18. Digital inequalities and adolescent mental health: the role of socioeconomic background, gender, and national context

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1 INTRODUCTION

This chapter examines how adolescents' digital engagement differs across socioeconomic status (SES) and gender and how it relates to their mental health. Social scientists have widely theorised about how digital divide contexts shape young people's lives. Scholars have argued that not all groups in society are benefiting equally from the rapid digital revolution that societies have experienced in recent decades (Di Maggio et al., 2004; Hargittai, 2008; Helsper, 2021; Van Dijk, 2006). These digital inequalities are likely to impact young people particularly.

While it has been claimed that adolescents across SES and gender are influenced differently by the opportunities and risks derived from using new mobile technologies, the literature presents two major gaps. First, it remains unclear how digital engagement shapes adolescent well-being at multiple points in time (e.g., from childhood to late adolescence) and specifically how the association between adolescents' digital use and their well-being outcomes differ by SES and gender. Second, how national contexts (e.g., across policy, economic, and cultural contexts) could relate to potential digital divides in the association between adolescent digital engagement and well-being remains largely understudied. This chapter contributes to the literature by providing a fresh look at these understudied areas of research.

More specifically, we add to the literature on the connection between digital divides and young people's well-being by examining SES and gender variations in digital engagement and analysing how the latter links to risks of experiencing mental health problems. We do so, first, by giving in-depth evidence using a longitudinal life-course approach within the context of a single country: Ireland. Additionally, we complement such dynamic longitudinal perspective with an exhaustive cross-national approach, using comparative data across 35 industrialised countries representing different policy, economic, and cultural contexts. Our study addresses three main empirical questions: (1) What roles do SES and gender play in the existing relationship between adolescents' digital engagement and mental health outcomes? (2) How is digital engagement and its relationship with mental health changing dynamically from childhood to late adolescence? (3) Does the relationship between adolescents' digital engagement and their mental health differ across national contexts?

The chapter is organised as follows. First, we review the most recent debates on digital inequalities in young people's well-being, with a specific focus on family SES and gender across countries, considering theoretical and empirical studies. Second, we briefly discuss the basic methodology and empirical strategy of our analysis. Third, we present the empirical results of the chapters (1) by analysing dynamics of adolescent digital engagement and mental health

from late childhood to late adolescence in Ireland and (2) by examining cross-nationally how adolescents' digital engagement links to mental health outcomes. Finally, we conclude with a global discussion of the main takeaways of the evidence presented in the context of the recent and future international literature on digital divides and young people's well-being.

2 BACKGROUND

2.1 Previous Literature on Digital Inequalities in Young People's Well-Being

Today's adolescents are living in hyper-digitalised worlds with unprecedented access to ubiquitous and increasingly complex mobile devices. These digital transformations are bringing great opportunities, including new chances for learning and new opportunities for socialising with others in online settings, but can also bring new forms of harm, such as experiencing gaming addiction, cyberbullying, and anxiety derived from social media use (Bohnert & Gracia, 2021; Livingstone et al., 2018; Mascheroni & Olaffson, 2016). These transformations in the online world intersect with societal processes happening in the offline world, where individuals' characteristics such as socioeconomic resources (i.e., SES) and demographic variables (i.e., gender) are likely to play an important role.

A first key question to consider from previous literature is how digital engagement relates to adolescent well-being in contemporary societies. A large body of literature has investigated how adolescent digital engagement links to well-being outcomes, with an increasing focus on mental health indicators, such as depression, anxiety, psychological distress, or online psychological risk. High amounts of screen-based time have been found to be associated with higher distraction and learning deficits (Chen & Yan, 2016), sleep deprivation (Exelmans & Van den Bulck, 2016), unhappiness (Lepp et al., 2014), sedentary behaviours (Lepp et al., 2013), poor mental health (Kelly et al., 2018), and depressive symptoms (Twenge et al., 2018).

Yet, other studies have called for caution when addressing the average effects of young people's digital media use and mental well-being, which contribute to reduce certain exaggerations of 'moral panic' on the time adolescents are spending in screen-based activities. Recent literature suggests that the average effects of screen time on well-being are relatively small (Orben & Przybylski, 2019) and context specific (Kardefelt-Winther et al., 2020). Crucially, research suggests that, when digital engagement is more interactive and balanced, and adolescents receive high levels of parental involvement and support, there may be benefits to adolescent well-being (Livingstone et al., 2011; Valkenburg & Piotrowski, 2017). While effects of digital media use on mental health problems can be relatively small for many young people, this fact does not exclude that an important group of children and adolescents can be at risk of experiencing mental health harm from engaging with digital devices. In short, previous literature suggests that high amounts of digital engagement, interacting with the nature, content, and context of such digital activities, is important to anticipated adolescents' well-being outcomes.

Now, are digital technologies impacting adolescents' well-being differently across population sub-groups? In seeking to answer this question, the digital inequalities literature has identified three levels of digital divides across the population, including the differential forms of 'access' to information and communications technology (ICT)-related mobile devices (level 1), the unequal type of online and digital 'skills' as well as divergent forms of 'engagement' (level 2), and the multiple 'outcomes' that stem from (dis)similar social and digital

contexts (level 3) (Di Maggio et al., 2004; Hargittai, 2008; Helsper, 2021; Van Dijk, 2006). The literature on digital divides does not target young people exclusively, and in fact age has been pointed as a key variable capturing divides in the digital world. But the notion of digital divides can apply particularly to the life-course stages that we explore here: childhood and adolescence.

