. Romer’s Tree Frog is named after the naturalist J. D. Romor who first reported it in 1952. Romor’s Tree Frog lives in well-wooded areas with small streams or other water sources nearby. This frog sits on bare ground or buries itself in fallen leaves.

Find and replace

Find:

Replace with:

Fig. 4. Example of a short response item measuring “browsing, searching and filtering data, information and digital content” under information and data literacy.

Jin, K.-Y., Reichert, F., Cagasan, L. P., de la Torre, J., & Law, N. (2020). Measuring digital literacy across three age cohorts: Exploring test dimensionality and performance differences. *Computers & Education* 157, 103968.
<https://doi.org/10.1016/j.compedu.2020.103968>

What did we find?

Digital Competence—digital literacy: What HK students could do in 2019

Information and
data literacy

* Simple search, evaluation & organization of information

Communication
and collaboration

* simple, routine communications & sharing digital information

Digital content
creation

* Can use common productivity tools to create, edit, change media

Digital Safety

* Can use simple ways to address risks, protect devices/privacy/ content

Problem solving
using ICT

* Can solve simple device/application problems, e.g. smartphone/bookmark

What did we find?

Digital Competence—digital literacy: **What HK students could not do in 2019**

Information and
data literacy

***Formulate complex search for highly relevant results, evaluate information**

Communication
and collaboration

***Adapt communication strategy to context, protect digital identity**

Digital content
creation

***Identify media uses that violate intellectual property rights**

Digital Safety

*** Sophisticated safety measures, e.g. identify safe ways to use USB drives**

Problem solving
using ICT

Solve complex device + application problems: e.g. no sound in video

Equity: digital competence divide

Digital Literacy performance divides within and between schools, 2019 to 2021

Primary school: Cohort 1

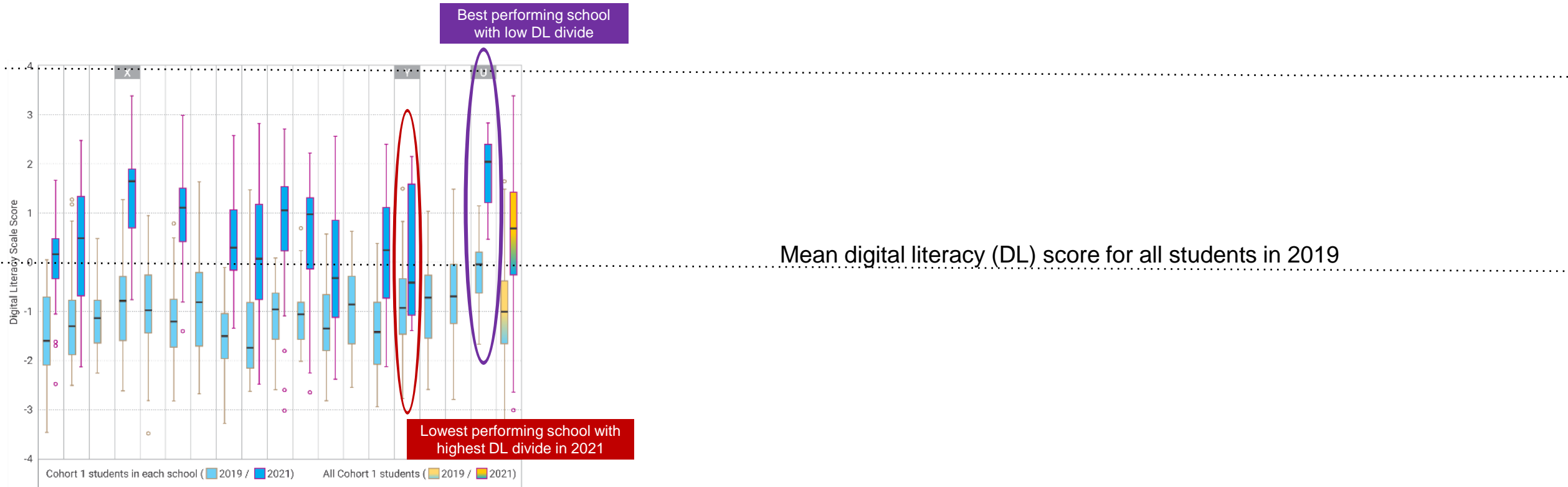


Figure 2.6. Boxplots of Primary School Students' Digital Literacy Performance by School across the Two Waves.

Digital Literacy performance divides within and between schools, 2019 to 2021

Secondary school: Cohort 2

Secondary school: Cohort 3

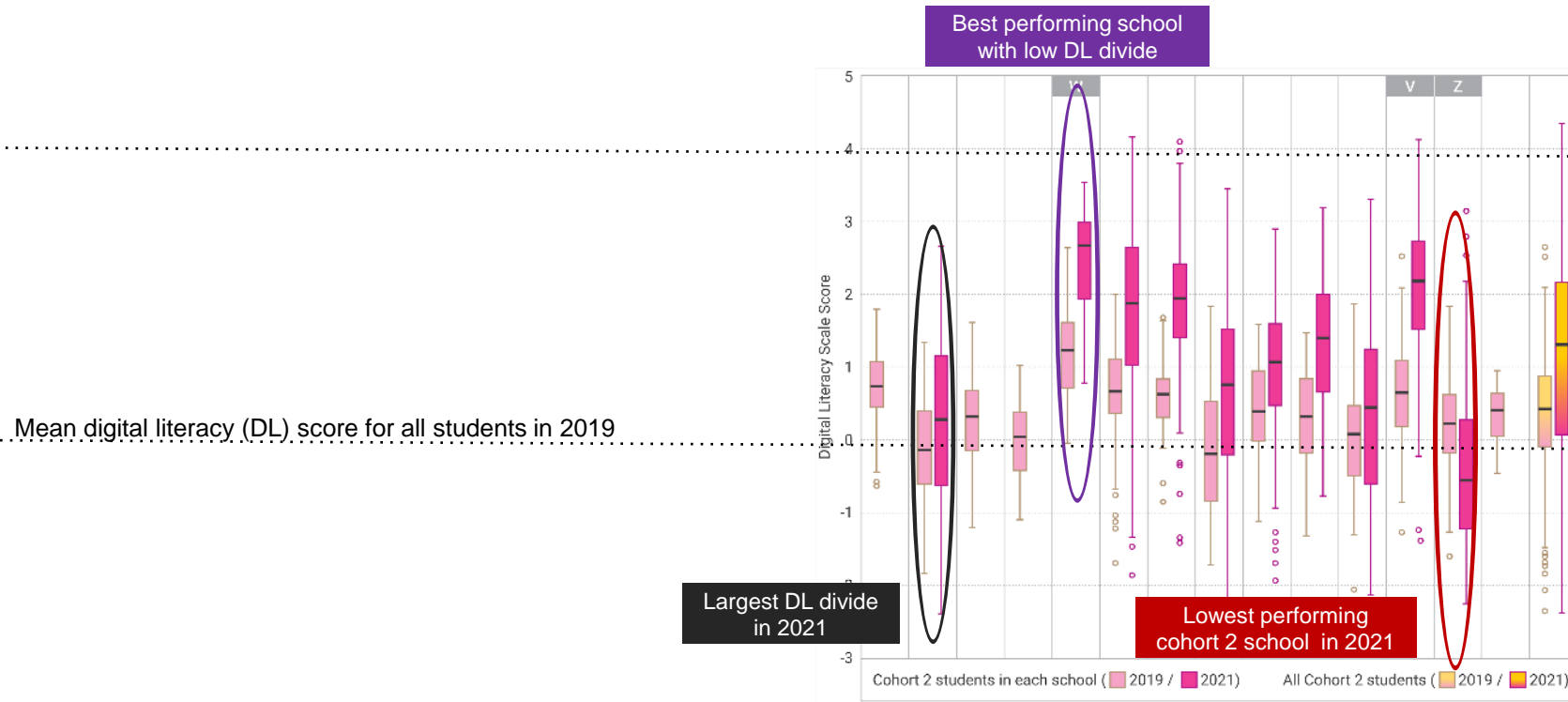


Figure 2.7. Boxplots of Cohort 2 Students' Digital Literacy Performance by School across the Two Waves.

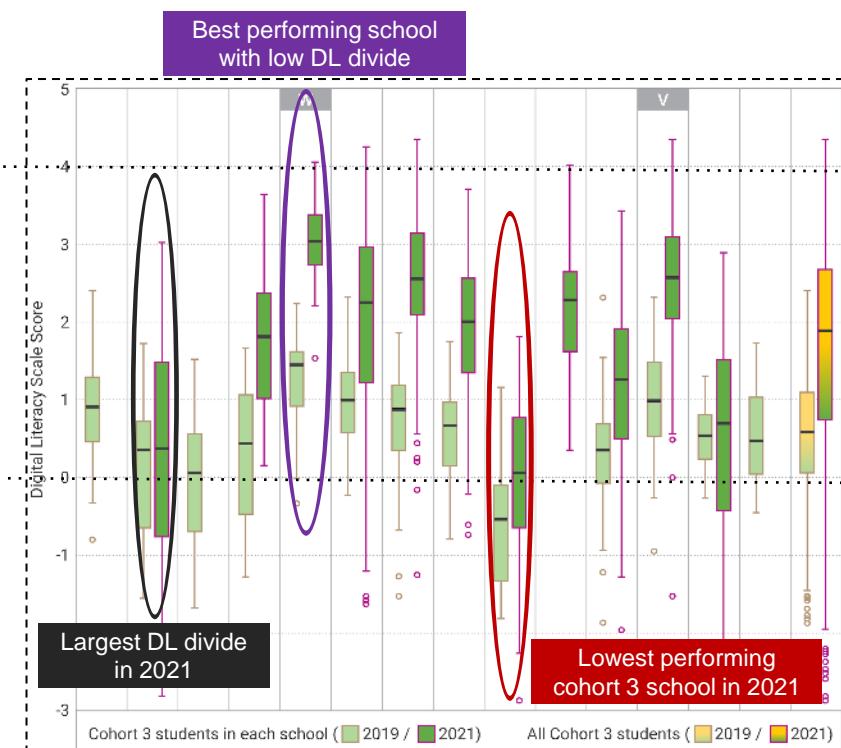


Figure 2.8. Boxplots of Cohort 3 Students' Digital Literacy Performance by School across the Two Waves.

Digital Literacy performance divides within and between schools, 2019 to 2021

Primary school: Cohort 1

Secondary school: Cohort 2

Secondary school: Cohort 3

In 2021, the P5 students' DL performance in the best performing primary school was better than the S5 students' overall DL performance of the entire cohort 3 students.