In this chapter, we focus on how young people's digital engagement differs by SES and gender (level 2) and whether these variations in sociodigital settings lead to different mental health outcomes across groups (level 3). Certainly, divides in digital access are today highly prevalent, not only in low-income and middle-income countries, but also in the richer economies (Helsper, 2021; Van Deursen et al., 2017). Even in high-income countries, we are observing today strong differences in the gradation of divides to access computers, high-speed internet, and high-quality and diversified mobile devices. Scholars have pointed to the persistence of digital exclusion among groups living in more vulnerable family and geographical contexts (Livingstone & Helsper, 2007). Although digital inequalities in access (level 1) need to be considered in this field of research, examining the links between adolescents' digital engagement (level 2) and well-being (level 3) is particularly important today if we want to understand young people's present and future development and life chances in our digitalised societies.

To date, however, the literature on sociodigital inequalities has provided little empirical evidence that links young people's digital engagement (level 2) to their well-being outcomes (level 3). This gap in the literature inspires the present chapter on adolescents' digital divides and mental health by SES and gender, where we combine longitudinal and cross-national approaches.

2.2 Adolescents' Mental Health and Digital Divides: The Role of Socioeconomic Background, Gender, and National Contexts

We specifically examine adolescents' mental health. Adolescent mental health can be defined as a multi-dimensional well-being construct that captures healthy, congruent, and vital functioning. We focus on a construct that may capture variations in the maximisation of opportunities and minimisation of harm in the online world that is related to potential differences in young people's mental capabilities and emotional states, including anxiety, depression, pro-social behaviour, and happiness (Castellacci & Tveito, 2018; Livingstone et al., 2011).

Previous studies on adolescent mental well-being have found important group differences in well-being across socioeconomic background and gender. Family SES is a key predictor of unequal trajectories in mental health outcomes, with low-SES adolescents being more harmed than high-SES adolescents in outcomes such as depression and anxiety (Chen & Paterson, 2006; Crosnoe & Johnson, 2011). As for gender, boys are more prone to experience externalising behavioural problems than girls (Leadbeater et al., 1999), while mental health outcomes such as unhappiness, depression, and suicide risk factors are stronger among girls than among boys (Keyes et al., 2019; Twenge et al., 2018). Such gender gaps are particularly pronounced during adolescence, with three times as many adolescent girls diagnosed with depression as boys (Salk et al., 2017). However, it is still debated how such mental well-being disparities among adolescents, both across SES and gender, happen in digital and online contexts.

We review the scholarship on digital engagement and adolescent mental health by considering divides across the dimensions of family SES, gender, and national context. First, regarding

SES variations, previous literature indicates that socioeconomic resources may shape the association between adolescents' digital engagement and their well-being. As high-SES teenagers have privileged access to family resources at home, their advantage relative to low-SES teenagers may transfer to the digital world by reproducing, if not amplifying, existing inequalities happening in the offline world. Compared to high-SES adolescents, low-SES adolescents have been found to spend higher amounts of time on screen-based activities and to experience more negative feelings during their online activities, having also scarcer economic, social, cultural, and digital resources that can help to secure a healthy and productive ICT engagement (Gracia et al., 2020; Helsper, 2021; Lareau, 2011; Livingstone et al., 2011; Ragnedda, 2018). To date, however, research has omitted a systematic analysis of how changes in digital engagement relate to mental health outcomes across SES groups.

Drawing on previous literature on SES gaps in digital contexts, it can be expected that high-SES teenagers are in a more privileged position than low-SES teenagers to maximise digital opportunities and minimise risks linked to mental well-being outcomes. Therefore, it can be expected that high-SES adolescents use their privileged resources to maximise opportunities and minimise potential mental health harm of engaging with ICT, while low-SES adolescents are comparatively at a higher risk of being mentally harmed from their digital engagement.

Second, regarding gender differences, there is growing literature on how boys and girls are influenced by their digital engagement in relation to their mental well-being. Some research suggests that girls show particularly high levels of unhappiness, depression, and suicide risk from high levels of mobile phone use, and at significantly higher levels than boys (Booker et al., 2018; Twenge et al., 2018). Compared to boys, girls who are active users of social media platforms engage more in online social comparisons, focus more on their online appearance, and show higher concerns with their body image (Nesi & Prinstein, 2015; Tiggemann & Slater, 2017; Yau & Reich, 2019). Additionally, previous studies indicate that girls report to be more vulnerable than boys to feelings of harm/upset from their daily online experiences (e.g., exposure to sexual content, cyber-bullying) (Shuai et al., 2021; Smahel et al., 2020). However, there is little research, particularly using a long-term longitudinal approach, on the gendered effects of digital engagement on adolescents' mental health trajectories.

Drawing on previous literature, the potential higher online vulnerability experienced by girls could lead girls to suffer particularly higher levels of mental health harm. Although boys have been found to spend more time than girls on digital activities and relatedly to be heavy online users (Becker, 2022; Gracia et al., 2022), the stressed gendered mechanisms in online risks can lead girls to be disproportionately harmed from their digital use in both their emotional and mental well-being. Therefore, one can expect girls to be more negatively affected by increasing their participation in digital activities, compared to boys.

Third, regarding the cross-national level of analysis, the role of internet policies and digital legislation on children's digital inequalities and online well-being across countries remains insufficiently understood. The work of Livingstone et al. (2018) reveals that countries show remarkable differences in their policy regulations of the internet, not only at school but also at the societal level. These studies define internet and digital policies in terms of how likely they are to minimise risks and maximise opportunities associated with child digital engagement. Helsper et al.'s (2013) study mapping children's digital engagement reveals cross-country policy regulations through a typology that differentiates how supported, protected, and unprotected children are by specific internet regulatory regimes. This literature, together with the

insights from the stratification (Esping-Andersen, 2015), gender (Walby, 2020), and welfare regimes (Ferragina & Seeleib-Kaiser, 2011) scholarship, justifies an analysis of both SES and gender digital divides in adolescent well-being across countries. For reasons of focus and space, in this chapter we do not test specific within-country and between-country mechanisms. We instead explore SES and gender differences in digital engagement and how they link to mental health outcomes across multiple industrialised countries.