Median score for P5 students in highest performing school

Median score for S5 students in lowest performing school

In 2021, the S5 students' DL performance in the lowest performing secondary school was poorer than the P5 students' overall DL performance of the entire cohort 1 students

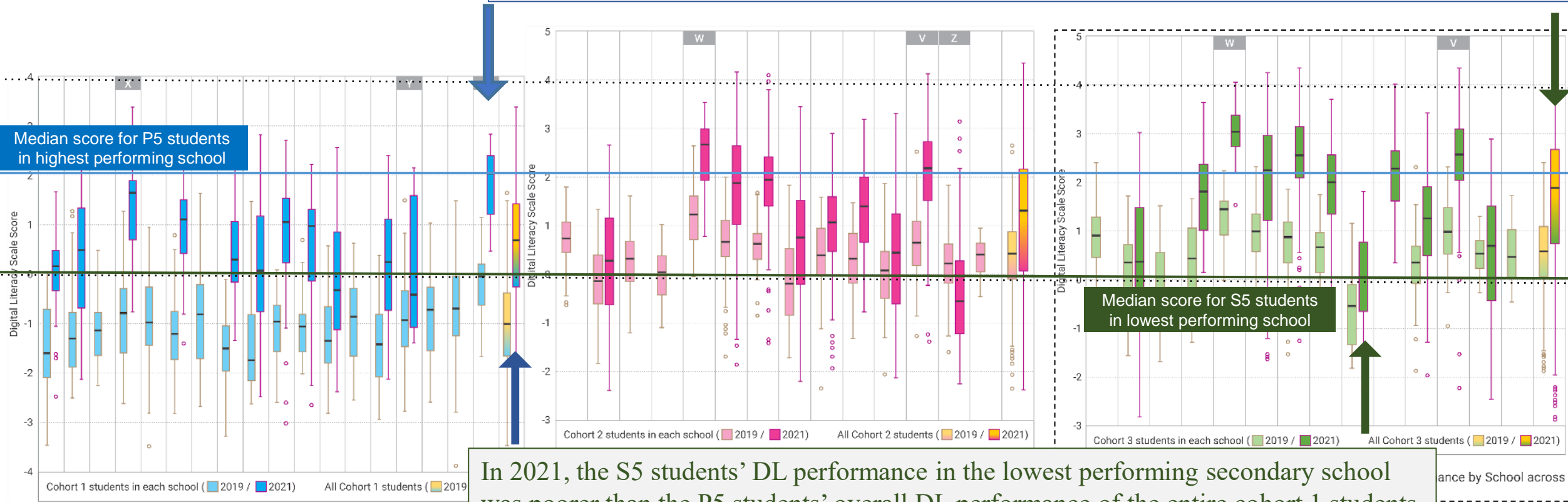
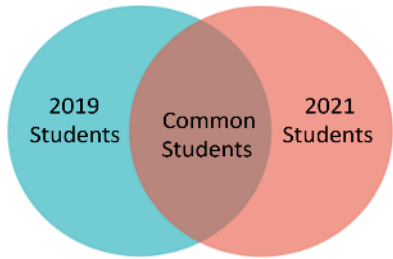


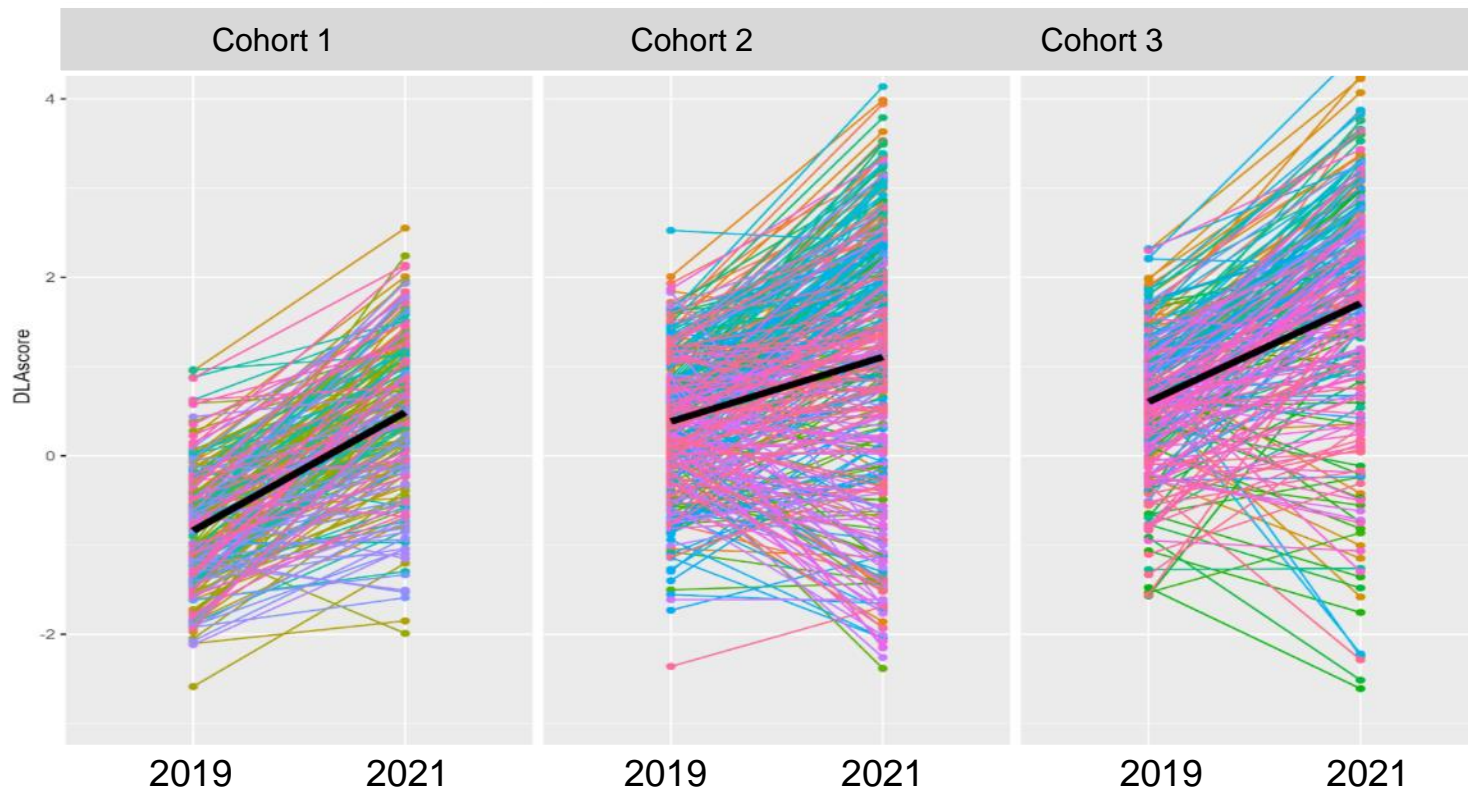
Figure 2.6. Boxplots of Primary School Students' Digital Literacy Performance by School across the Two Waves.

How has individual students' digital literacy performance changed 2019 -2021?



Cohorts	Schools		Classes		Students		
	2019	2021	2019	2021	2019	2021	Common
1	18	12	39	48	750	507	234
2	14	11	27	39	715	839	389
3			29	38	581	625	264

Spaghetti Plots of Individual Digital Literacy Growth Trajectories by Cohort



1. Most students have improved in their DL scores from 2019 to 2021.
2. For each cohort, there is a minority of students who have in fact regressed in their DL scores
3. The performance divide has increased over time across all three cohorts.
4. The divide gap increase is bigger for the older age cohorts.

Digital literacy divide and students' family SES

Correlations between DLA and SES (ACAD-CAP and HOME-RES) across Cohorts (2021)

Family SES measurement

Academic social capital (ACAD-CAP):

- parental education levels
- the number of books at home

Home resources (HOME-RES):

whether students have:

- their own room
- study desk
- a quiet place to study

Cohort	ACAD-CAP	HOME-RES
C1	0.17**	0.14**
C2	0.13**	0.06
C3	0.08	0.02

Note. ** $p < 0.01$

- Family SES is positively related to students' DL achievement
- The SES impact is greatest at younger ages
- Family investment in academic support is more important than overall economic status

Effect of SES on DL achievement found only at the school level:

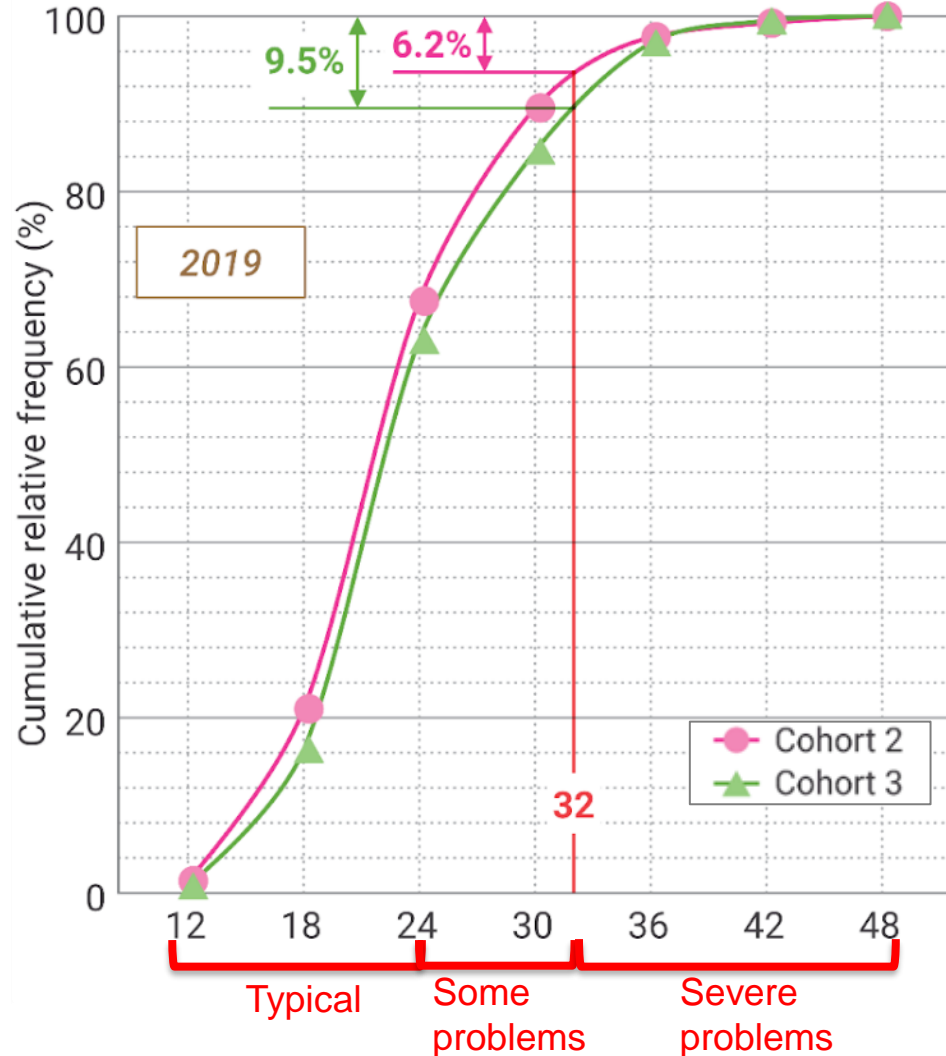
- Students studying in schools with higher mean SES have higher DL
- Students' family SES does not affect their DL compared to students in the same school

Wellbeing of students (2019 – 2021)

- Online learning participation efficacy
- Internet addiction
- Game addiction
- Cyberbullying experience
- Ability to handle cyber-risks

Digital wellness status of HK students' Mental Health

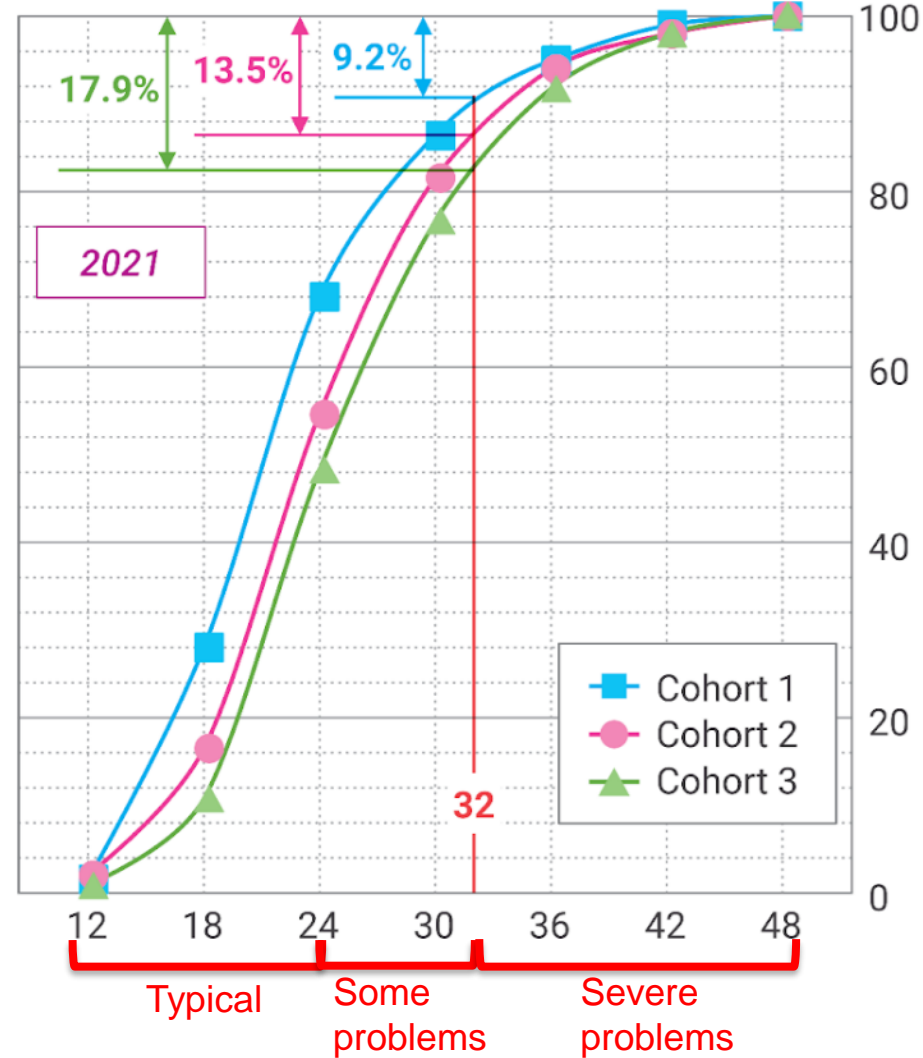
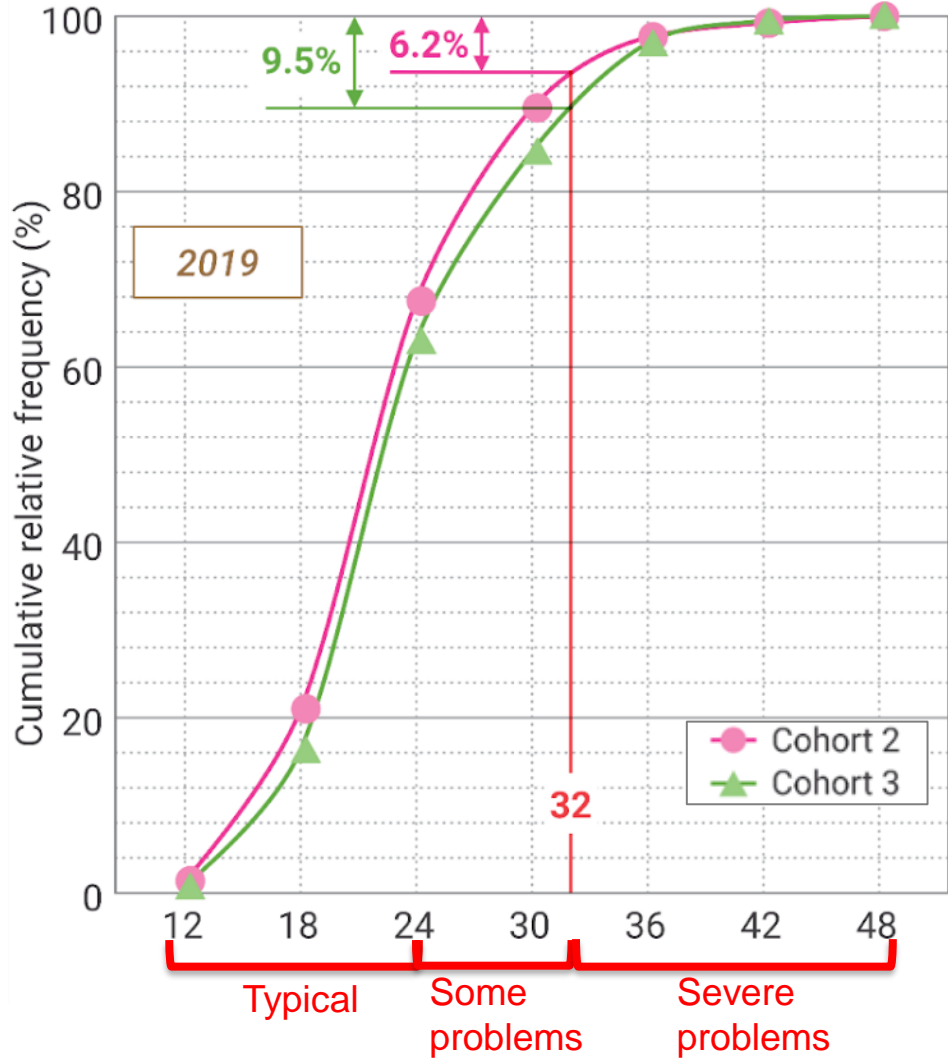
Measured by GHQ12 (General Health Questionnaire (Goldberg, 1970))



- Instrument not suitable for students under 10.
- Students in older cohorts reported more mental health problems than younger students in both 2019 and 2021
- Significant increases in mental health problems across all cohorts.

Digital wellness status of HK students Mental Health

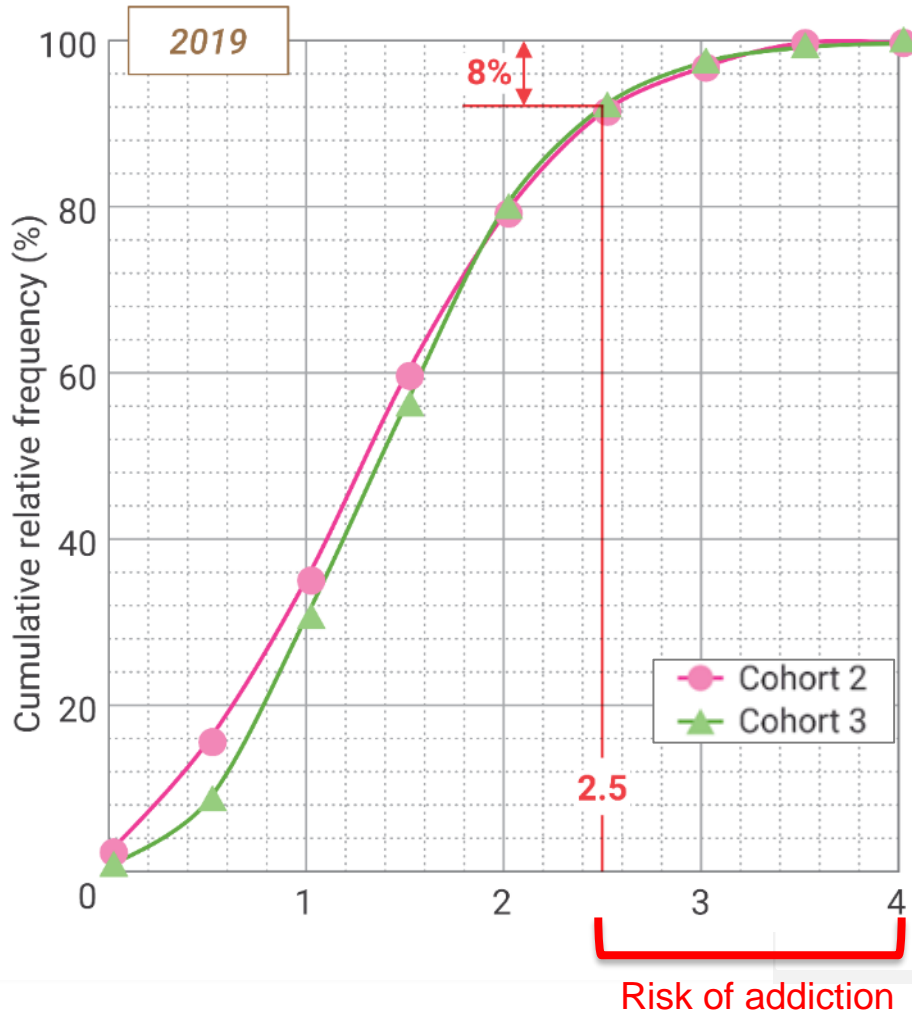
Measured by GHQ12 (General Health Questionnaire (Goldberg, 1970))



- Instrument not suitable for students under 10.
- Students in older cohorts reported more mental health problems than younger students in both 2019 and 2021
- Significant increases in mental health problems across all cohorts.