Overall, previous literature indicates that adolescents from different SES groups and genders may engage differently with digital devices as well as be differently affected in their mental health by their digital time use. In addition, given that national contexts differ significantly in their digital, policy, economic, and cultural contexts, the processes surrounding the existence of SES and gender digital divides in adolescent well-being are likely to differ cross-nationally.

3 METHODOLOGY AND DATA

3.1 Cohort Longitudinal Data

The first set of analyses (presented in Section 4.1) examines the associations between digital engagement and the risks of experiencing mental health difficulties from childhood to late adolescence. To do so, we employ high-quality longitudinal data from the Growing Up in Ireland (GUI) study, a dataset that has been widely validated to study change in adolescents' well-being (Williams et al., 2009). The GUI is a birth cohort study, which collects data on the same cohort of children across different points in time. We present data from the 'Child Cohort' of the GUI, with all children born in 1998, using data collected when they were at the ages of 9, 13, and 17.

Our dependent variable measures mental health difficulties with the Total Difficulties Score (TDS) from the Strengths and Difficulties Questionnaire (SDQ). The SDQ-TDS is regarded as 'a concise and well-validated tool' used to measure the socioemotional well-being of 3 to 16 year olds (Goodman & Goodman, 2011). We utilise an objective conception of well-being that specifies mental well-being as an indicator of healthy, congruent, and vital functioning (Castellacci & Tveito, 2018). The SDQ-TDS measure operationalises psychological challenges as the degree of variation in emotional, conduct, hyperactivity, and peer relationship difficulties.

The main independent variables in the longitudinal analyses separate between the amount and type of digital engagement. We first differentiate between digital and TV time, where retrospective reports asked respondents how many hours respondents spent watching TV per average weekday and spent on digital devices per average weekday (i.e., mobile phone, computer, tablet, and e-reader). These variables were measured by four categories: 'none', 'less than an hour', '1 to 3 hours', and '3 hours or more'. While the mechanisms predicting children's time use can differ between weekdays and weekends (Gracia & García-Román, 2018), measurements of weekday and weekend digital technology use have been shown to be highly correlated (Orben & Przybylski, 2019). Additionally, we utilise three categories of participation in different digital activities, which are only available in the data as binary dummy variables. These three categories separate respondents between those who engage in these activities on an average day (1 = yes) and those who do not (0 = no): (1) 'gaming'; (2) social and media; and (3) learning-oriented activities. These categories were constructed from

the GUI questionnaire in which children were given a list of digital activities and were asked which activities they currently did or did not engage in.

Our empirical strategy with the GUI data is based on longitudinal analyses with fixed-effects models. Before estimating regression models, we show the amount of time spent by respondents on digital screen-based activities across three time points (age 9, 13, and 17/18) by SES and gender. We then run fixed-effects models separately by SES and gender. SES was generated from both the Primary and the Secondary Caregiver Questionnaires, with overall household SES taken as the highest SES of both partners in the household (as relevant). For our analyses, we separate our sample by a binary measure of SES, differentiating between high SES (i.e., professional, managerial, and technical occupations) and low SES (non-manual and manual working-class occupations). We further compare analyses between boys and girls, as identified in the GUI data. We include various time-variant demographic variables as controls.

3.2 Cross-National Data

Our second set of analyses (see Section 4.2) employs a cross-national approach. We compared 35 countries using the Health Behaviour in School-Aged Children (HBSC) 2013–2014 Survey (Inchley & Currie, 2016). This includes 32 European countries (counting Belgium as two separated units that represent the regions of Flanders and Wallonia), and three non-European countries, namely Canada, Israel, and Russia. Only those national cases from the HBSC data with full information on our measures of study were included in the analyses. The HBSC study measures 11- to 15-year-old boys and girls across different demographic and SES groups within each national context. The survey has been widely used in the literature to compare the health-related activities of young people across many countries (Inchley & Currie, 2016).

Our cross-national data allow us to measure mental health complaints as the combined frequency (i.e., 'about every day', 'more than once a week', 'about once a week', 'about once a month', 'rarely or never') in which respondents did experience any of these three items: 'irritability or bad temper', 'feeling low', and 'feeling nervous'. In the final measure, we considered the highest frequency of any of the items as the ultimate score of mental health complaints. We treat the measure as an ordinal variable, ranging from experiencing mental health complaints 'rarely or never' (= 1) to experiencing mental health complaints 'about every day' (= 5), with the values 'more than once a week' (= 2), 'about once a week' (= 3), and 'about once a month' (= 4) in between the two extremes.

We use combined measures of digital screen-based time that estimate the average hours that respondents spent on the sum of two measures from HBSC: gaming and using computers. We further calculated average hours per day using the weekend and weekday variables by multiplying by five the time spent on weekdays, by two the time on weekdays, and then dividing the outcome by seven. Unfortunately, with the 2013–2014 HBSC data, we do not have information on the amount of time adolescents spend on activities using mobile phones, and we cannot produce reliable estimates of the hours spent using social media with mobile devices. Therefore, we only include gaming and computer use in our HBSC measures of screen time.

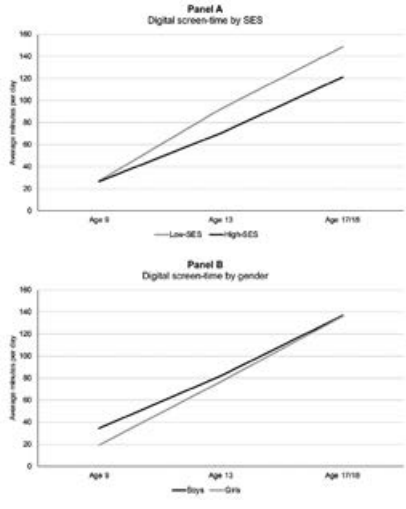
Our cross-national empirical strategy is based on comparing digital engagement and how it relates to mental health across countries. We start by addressing SES and gender differences in adolescents' average digital screen-based hours. We further explore the bivariate statistical associations between screen-based hours and mental health problems for each country and then compare the difference of these associations by SES and gender. We measure parental SES

with the HBSC data using the Family Affluence Scale (FAS), a reliable HBSC measure that is available for all countries with low levels of missing data (Torsheim et al., 2016). The FAS indicates affluence in the family: 'owning a car or a van, ability to afford a holiday abroad, owning a dishwasher, owning computers at home, having a separate bedroom for the child, number of bathrooms in the house'. We used a ranking procedure that ranks each adolescent within their countries so that respondents' FAS score is ranged from 0 to 1 depending on their rank within their country. We then created a 'low-SES' category for adolescents with a less than 0.5 score and a 'high-SES' category for those with a score equal to or higher than 0.5. Finally, we measure gender as available in the HBSC by separating between boys and girls.

4 EMPIRICAL RESULTS

4.1 Dynamic Longitudinal Approach

Figure 18.1 presents the evolution of time spent on digital engagement, both by gender and SES, from age 9 to age 17 in Ireland. We present the raw evolution of digital screen-based time on an average day, without controlling for any covariates. This measure of 'screen time' is a composite measure that accounts for all time spent with digital devices and digital activities, including gaming, social media, watching videos, messaging friends, and surfing the internet, on an average day (Williams et al., 2009). We can first observe a steady increase in average digital screen time from mid-childhood to late adolescence. At age 9, children were on average spending 27 minutes per day on digital screens. This average screen time increases to 79 minutes per day at age 13, and further to 136 minutes per day by age 17. As individuals move



Note: Average digital screen time at ages 9, 13, and 17/18 by SES and gender.
Source: GUI survey.

Figure 18.1 Changes in digital engagement from childhood to late adolescence by SES and gender

from childhood to adolescence, they spend increasing amounts of time on digital devices such as computers, tablets, and mobile phones.

In Figure 18.1 we also observe interesting patterns in digital engagement across SES and from age 9 to 17. Regarding SES, we see an emerging gap in the average screen time between low-SES and high-SES children. While both low-SES and high-SES children engaged in approximately 27 minutes of average digital screen time at age 9, by age 13 low-SES adolescents spend 23 minutes more on average than high-SES adolescents, and this gap is sustained through age 17. For gender, we find a gap between boys' and girls' digital time allocation at age 9, where boys spend on average 35 minutes per day on digital devices and girls spend only 19 minutes. However, this gap closes to only 5 minutes by the age of 13 and closes completely by age 17. Overall, we observe SES gaps in digital engagement trajectories throughout adolescence, in parallel with closing gender gaps. This evidence complements previous time-use data across national contexts addressing educational (Gracia et al., 2020) and gender variations (Gracia et al., 2022) in screen-based time, using a longitudinal dynamic approach.

Table 18.1 shows statistical associations (within children) between digital engagement and mental health difficulties by parental SES and gender obtained from our fixed-effects models. Focusing first on SES, we observe that for low-SES children, digital time use is associated with increased mental health difficulties at all levels of usage, with no digital usage being the reference category: less than an hour ($b = 0.527$, $p < 0.05$), 1 to 3 hours ($b = 0.914$, $p < 0.001$), and 3+ hours ($b = 1.243$, $p < 0.001$). While we also find high levels of use are associated with increased mental health difficulties for high-SES children ($b = 0.739$, $p < 0.01$), we observe that low digital use (less than an hour) is associated with *decreases* in mental difficulties ($b = -0.281$, $p < 0.05$). Additionally, we can observe that the magnitude of association with mental difficulties at 3+ hours is substantially greater for low-SES children than high-SES children.

Looking next at gender, in Table 18.1 we find that boys' mental health difficulties are minimally affected by digital engagement and observe a significant association with greater mental health difficulties only for 3+ hours of daily TV screen time ($b = 0.474$, $p < 0.05$). For girls, on the other hand, we find significant associations of moderate ($b = 0.502$, $p < 0.01$) and high ($b = 0.949$, $p < 0.001$) levels of digital use on greater mental health difficulties. These associations are particularly strong at the highest level of usage (3+ hours).

To sum up, longitudinal results with the GUI data show that low-SES children increased their time on digital activities to a larger extent than high-SES adolescents from age 9 to 17, whereas the higher amount of time spent in digital activities among boys at age 9 leads to a convergence as boys and girls move through adolescence. Additionally, compared to high-SES adolescents, low-SES adolescents experience more psychological problems from engaging in digital activities, while high-SES adolescents experience fewer psychological problems from high levels of usage as well as small improvements in psychological well-being from low levels of digital use and gaming. Meanwhile, girls experience higher psychological problems from high levels of usage compared to boys, who we observe to be minimally harmed by time spent on digital screen-based devices.