Digital wellness status of HK students' internet addiction

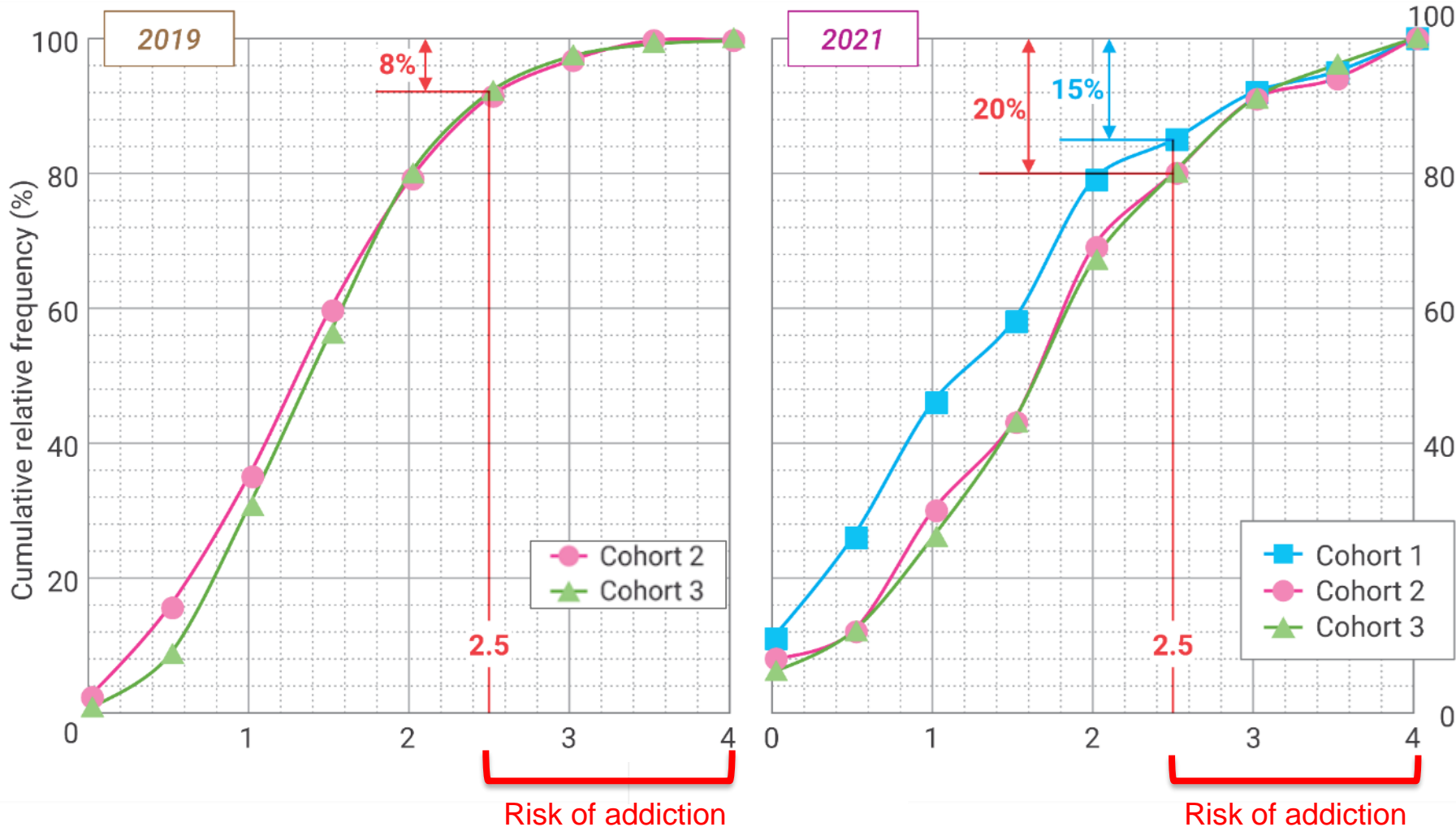
Measured by Internet Addiction Test (Young 2016)



- Instrument not suitable for students under 10.
- No difference between cohorts 2 & 3 students
- Internet addiction increased significantly for both cohorts 2 & 3 students, and these are higher than cohort 1 students in 2021.

Digital wellness status of HK students' internet addiction

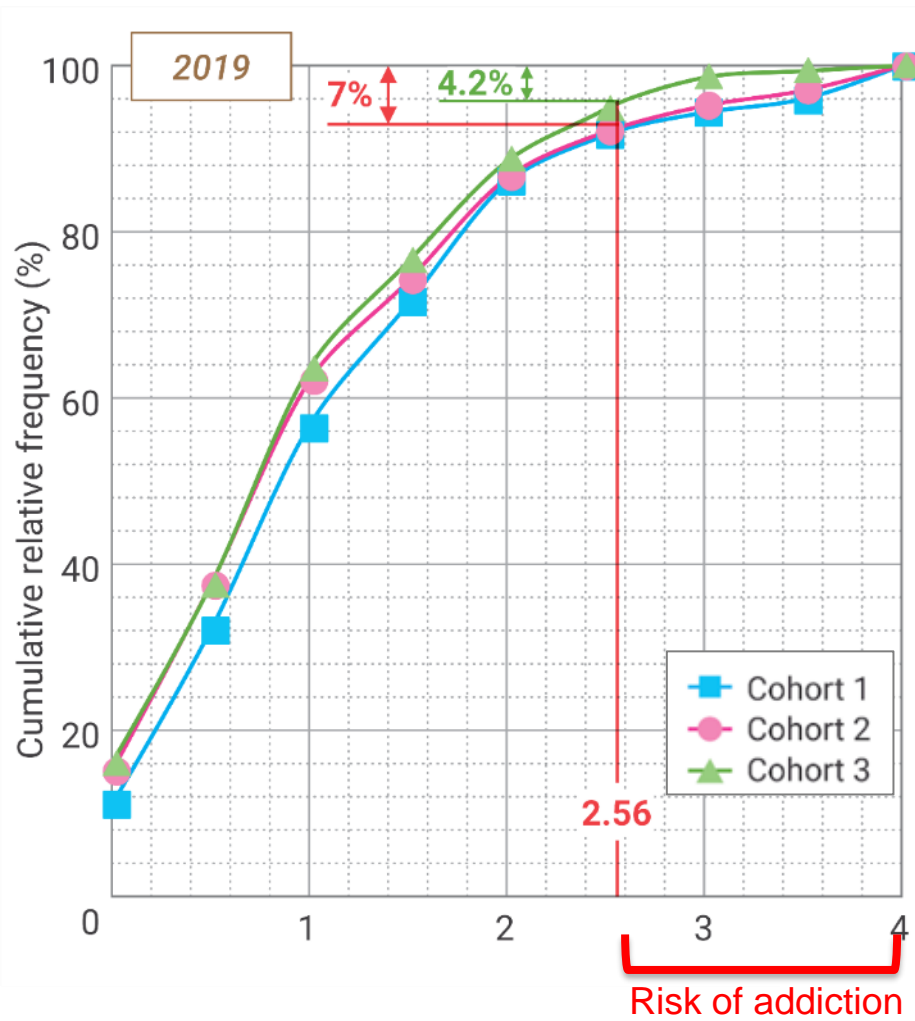
Measured by Internet Addiction Test (Young 2016)



- Instrument not suitable for students under 10.
- No difference between cohorts 2 & 3 students
- Internet addiction increased significantly for both cohorts 2 & 3 students, and these are higher than cohort 1 students in 2021.

Digital wellness status of HK students' Game Addiction

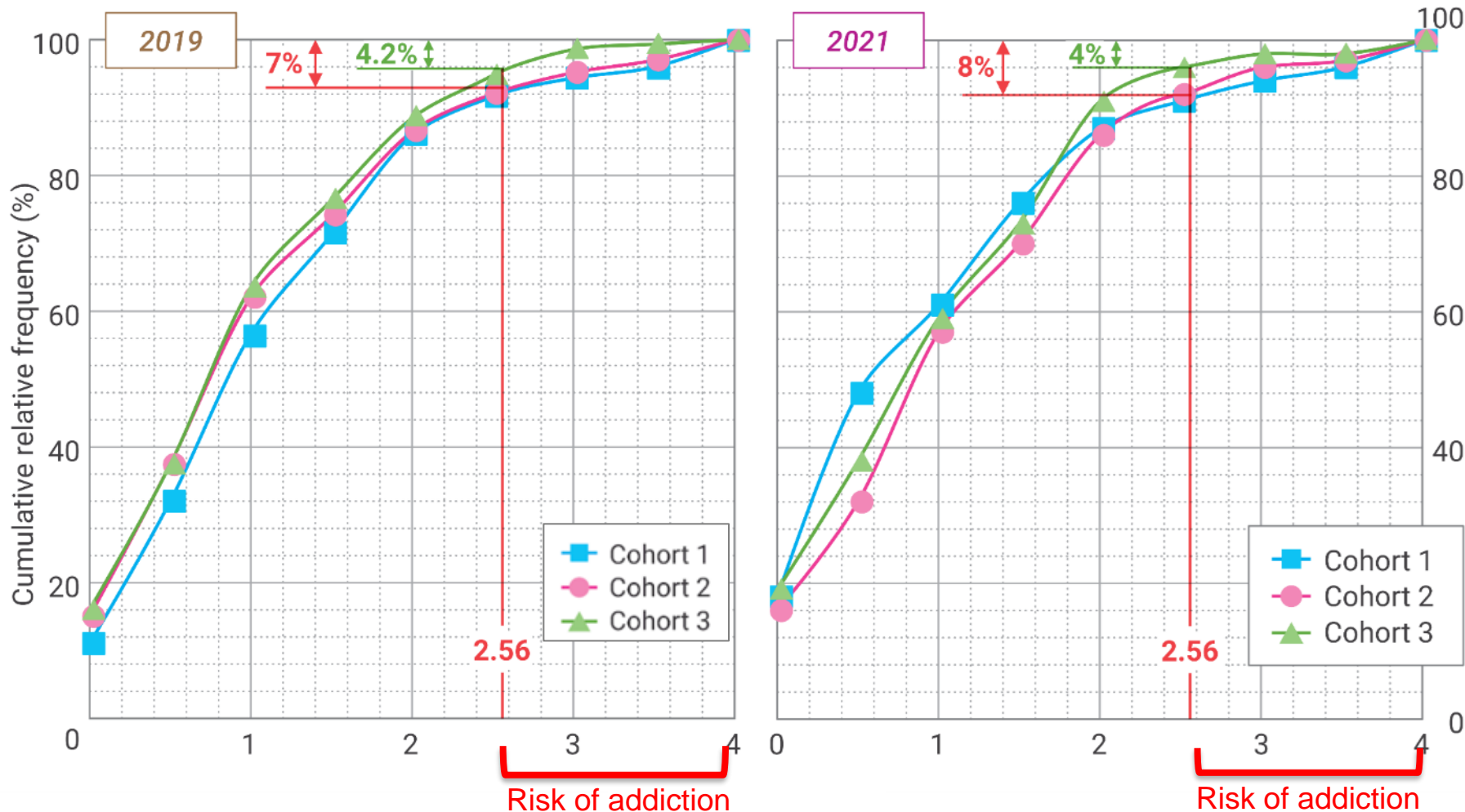
ale (Lemmens, Valkenburg, & Gentile, 2015)



- Cohort 3 students in 2019 had significantly less game addiction than Cohorts 1 & 2 students.
- In 2021, students in all three cohorts showed no significant change in game addiction compared to 2019.
- Game addiction is much lower than Internet addiction for all three cohorts
- Boys showed higher levels of game addiction at both time points in all three cohorts.