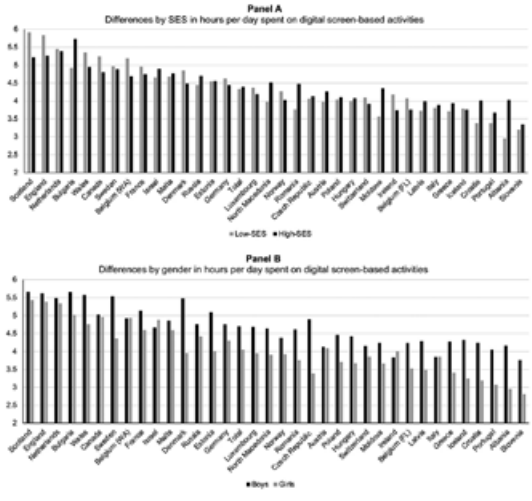
Table 18.1 Adolescents' mental health difficulties predicted by digital engagement

		Total Difficulties Score							
		Low-SES		High-SES		Boys		Girls	
		b	se	b	se	b	se	b	se
Hours online									
	None (Ref)								
	< 1 hour	0.527*	0.222	–0.281*	0.132	–0.022	0.150	0.039	0.162
	1 to 3 hours	0.914***	0.258	–0.112	0.178	0.093	0.177	0.502**	0.188
	3+ hours	1.243***	0.345	0.739**	0.257	0.379	0.252	0.949***	0.252
Hours TV									
	None (Ref)								
	< 1 hour	0.153	0.367	0.171	0.187	0.157	0.218	0.016	0.209
	1 to 3 hours	0.038	0.364	0.302	0.193	0.124	0.218	–0.010	0.215
	3+ hours	0.587	0.384	0.390	0.228	0.474*	0.242	0.038	0.242
Activities									
	Social/media	–0.095	0.204	0.068	0.132	0.048	0.135	–0.057	0.143
	Learning	–0.136	0.203	–0.122	0.152	–0.272	0.146	0.057	0.153
	Gaming	–0.168	0.154	–0.276**	0.104	0.003	0.106	–0.164	0.119
R^2 (within)		0.039		0.024		0.042		0.021	
N (children)		4,210		5,152		3,903		4,154	
N (observations)		6,707		9,584		8,372		8,961	

Note: Fixed effects linear regression separately by SES and gender (coefficients and standard errors shown). Models control for single parenthood, income, and wave (coefficients not shown). * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.
Source: GUI survey.

4.2 Cross-National Approach

Figure 18.2 shows the average time on screen-based activities that adolescents from low-SES and high-SES backgrounds spend on an average day (Panel A) and the average time that boys and girls spend in the same activities (Panel B), with both panels comparing 35 countries.



Note: The measures presented in the figure capture the total digital screen-based time allocated on a random day of the week, using a measure that weights weekdays and weekends to represent a random day of the whole week. Digital screen-based hours per day are the sum of the total time that is reported to be allocated to gaming and using computers. Data from Belgium were sampled from the regions of Wallonia and Flanders separately (FL: Flanders; WA: Wallonia).
Source: HBSC 2013–2014 survey.

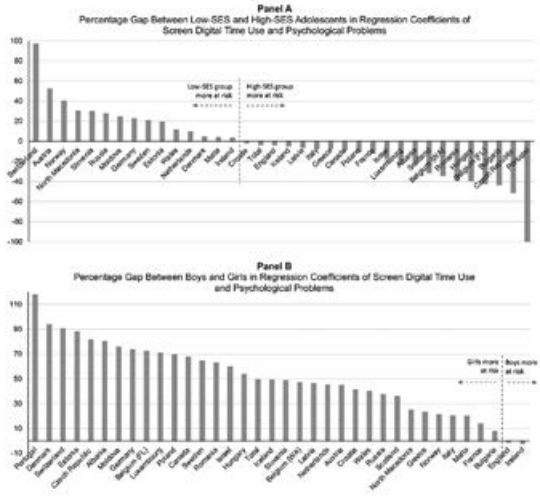
Figure 18.2 Digital screen time across countries by SES and gender

In Panel A of Figure 18.2 we observe that both low-SES and high-SES adolescents spend around 4 hours and 20 minutes per day on screen-based activities. However, we find interesting variations across countries: the gap between high-SES and low-SES adolescents ranges from less than a minute (Estonia; 0 minutes) to over an hour (Albania; 1.08 hours). In Hungary, Czech Republic, Poland, Estonia, Iceland, and the Netherlands, the socioeconomic gap in screen time is below 5 minutes. By contrast, in Albania, Bulgaria, Romania, Moldova, and Scotland, the socioeconomic gap on screen time is above 40 daily minutes. In some of these countries, low-SES adolescents have higher average screen time than high-SES adolescents, including English-speaking countries like Scotland (41-minute gap), England (34-minute gap), and Ireland (27-minute gap). By contrast, in other countries, including various Eastern European countries, high-SES adolescents spend more time on screen-based activities than low-SES adolescents. Compared to low-SES adolescents, high-SES adolescents exceed their time on screen-based activities by 1 hour and 4 minutes in Albania, 48 minutes in Bulgaria, and 46 minutes in Moldova.

As for gender, Panel B of Figure 18.2 shows that the total average screen time for boys is nearly 40 minutes higher than the total average for girls. We observe the highest gender gap

in screen-based time in Denmark (1.53 hours) and the lowest in Italy (1 minute). The gender gap across countries is consistent in that boys spend more time on screen than girls in most countries, except in Israel, Ireland, Belgian Wallonia, and Italy. However, in the few countries where girls spend more screen time than boys, this gap is quite small, with boys always spending less than 13 minutes on screen-based activities than girls in all these countries. However, for most countries where boys show higher screen-time averages than girls, gaps are more prominent. To illustrate, boys in Croatia, Iceland, Estonia, Sweden, Albania, Czech Republic, and Denmark spend over an hour more per day on screen-based activities than girls.

Figure 18.3 illustrates how the association between adolescents' screen-based time and psychological complaints differs by SES and gender. In Panel A of Figure 18.3 we present the percentage differences in the coefficient between screen-based hours and psychological complaints, comparing low-SES and high-SES adolescents. Positive values indicate that the coefficient is higher for low SES and negative values indicate that the coefficient of screen time is higher for high SES. Similarly, in Panel B of Figure 18.3, we present the percentage differences in the statistical association between screen-based time and psychological complaints between boys and girls. Positive values indicate that the coefficient of screen time is higher for girls, with negative values indicating a higher coefficient for boys. Detailed numbers for Figure 18.3 are presented in Tables 18A.1 and 18A.2 in the Appendix.



Note: The analyses show the percentage differences between high- and low-SES groups (Panel A) and boys and girls (Panel B) across countries. In Panel A, positive values represent when low-SES adolescents are more at risk and negative values represent when high-SES adolescents are more at risk. In Panel B, positive values represent when girls are more at risk and negative values represent when boys are more at risk. Cut-off points are shown with a dashed line. Data from Belgium were sampled from the regions of Wallonia and Flanders separately (FL: Flanders; WA: Wallonia).
Source: HBSC 2013–2014 survey.

Figure 18.3 Percentage differences in regression coefficients of daily screen-based time on adolescents' mental health problems by SES and gender

In Figure 18.3 (Panel A), we observe that the association between screen-based time and psychological complaints by SES differs strongly across countries. This evidence suggests that national contexts matter in shaping potential digital divides by SES in adolescents' mental well-being. On average, high-SES adolescents are 3.56 per cent more at risk than low-SES adolescents, showing a small difference for the overall sample. The smallest percentage difference by SES is observed in Croatia, where the high SES are 1.62 per cent more at psychological risk from increasing screen-based time, compared to low-SES adolescents. In other national contexts, we observe larger differences by SES. In Switzerland, low-SES adolescents are 96.98 per cent more at risk than high-SES adolescents of experiencing psychological complaints from their increase of time on screen-based activities. Similarly, in Austria, low-SES adolescents are 52.20 per cent more at risk than high-SES adolescents, and in Norway the low SES are 40.16 per cent more at risk than the high SES. By contrast, in Portugal high-SES adolescents are 104.57 per cent more at risk than low-SES adolescents, whereas high-SES adolescents are 51.13 per cent more at risk in Czech Republic and 42.92 per cent more in Bulgaria, compared to their low-SES counterparts.

In Figure 18.3 (Panel B), we observe that girls are on average 49.42 per cent more at risk than boys of experiencing psychological problems from their digital screen-based engagement. An increase of screen-based hours is associated with psychological problems to a higher extent among girls than boys in all countries, except in England and Ireland, where gender gaps are close to zero, with boys being 1.16 per cent more at risk than girls in England and 2.29 per cent more in Ireland. As with the observed differences in SES, Portugal shows the largest percentage differentials by gender, where girls are 117.85 per cent more at psychological risk than boys from increasing screen-based time. Similarly, girls are 93.89 per cent more at risk compared to boys in Denmark, and girls are 90.44 per cent at higher risk than boys in Switzerland. The smallest disadvantage among girls is observed in Bulgaria, where girls are found to be 7.78 per cent more at psychological risk from their digital engagement in relation to boys.

Overall, the cross-national analyses with the HBSC data show interesting variations by SES and gender in adolescents' digital engagement and how it relates to their psychological well-being across countries. For parental SES, differences are certainly mixed, while the direction of results differs quite radically across countries. As for gender, boys clearly spend higher amounts of time on screen-based activities and girls are at a higher risk of experiencing psychological complaints as they increase their digital engagement, but the magnitude of these variations differs clearly across national contexts. In the conclusions, we further discuss the broader implications of these cross-national results, together with a discussion of the longitudinal analyses.

5 DISCUSSION

This chapter has examined how adolescents' digital engagement by family SES and gender and how adolescent digital engagement relates to SES and gender variations in mental health outcomes. The chapter contributes to the international literature by not only reviewing previous scholarship in this area, but also (1) utilising a life-course approach from childhood to late adolescence (using GUI longitudinal data from Ireland) and (2) adopting a cross-national perspective (using HBSC data to compare 35 national contexts).

The main results of the chapter can be summarised at four levels. First, our analyses using high-quality longitudinal data from Ireland show that young people from low-SES backgrounds increase their amount of time on digital activities more than those from high-SES backgrounds as they move from childhood to late adolescence, leading to increasing SES differences in the amount of digital screen time. For low-SES adolescents, we found a strong increase in mental health problems at all levels of digital engagement, suggesting that low-SES children are deprived of resources that would enable them to minimise the potential risks of digital use (Livingstone et al., 2018). Contrastingly, for high-SES adolescents, we only found a clear association between digital use and adolescent mental health difficulties at the highest levels of use, whereas low levels of daily digital use (i.e., less than an hour) among high-SES adolescents was associated with lower mental health problems. The finding that low levels of digital use might be beneficial to child and adolescent well-being has been previously hypothesised and observed (Przybylski & Weinstein, 2017). However, our results with longitudinal data suggest that the mental well-being benefits of moderate digital engagement are restricted to adolescents from more privileged socioeconomic backgrounds.