Digital wellness status of HK students' Game Addiction

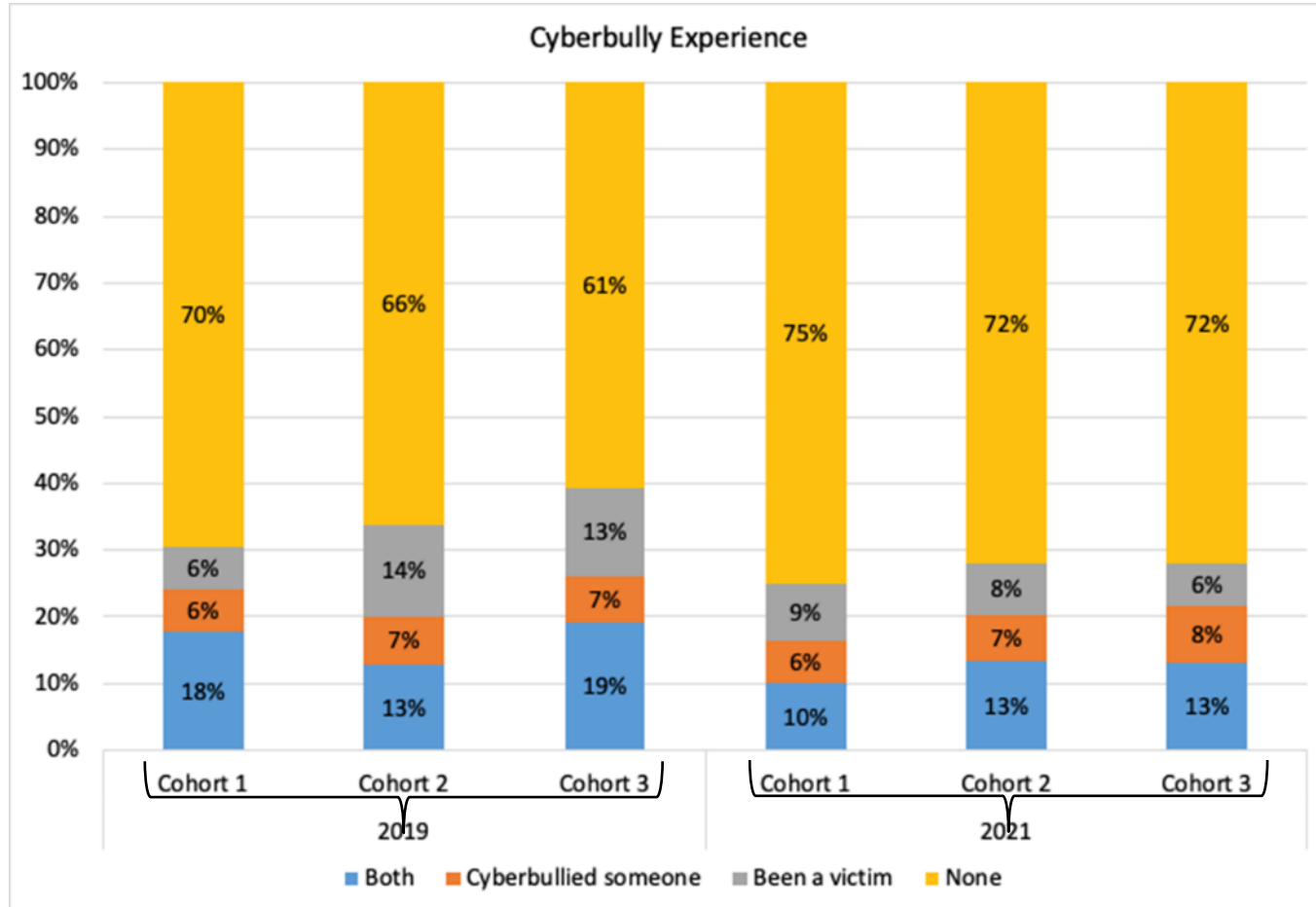
Measured by the Short Internet Gaming Disorder Scale (Lemmens, Valkenburg, & Gentile, 2015)



- Cohort 3 students in 2019 had significantly less game addiction than Cohorts 1 & 2 students.
- In 2021, students in all three cohorts showed no significant change in game addiction compared to 2019.
- Game addiction is much lower than Internet addiction for all three cohorts
- Boys showed higher levels of game addiction at both time points in all three cohorts.

Digital wellness status of HK students'

Cyberbullying experience



Examples of cyberbullying:

- sending mean texts to someone
- being rude or mean to someone in an online game
- spreading secrets or rumors about someone online.

- Among 2019 students with cyberbullying experience, almost half (48%) were both victims and perpetrators, indicating a strong correlation (Pearson $r = 0.53$) between being a victim and a perpetrator.
- Previous cyberbullying experience (2019) is positively correlated with subsequent cyberbullying experience (2021; Pearson $r = 0.71$).

Note:

Question in 2019: **Have you ever experienced** following cyberbullying experience...

Question in 2021: **In the past three months, have you experienced** following cyberbullying experience...

Relationship between students'
wellbeing and their digital competence

Conceptual Framework of the relations between DL and cyber-wellness

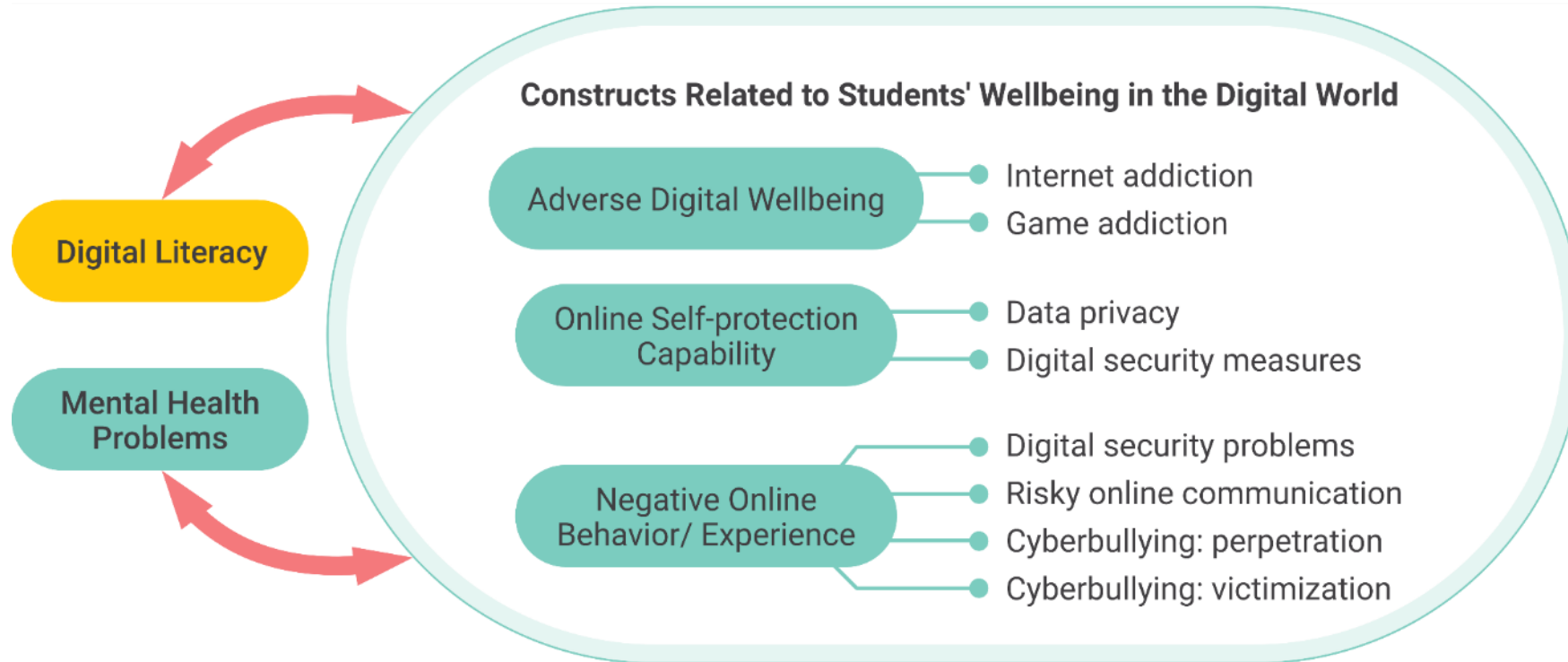
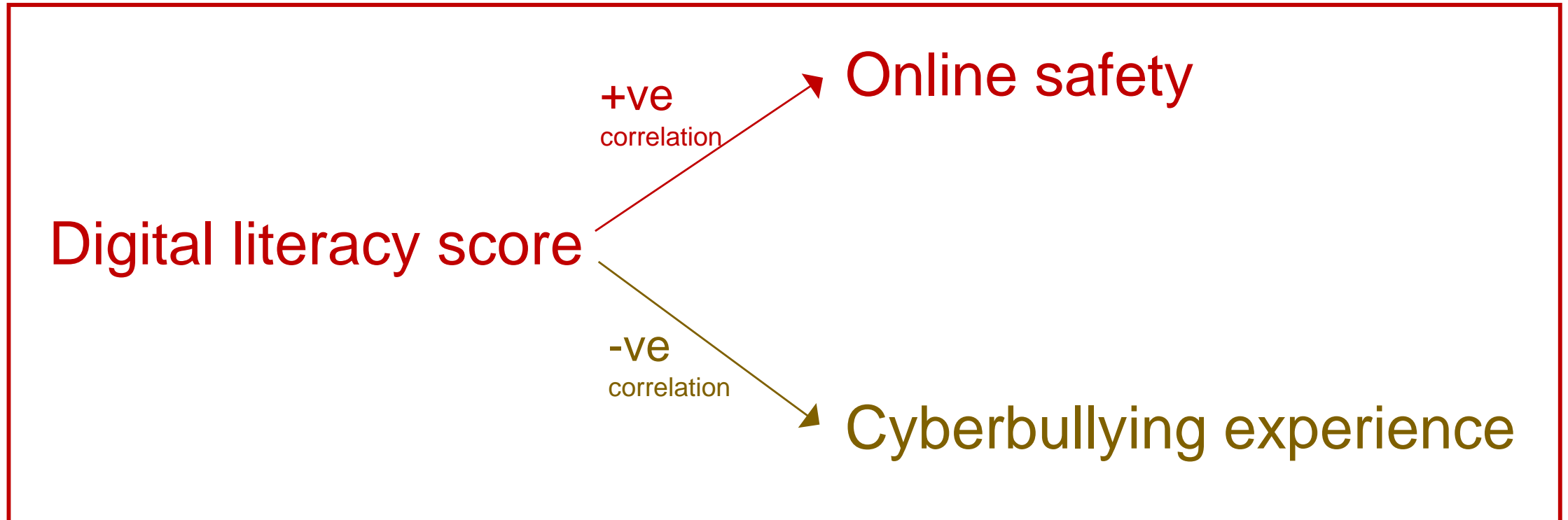


Figure 5.1. Conceptual Framework of the Relationships between DL, Mental Health Problems, and Constructs Associated with Wellbeing in the Digital World.