Second, the evidence on gender from Irish longitudinal data show also relevant variations in both use and well-being outcomes. Interestingly, and opposite to the trend observed for SES, the much higher engagement in digital screen-based activities during late childhood among boys is found to almost converge with girls during early adolescence, and this gender gap disappears completely in late adolescence. For girls, we found high levels of digital use to be associated with greater mental health difficulties, ranging from moderate to high levels of engagement. By contrast, we found minimal effects of digital use on mental health difficulties for boys. These findings support previous research implying that girls' well-being, compared to boys' well-being, is more negatively associated with digital engagement (Booker et al., 2018, Twenge & Martin, 2020). Our study has provided robust longitudinal analysis from childhood to late adolescence, using a dynamic approach that has received little attention in previous literature.

Third, our cross-national analyses on SES yielded mixed results. In contrast to the longitudinal results for Ireland, and inconsistent with most previous theoretical contributions, the HBSC analyses show marginal SES differences both in adolescents' digital screen time and in how it impacts their mental health. In some countries, such as France, Denmark, and Ireland, we found that low-SES adolescents tend to engage in digital activities longer than high-SES adolescents. Yet, in countries such as Austria, Latvia, and Greece, it is high-SES adolescents who engage in digital activities longer. In some countries (notably Switzerland, Austria, Norway), low-SES adolescents' mental well-being was more harmed from digital screen time, whereas in other countries (particularly Portugal, Czech Republic, Bulgaria) high-SES adolescents were the ones more mentally harmed from spending time on digital activities. While Eastern European countries are typically the countries where high-SES adolescents are digitally more active, the overall cross-national results by SES do not indicate clear regional patterns. Future research on SES digital divides should further address the role of within-country factors.

Fourth, while gender was an important variable related to adolescents' digital engagement and how it is associated with mental health outcomes, the magnitude of gender gaps in these areas differed across countries. Boys were more active in digital screen time than girls in 33 out of the 35 countries examined. In eight countries (i.e., Croatia, Iceland, Estonia, Sweden, Estonia, Albania, Czech Republic, and Denmark) this gender gap was particularly salient, where boys spent more than one extra hour per day on digital activities compared to girls. In

most countries, girls were mentally more harmed than boys by spending time on digital activities, and particularly so in Portugal, Denmark, Switzerland, and Estonia. Interestingly, such gender gaps with the HBSC data were not observed for Ireland. That findings on mental health for Ireland differed between the HBSC (cross-sectional design) and GUI (longitudinal design) may be related to the nature of the different measures and data employed. Still, we must highlight that the longitudinal design used with the GUI data differed radically from the descriptive design applied with the HBSC data. Future studies will be needed to disentangle how gender intersects with the country level in shaping digital divides in adolescents' mental well-being.

To conclude, this chapter has provided a comprehensive study of SES and gender digital divides in adolescents' digital engagement and mental health by combining longitudinal with cross-national approaches. Findings for gender suggest that, while boys spend more time using digital devices than girls do, digital usage harms the psychological well-being of girls to a much higher extent than boys, even if national contexts matter in explaining such gender gaps. As for SES, longitudinal results imply that low-SES adolescents are at a higher risk of experiencing mental health issues when increasing their digital screen time, while high-SES adolescents benefit relatively more from using digital devices. Yet, cross-national analyses reveal weak digital divides by SES in most countries, with results being highly mixed, showing important cross-national variations on SES digital divides in adolescent well-being. More research is certainly needed to clarify this puzzle. We hope this chapter is making a relevant contribution to provide tools for a better understanding of how adolescents' digital engagement links to well-being outcomes across socioeconomic and demographic groups in our digitalised societies.

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APPENDIX

Table 18A.1 Bivariate regression coefficients of digital engagement predicting mental health problems by SES across countries

Country	Low SES			High SES			Difference
	b	se	*N*	b	se	*N*	%
Albania	−0.062*	0.013	2,035	−0.079*	0.013	2,365	−23.30
Austria	−0.048*	0.018	554	−0.028	0.018	426	52.20
Belgium (FL)	−0.034*	0.021	1,834	−0.053*	0.020	2,037	−41.95
Belgium (WA)	−0.049*	0.011	1,531	−0.068*	0.010	1,685	−33.81
Bulgaria	−0.036*	0.010	1,969	−0.055*	0.011	2,067	−42.92
Canada	−0.071*	0.009	4,677	−0.077*	0.009	5,803	−8.51
Croatia	−0.046*	0.010	1,942	−0.047*	0.010	1,987	−1.62
Czech Republic	−0.032*	0.007	2,322	−0.053*	0.007	2,353	−51.13
Denmark	−0.023*	0.006	1,421	−0.022*	0.007	1,589	4.49
England	−0.060*	0.010	575	−0.063*	0.010	768	−3.80
Estonia	−0.054*	0.008	1,908	−0.045*	0.009	1,925	19.23
France	−0.047*	0.008	819	−0.053*	0.008	770	−11.86
Germany	−0.066*	0.010	2,567	−0.052*	0.010	2,601	22.62
Greece	−0.087*	0.012	1,852	−0.093*	0.012	2,024	−7.20
Hungary	−0.048*	0.011	1,870	−0.071*	0.010	1,713	−39.25
Iceland	−0.072*	0.010	4,766	−0.075*	0.009	4,333	−4.48
Ireland	−0.106*	0.016	1,425	−0.103*	0.014	1,776	3.26
Israel	−0.047*	0.006	2,071	−0.055*	0.006	2,374	−16.70
Italy	−0.075*	0.010	1,883	−0.081*	0.009	1,763	−7.18
Latvia	−0.065*	0.009	2,463	−0.069*	0.009	2,581	−6.15