Digital literacy: 2019 (Wave 1) findings

Students' digital literacy affect their digital wellness



Students' digital literacy affect their cyber-wellness

Pearson Correlation Coefficients (r) between DL and cyber-wellbeing

Aspect	Variable	Cohort 1		Cohort 2		Cohort 3	
		2019	2021	2019	2021	2019	2021
Adverse digital wellbeing	Internet addiction	-	-0.31***	0.00	-0.03	0.10	0.14**
	Game addiction	-0.27***	-0.35***	-0.19***	-0.28***	-0.02	-0.05
Online self-protection capabilities	Data privacy	0.26***	0.39***	0.35***	0.44***	0.36***	0.44***
	Digital security measures	0.07	0.21***	0.17**	0.21***	0.13	0.32***
Negative online behavior/experience	Digital security problems	-0.26***	-0.26***	-0.21***	-0.33***	-0.11	-0.23***
	Risky online communication	-0.28***	-0.16*	-0.10	-0.11*	0.00	-0.06
	Cyberbullying: perpetration	-0.28***	-0.23***	-0.2***	-0.26***	-0.07	-0.23***
	Cyberbullying: victimization	-0.29***	-0.25***	-0.13**	-0.23***	-0.06	-0.2***

Note. * p<0.05, ** p<0.01, ***p<0.001 (p-values were adjusted by Bonferroni correction); - not measured.

Students' mental health and their cyber-wellness

Pearson Correlation Coefficients (r) between **Mental Health Problems** and **cyber-wellbeing**

Aspect	Variable	Cohort 1		Cohort 2		Cohort 3	
		2019	2021	2019	2021	2019	2021
Adverse digital wellbeing	Internet addiction	-	0.36***	0.34***	0.23***	0.42***	0.29***
	Game addiction	-	0.26***	0.2***	0.09	0.19***	0.15**
Online self-protection capabilities	Data privacy	-	0.04	-0.01	0.03	-0.02	-0.02
	Digital security measures	-	-0.04	-0.12	-0.03	-0.13	-0.07
Negative online behavior/experience	Digital security problems	-	0.08	0.03	0.08	0.16*	0.06
	Risky online communication	-	0.10	0.07	0.06	0.25***	0.07
	Cyberbullying: perpetration	-	0.08	0.13**	0.09	0.15**	0.11
	Cyberbullying: victimization	-	0.13	0.17***	0.13**	0.24***	0.14**

Note. * p<0.05, ** p<0.01, ***p<0.001 (p-values were adjusted by Bonferroni correction); - not measured.

Children and adolescents with **gaming addiction** may:

- * have physical health problems such as **obesity** and **insomnia**.
- * show **aggression**, **impulsive behaviors**, **obsessive-compulsive disorder**
- * be prone to **risky online behaviors** such as **cyberbullying**

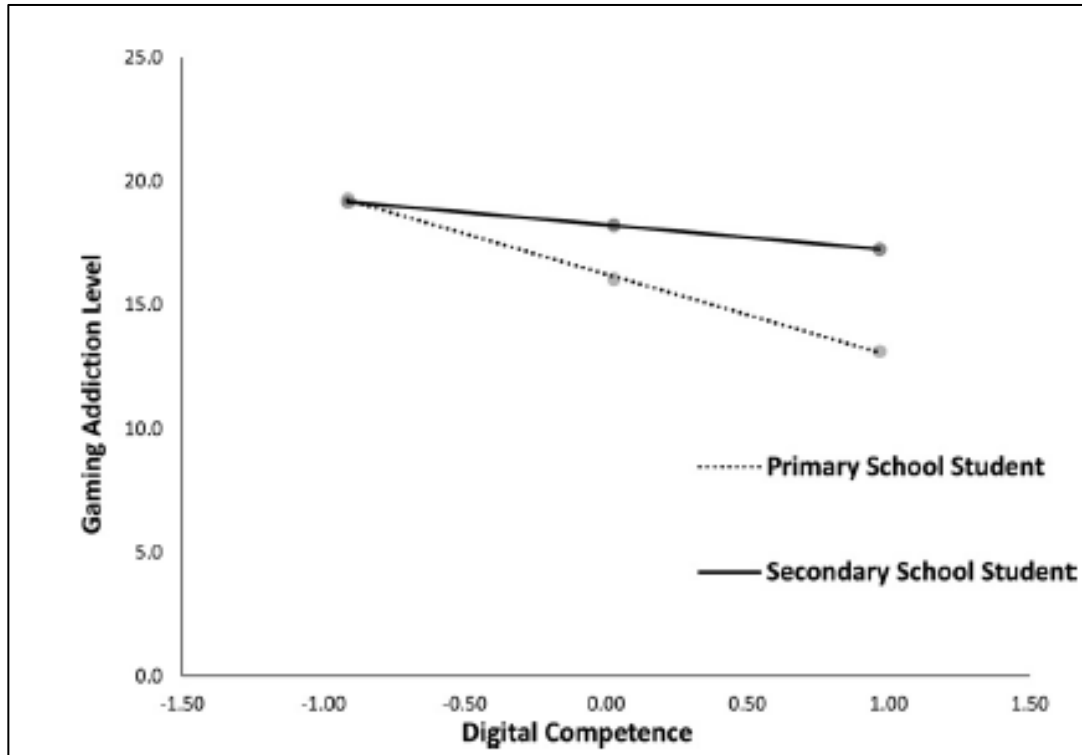


Figure 1. Game addiction as a function of digital competence in primary and secondary school children after controlling for gender and SES.

Digital competence as a protective factor against gaming addiction in children and adolescents: A cross-sectional study in Hong Kong

Winnie W.Y. Tso,^{a,b} Frank Reichert,^{c,1} Nancy Law,^c King Wa Fu,^d Jimmy de la Torre,^c Nirmala Rao,^c Lok Kan Leung,^a Yu-Liang Wang,^a Wilfred H.S. Wong,^a and Patrick Ip^{a,*}

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Summary

Background Digital competence can help children and adolescents engage with technology for acquiring new knowledge and for broadening social contact and support, while reducing the risk of inappropriate media use. This study investigated the effects of digital competence on the risk of gaming addiction among children and adolescents. We explored whether students with good digital competence were protected from the adverse effects of media use and the risk of gaming addiction.

Methods 1956 students (690 primary and 1266 secondary) completed a digital competence assessment and a self-report questionnaire on their mental health status, use of digital devices, and experiences of cyberbullying. Multiple regression analyses with further mediation and moderation analyses were performed to investigate the association of digital competence with gaming addiction and mental health in children and adolescents.

Findings Regression analyses showed that children and adolescents with better digital competence were less likely to develop gaming addiction ($\beta = -0.144$, $p < 0.0001$) and experienced less cyberbullying behaviour as perpetrators ($\beta = -0.169$, $p < 0.0001$) and as victims ($\beta = -0.121$, $p < 0.0001$). Digital competence was found to mediate the relationship between digital device usage time and gaming addiction.

Interpretation Digital competence is associated with less gaming addiction and could potentially lead to better mental wellbeing by reducing the risks of gaming addiction and cyberbullying. Education that promotes digital competence is essential to maximize the benefits of media use, while reducing the potential adverse effects from the inappropriate use of digital devices.

Funding This study was supported by a grant from the Research Grants Council of the HKSAR Government (#T44-707/16N) under the Theme-based Research Scheme

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Keywords: Digital competence; Gaming addiction; Cyberbullying; Mental health; Digital device; Digital literacy

Introduction

Technology plays an increasingly large role in today's world. Children and adolescents are exposed to digital media at a very young age and social media is becoming

a big part of their lives. As a result, the influence of media on children has been gaining increasing attention among parents, educators, and healthcare professionals. Overuse of media and increased screen time are known to have detrimental effects on children's physical and mental health, including the lack of physical exercise, sleep deprivation, and decreased face-to-face social interactions.¹

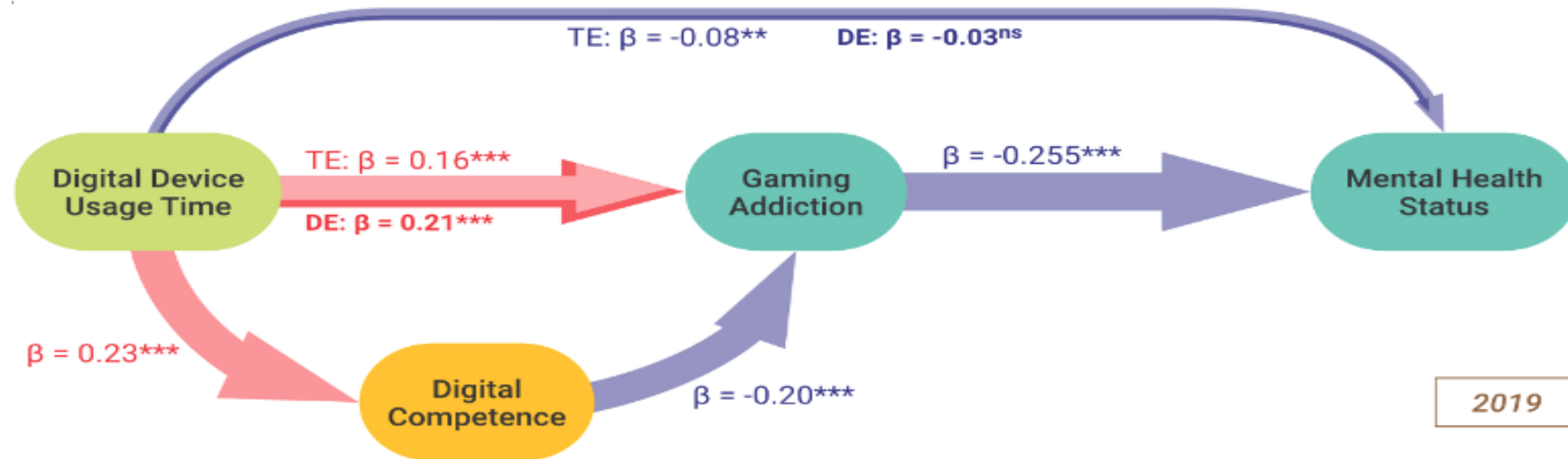
Although video gaming and internet surfing have become popular recreational activities for children and adolescents, there are growing concerns about gaming

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¹ Co-first authors

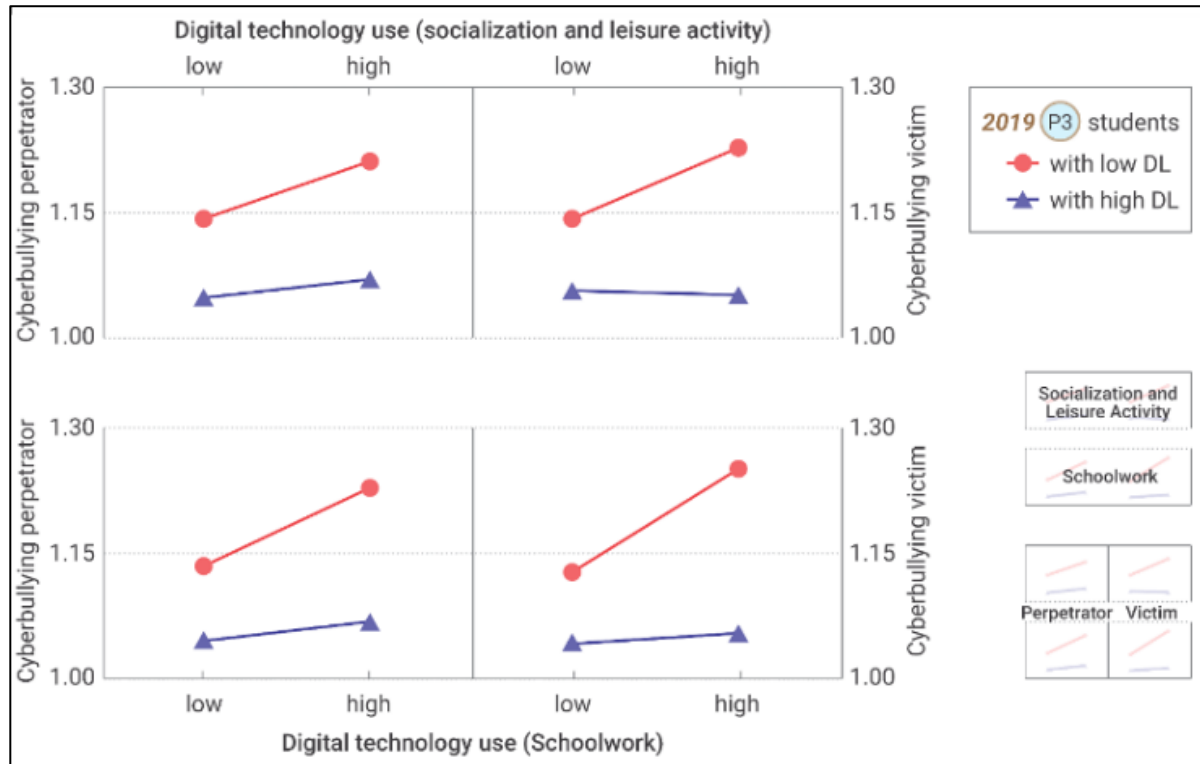
Digital competence protective against mental health issues related to digital technology use



- Digital competence is associated with **less gaming addiction** and could potentially lead to **better mental wellbeing** by reducing the risks of **gaming addiction and cyberbullying**.

Digital technology use and cyberbullying among primary school children: Digital literacy and parental mediation as moderators.

- Research has shown a positive correlation between digital technology use and cyberbullying among primary school-aged children, with digital literacy and parental mediation playing a moderating role.
- Children with **higher DL levels** are **less likely** to be **victims** of cyberbullying even when the frequency of digital technology use was high.



•Tao, S., Reichert, F., Law, N., & Rao, N. (2022) Digital technology use and cyberbullying among primary school children: Digital literacy and parental mediation as moderators. *Cyberpsychology, Behavior, and Social Networking* <http://doi.org/10.1089/cyber.2022.0012>



Digital Technology Use and Cyberbullying Among Primary School Children: Digital Literacy and Parental Mediation as Moderators

Sisi Tao, PhD,¹ Frank Reichert, Dr. Phil,² Nancy Law, PhD,^{1,3} and Nirmala Rao, PhD⁴

Abstract

Cyberbullying has become a critical issue in many parts of the world. Children affected by bullying in cyberspace may also experience various other problems in their daily lives, such as emotional and behavioral issues. Despite the well-documented positive correlation between digital technology use and cyberbullying experiences in adolescents, a paucity of research has explored the association between digital technology use and cyberbullying, and the extent to which digital literacy (DL) and parental mediation moderate these relationships among primary school-aged children. This study addressed these research gaps. A total of 736 children (third grade, female = 52 percent) in Hong Kong, selected through stratified random sampling, reported on their digital technology use, parental mediation of technology use (i.e., active mediation and restriction), and cyberbullying experiences. A performance-based assessment measured children's DL. Results showed a positive association between children's digital technology use (both for leisure activities and for schoolwork) and cyberbullying experiences (both as perpetrator and victim). These positive associations were more pronounced among children with low levels of DL (only victims) as well as among children with highly restrictive parents (both perpetrators and victims). Implications for digital citizenship education and parental intervention are discussed.

Keywords: cyberbullying, digital literacy, digital technology use, parental mediation, primary school

Introduction

CYBERBULLYING IS PREVALENT among children growing up in the digital era.¹ Bullying is defined as aggressive behavior intended to cause harm through repeated actions to someone who cannot defend himself/herself, and bullying perpetrated through cyberspace is called cyberbullying.² Previous studies on cyberbullying have primarily focused on adolescents older than 13 years, as cyberbullying peaks in middle school and declines in high school.³ However, a growing number of studies indicate that cyberbullying can occur as early as primary school age,⁴ highlighting the need

to examine cyberbullying in younger samples before its prevalence peaks. This study examined the association between digital technology use and cyberbullying, and how digital literacy (DL) and parental mediation moderate these relationships among primary school-aged children.

Young children's digital experiences

Digital technologies accord many benefits for children by allowing instant access to information, rapid communication, and extensive social networking. However, despite the advantages of these technologies when used appropriately,

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Two connected studies each with 2 phases of data collection

RGC TRS wave-1
(Jan-Jun 2019)

Funded by the Research Grants Council of HK



RGC TRS wave-2
(Apr – Jul 2021)

Funded by the Research Grants Council of HK



Dates indicated are the time period for data collection

eCitizen Education 360: An extension of the Learning and Assessment for Digital Citizenship project



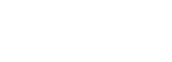
An action-oriented study to engage community partners in interpreting and making aligned efforts to support learning at all levels to

Co-INVENT the New Normal

Supported by



Supporting Organizations



Two connected studies each with 2 phases of data collection

**RGC TRS wave-1
(Jan-Jun 2019)**



Funded by the Research Grants Council of HK

**1st/2nd wave COVID
e360
(8 Jun – 12 Jul 2020)**



Funded by the HK Jockey Club Charities Trust

**RGC TRS wave-2
(Apr – Jul 2021)**



Funded by the Research Grants Council of HK

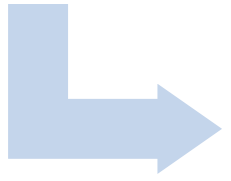
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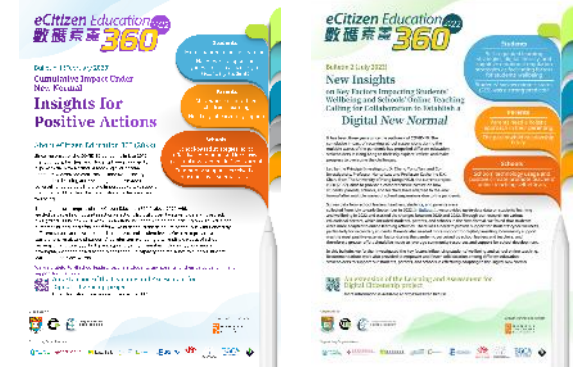
**RGC TRS wave-2
(Apr – Jul 2021)**



Funded by the Research Grants Council of HK



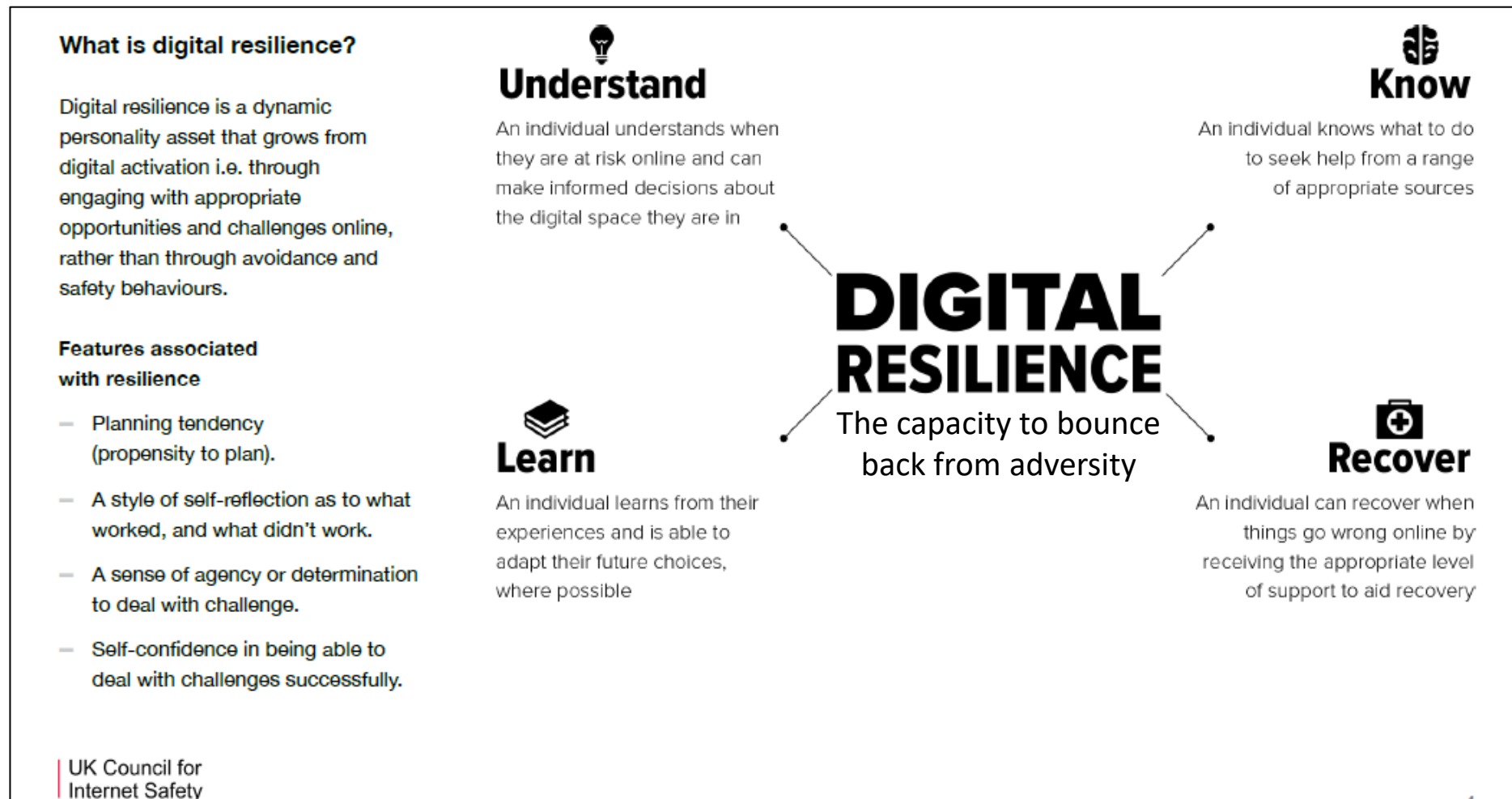
**5th Wave (2022 -)
e-360 Ver2
(Jun-Aug, 2022)**



Funded by another charity: the DH Chen Foundation

Dates indicated are the time period for data collection

What is digital resilience, its importance and relationship with digital competence