Country	Low SES			High SES			Difference
	b	se	*N*	b	se	*N*	%
Luxembourg	−0.053*	0.011	1,349	−0.067*	0.010	1,157	−22.67
Malta	−0.071*	0.005	1,014	−0.069*	0.005	952	3.65
Moldova	−0.055*	0.013	2,260	−0.043*	0.013	2,146	24.38
Netherlands	−0.050*	0.008	1,674	−0.045*	0.008	1,771	9.77
North Macedonia	−0.096*	0.011	1,771	−0.071*	0.010	1,856	30.06
Norway	−0.094*	0.010	321	−0.062*	0.010	415	40.16
Poland	−0.062*	0.013	1,932	−0.069*	0.010	2,228	−10.19
Portugal	−0.008	0.008	1,929	−0.026*	0.007	2,016	−104.47
Romania	−0.040*	0.010	1,424	−0.059*	0.009	1,586	−38.83
Russia	−0.080*	0.014	2,039	−0.061*	0.011	1,897	27.48
Scotland	−0.066*	0.010	2,371	−0.090*	0.010	2,687	−31.39
Slovenia	−0.085*	0.010	2,321	−0.063*	0.009	1,989	29.70*
Sweden	−0.064*	0.009	3,446	−0.052*	0.008	2,912	20.68
Switzerland	−0.077*	0.008	927	−0.027*	0.009	1,081	96.98
Wales	−0.069*	0.011	2,329	−0.062*	0.010	1,989	11.43**
Total	−0.061*	0.002	67,591	−0.064*	0.002	69,622	−3.56

Note: Percentage difference = $100 \times (b_{LowSES} - b_{HighSES}) / ((b_{LowSES} + b_{HighSES}) / 2)$. Level of significance for coefficients: * $p < 0.05$. Level of significance for difference: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Data from Belgium were sampled from the regions of Wallonia and Flanders separately (FL: Flanders; WA: Wallonia).
Source: HBSC 2013–2014 survey.

Table 18A.2 Regression bivariate coefficient between digital engagement and mental health problems by gender across countries

Country	Boys			Girls			Difference
	b	se	*N*	b	se	*N*	%
Albania	−0.056*	0.009	2,100	−0.131*	0.011	2,300	80.27***
Austria	−0.029	0.009	402	−0.045*	0.010	578	44.55
Belgium (FL)	−0.036*	0.013	2,078	−0.077*	0.012	1,793	72.37**
Belgium (WA)	−0.044*	0.009	1,523	−0.070*	0.011	1,693	47.10*
Bulgaria	−0.049*	0.008	2,011	−0.053*	0.009	2,025	7.78
Canada	−0.049*	0.010	5,002	−0.099*	0.012	5,478	67.45***
Croatia	−0.050*	0.009	1,889	−0.075*	0.010	2,040	41.04
Czech Republic	−0.037*	0.006	2,201	−0.088*	0.007	2,474	81.47***
Denmark	−0.023*	0.008	1,377	−0.065*	0.011	1,633	93.89**
England	−0.067*	0.010	674	−0.066*	0.010	669	−1.16
Estonia	−0.038*	0.010	1,897	−0.098*	0.011	1,936	87.93**
France	−0.054*	0.005	773	−0.062*	0.005	816	13.79
Germany	−0.040*	0.006	2,617	−0.086*	0.006	2,551	73.67***
Greece	−0.093*	0.012	1,898	−0.117*	0.013	1,978	23.35
Hungary	−0.049*	0.009	1,766	−0.084*	0.007	1,817	53.77*
Iceland	−0.067*	0.010	4,436	−0.111*	0.010	4,663	49.19***
Ireland	−0.106*	0.006	1,185	−0.104*	0.007	2,016	−2.29
Israel	−0.033*	0.009	2,040	−0.061*	0.012	2,405	59.60*

Country	Boys			Girls			Difference
	b	se	*N*	b	se	*N*	%
Italy	−0.068*	0.010	1,799	−0.084*	0.009	1,847	20.16
Latvia	−0.063*	0.009	2,330	−0.101*	0.009	2,714	46.42*
Luxembourg	−0.044*	0.008	1,148	−0.092*	0.008	1,358	70.82**
Malta	−0.065*	0.020	962	−0.079*	0.016	1,004	19.90
Moldova	−0.036*	0.008	2,200	−0.079*	0.008	2,206	75.70**
Netherlands	−0.036*	0.010	1,644	−0.057*	0.009	1,801	44.90
North Macedonia	−0.080*	0.009	1,720	−0.103*	0.010	1,907	25.05
Norway	−0.074*	0.008	336	−0.091*	0.007	400	20.94
Poland	−0.053*	0.010	2,036	−0.109*	0.011	2,124	69.55***
Portugal	−0.014	0.010	1,856	−0.055*	0.011	2,089	117.85**
Romania	−0.043*	0.020	1,360	−0.083*	0.020	1,650	62.85*
Russia	−0.060*	0.010	1,702	−0.087*	0.008	2,234	37.42*
Scotland	−0.067*	0.013	2,444	−0.096*	0.012	2,614	35.77**
Slovenia	−0.076*	0.013	2,079	−0.124*	0.012	2,231	48.82**
Sweden	−0.052*	0.008	3,078	−0.102*	0.009	3,280	64.39***
Switzerland	−0.030*	0.014	994	−0.080*	0.014	1,014	90.44**
Wales	−0.060*	0.012	2,142	−0.090*	0.009	2,176	39.90**
Total	−0.052*	0.002	65,699	−0.087	0.002*	71,514	49.44***

Note: Percentage difference = $100 \times (b_{Girls} - b_{Boys}) / ((b_{Girls} + b_{Boys}) / 2)$. Level of significance for coefficients: * $p < 0.05$. Level of significance for difference: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Data from Belgium were sampled from the regions of Wallonia and Flanders separately (FL: Flanders; WA: Wallonia).
Source: HBSC 2013–2014 survey.