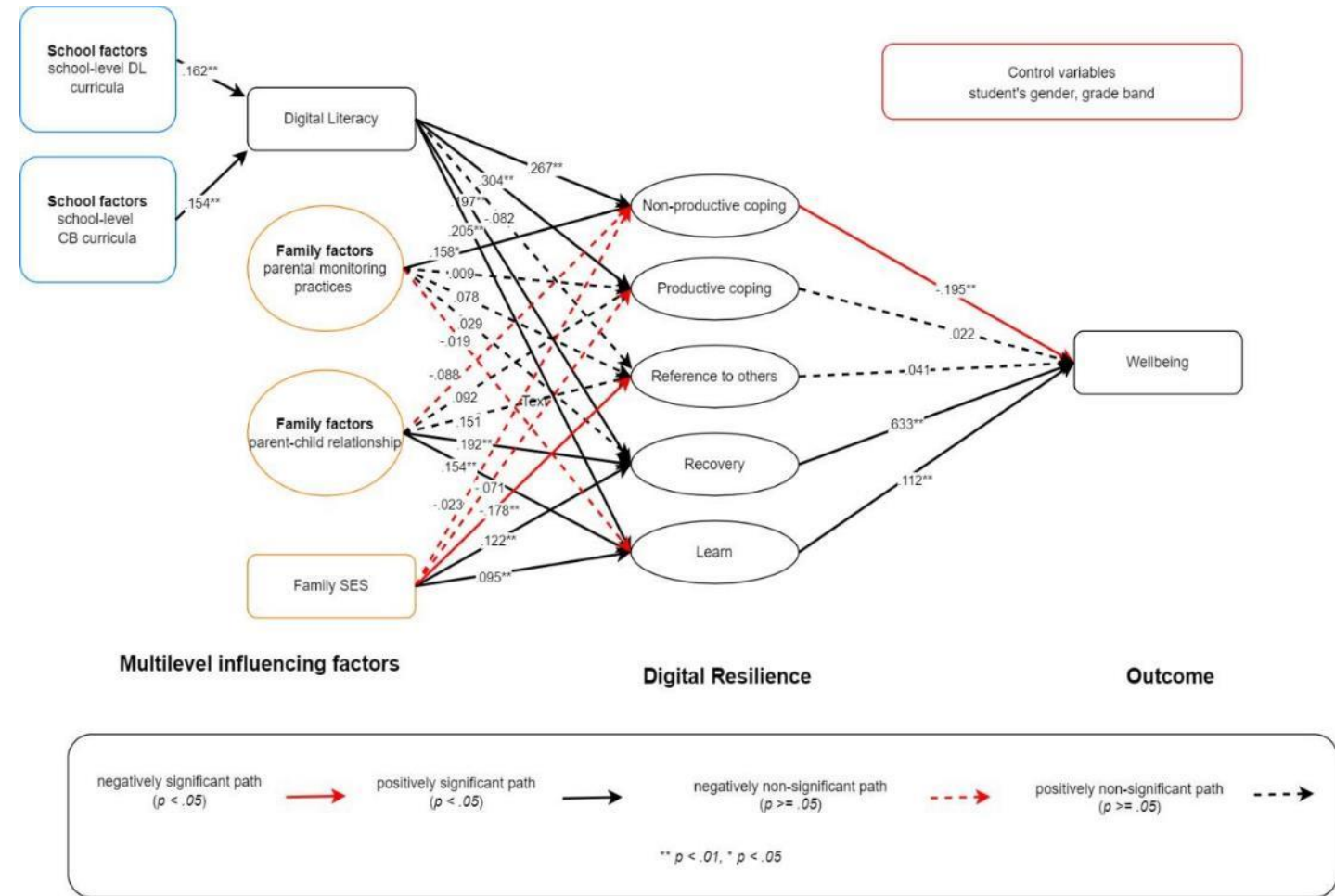
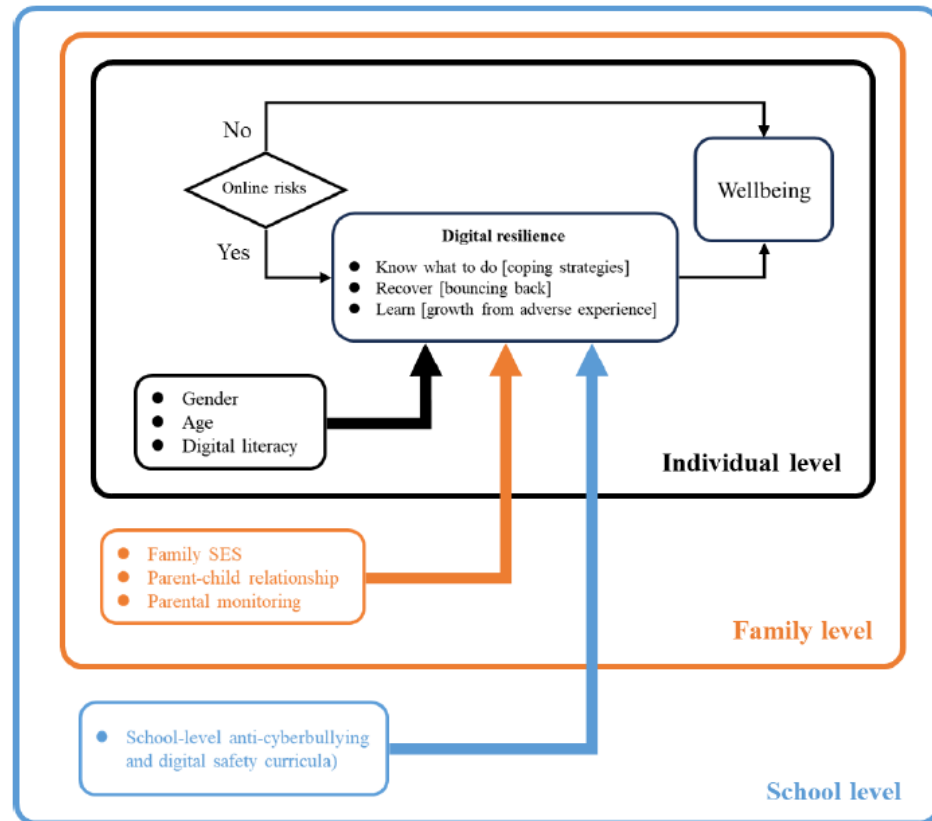


Three types of coping strategies when encountering adversity:

1. Communicative coping (e.g., seeking support from parents or friends),
2. Proactive or productive coping (e.g., actively addressing problems)
3. Passive or non-productive coping (e.g., ignoring problems)

Pan et al. (November, 2023). Protective factors contributing to adolescents' multifaceted digital resilience for their wellbeing

Conceptual Framework of digital resilience in the present study

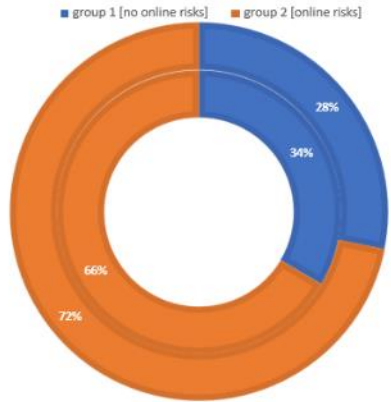


Note. Only Group 2 data was used.

The figure only displays standardised coefficients of targeted variables, while controlling for students' gender and grade band. Female students had significantly higher levels of Reference to others, wellbeing, and digital literacy than male students and significantly lower levels of parental monitoring ($ps < .05$). Junior secondary students had significantly higher levels of Productive coping, Learn from online risks, parental relationship, parental monitoring, and family SES and lower level of digital literacy than Senior secondary students ($ps < .01$).

Associations between wellbeing, digital resilience, and digital literacy

SAMPLES (secondary schools)



1,882 parent-child pairs in 30 secondary schools in Hong Kong.

- Group 1 consists of those students who did not report any online risk experiences ($N_{G1}=589$, 31%)
- Group 2 consists of those students who did report online risk experiences ($N_{G2}=1,239$, 66%)
- Missing 54 student-parent pairs (3%)

WB-Pro factors

Competence
Clear thinking
Emotional stability
Engagement
Meaning
Optimism
Positive emotions
Positive relations
Resilience
Self-esteem
Vitality
Self-acceptance*
Autonomy*
Empathy*
Prosocial

Key findings

1. Impact of digital resilience on wellbeing

- Recovery and Learn components of DR are significantly associated with adolescents' wellbeing
- The use of non-productive coping strategies (non-PC) negatively affects adolescents' wellbeing

2. Impact factors on digital resilience at the individual level

- Students' DL is positively and significantly associated with both productive (PC) and non-productive (non-PC) coping strategies, with the impact slightly stronger for PC.

3. Familial factors impact on digital resilience

- Parental monitoring (PM) is only significantly associated with students' non-productive (non-PC)
- Parent-child relationship (PCR) is significantly associated with students' Recovery and Learn
- Family SES is positively associated with Recovery and Learn.
- SES is negatively associated with RtO coping strategies

4. School level impact factors to promote digital resilience

- The presence of digital literacy (DL) programmes and cyberbullying-related curricula (CB) were both found to be significantly associated with students' DL

Summary of findings

- There is a gigantic, digital literacy (DL) divide among students, within and between schools that is more serious for older students
- Students' mental health and digital wellbeing have generally deteriorated significantly between 2019 and 2021
- DL is a protective factor for overall wellbeing of students
- The digital competence gaps have implications not only on students' academic learning but also mental health and cyber-wellness
- Parent-child relationship is significantly associated with students' wellbeing and digital resilience

What should be done to both foster digital literacy and to protect students' mental health (and other wellbeing aspects)?

Students need to be guided in their development of

Digital competence:

- Digital literacy
- Collaborative problem solving

Integrated across the school curriculum

online resilience:

- Needs exposure
- Similar to the concept of vaccination

Needs guidance from parents, teachers & community

Recommendations



For Students

- Provide support to help students equip with ***self-regulated learning strategies*** and ***positive cognitive emotional regulation strategies*** to facilitate their wellbeing.
- Encourage students to participate in activities that can develop their ***digital literacy*** and master strategies to prevent and respond to cyberbullying.

For Parents

- Need a holistic approach in their parenting, focusing on cultivating a ***positive relationship*** with their children in addition to practicing ***digital and general parenting*** to support students' online learning and wellbeing.
- Stay informed about the latest digital trends and risks to improve their children digital literacy.
- Encourage and teach their children to use strategies for managing their emotions and focusing on goals, to develop their abilities of self-regulated learning strategies and cognitive emotional regulation strategies.



Recommendations



For Schools

- Encourage **greater usage of digital technology**, cultivate a **positive school climate** (i.e., positive energy, trust & collaboration), and facilitate **teacher collaboration** so that teachers can be more efficacious in their online teaching.
- Organise more anti-cyberbullying workshops to teach students how to prevent and respond to cyberbullying, and provide them with secure reporting channels.
- Facilitate students' self-regulated learning strategies and strengthen digital literacy with relevant measures.

For Community

- The whole community including relevant professional, community, business and governmental organisations as well as individual professionals, should be involved further to harness their expertise, resources or services not just to provide students with **emotional and social support**, but also to help parents on **effective parenting practices** (including general and digital parenting) as well as to provide support for **school development** especially in student wellbeing.

