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Mobile Devices and Children's Development: The Case for School Restrictions

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Abstract *

The widespread use of mobile devices among adolescents has led many schools and governments to consider or implement restrictions on their usage. This study provides a comprehensive analysis of the effects of school cellphone policies on student outcomes, focusing primarily on student well-being and classroom dynamics. Using detailed micro-data from the 2022 Programme for International Student Assessment (PISA) across 81 countries, the study finds that stricter cellphone policies are associated with significant reductions in classroom distractions and lower levels of student-reported anxiety related to mobile-device use, even under mild enforcement conditions. Moreover, when bans are effectively enforced, measurable improvements in standardized test scores emerge, providing clarity to previously inconclusive findings in the literature. Subgroup analyses reveal limited heterogeneity, although private school students experience greater anxiety reductions. Policy recommendations emphasize the critical role of enforcement, the importance of targeted approaches tailored to school context and socioeconomic differences, and the necessity of continuous policy evaluation and adaptation.

JEL classifications: I21, I31, O33, J24

Keywords: mobile devices, child development, smartphone bans, student well-being, human capital

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1 Introduction

Mobile-device use by children and adolescents has become increasingly common, alongside growing concerns around the world regarding digital distraction in classrooms (Campbell et al., 2024). Teachers and parents are concerned that students are hurt by always-on connectivity in terms of their ability to pay attention and be engaged with their learning, and indeed experimental evidence does find that multitasking with mobile phones can have significant negative effects on students' learning-outcome performance (Chen and Yan, 2016). More broadly, excessive screen time has even been found to pose threats to student well-being, such as higher levels of stress, anxiety, and depression (Twenge and Campbell, 2018). Reacting to such concerns, school systems and governments have increasingly imposed policy to either limit students' use of smartphones during the day or to outright ban it from the school day to reduce distraction and refocus students on learning (Campbell et al., 2024).

However, the empirical evidence on the effectiveness of school cellphone policies is still scarce and inconclusive. Some research shows that banning phones may offer modest academic benefits. For instance, in a study analyzing the causal impact of banning students from using cellphones on academic achievement in English secondary schools, the authors found that banning cellphones led to a significant increase in a school's exam scores, especially among students who were lower-performing before the ban was implemented (Beland and Murphy, 2016). Similarly, a recent study in Spain found that students' scores increased after the introduction of local smartphone bans (Beneito and Vicente-Chirivella, 2022). Meanwhile, other research has been unable to detect an effect of school phone bans on measures of academic performance. Large-scale research in Sweden found no effect on students' test scores following a national-level smartphone ban (Kessel et al., 2020), in line with null findings from other contexts (Guldvik and Kvinnsland, 2018). Beyond test scores, recent quasi-experimental evidence from Norway shows declines in psychological healthcare utilization and bullying, and improvements in girls' GPA and academic-track enrollment, following

smartphone bans (Abrahamsson, 2024). Moreover, aside from this paper, few studies have examined outcomes beyond test scores, leaving uncertainties about how such policies affect daily classroom engagement or student well-being (Campbell et al., 2024). In short, it is still unclear if (or how) restricting students' in-school smartphone use translates into real improvements in their learning conditions or outcomes.

This paper addresses these issues by adopting a multifaceted approach. First, I present a conceptual framework and a review of the prior literature on mobile-device policies and student outcomes, synthesizing findings from both educational and psychological research. Next, I conduct an original empirical analysis using microdata from the 2022 Programme for International Student Assessment (PISA). Leveraging cross-country variation in PISA data, I examine whether schools that restrict students' use of smartphones exhibit differences in key outcomes such as classroom distractions, student anxiety, and academic achievement. I further complement these quantitative results with an overview of international policy experiences, describing how various countries have implemented school cellphone bans and the lessons learned from those initiatives. Finally, drawing on the combined evidence, I offer policy recommendations for educators and decision-makers seeking to manage digital distractions and improve student engagement.

My analysis yields several interesting findings. I find that school-wide cellphone bans are associated with a calmer, more focused classroom environment: Students in schools with phone restrictions report fewer distractions and off-task behaviors during lessons. I also observe suggestive benefits for student well-being, as indicated by lower self-reported anxiety levels in schools that limit smartphone use. When analyzing the correlation of cellphone bans and test scores, I do not find significant effects. However, when focused on schools in which the ban policy is more likely enforced (mediated by very low use of digital devices, including cellphones, by students at school), I find that students in "strict cellphone ban" schools exhibit significantly higher test scores in science, math, and reading. The correlations

are sizable, ranging from 0.09 to 0.1 standard deviations (SD).

While the analysis controls for a rich set of covariates and includes country fixed effects to mitigate potential confounding, it is based on cross-sectional variation and should therefore be interpreted with caution. The results reflect associations between cellphone bans and student outcomes, and although the specification helps address observable differences, unobserved heterogeneity affecting both policy adoption and outcomes may remain. As such, the findings are best viewed as indicative correlations rather than definitive causal estimates.

The rest of the paper is organized as follows: Section 2 presents the conceptual framework guiding the analysis, highlighting the key mechanisms through which cellphone use could affect students' outcomes. Section 3 reviews the existing literature, emphasizing both established findings and persistent gaps that motivate this research. Section 4 offers a contextual background, describing recent trends in Latin America and the Caribbean (LAC) regarding cellphone use policies in educational settings. Section 5 describes the methods, empirical strategy, and data sources used in the analysis. Section 6 presents the main empirical results, including heterogeneous effects. Section 7 discusses specific policy examples from recent experiences in developed and developing countries. Finally, Section 8 concludes the paper and summarizes the key findings alongside concrete policy recommendations.

2 Conceptual Framework

2.1 Definition of Mobile Devices in Context

I use the term *mobile devices* to refer to portable communication tools such as smartphones, tablets, and laptops with internet connectivity. In less-developed settings, this definition also encompasses inexpensive tablets and laptops that provide basic access to the internet and learning opportunities (Radesky et al., 2015). In today's smartphone-driven era, children

are increasingly engaging with digital media primarily through these devices. My study therefore considers the use of smartphones, tablets, and similar mobile screens, including laptops, among children and adolescents.

The data used in the empirical section of this paper refers mostly to cellphones ([OECD's Programme for International Student Assessment \(PISA\), 2022](#)). While questions about ownership refer to cellphones with internet access, other questions about distraction in class refer to the use of “digital resources” that includes smartphones and web apps.

2.2 Developmental Differences: Between the Child and Adolescent

There is a great deal of difference between children and adolescents. Children’s cognitive skills (working memory, self-regulation) are still developing and dependent on caregiver interactions for learning. Adolescents have developed cognitive capacities, are autonomous, and are influenced by peers through digital social spaces ([Twenge and Campbell, 2018](#)).

Teenagers are primarily engaging with devices for social media and communication, which puts them at significant risk for issues such as cyberbullying and social comparison ([Twenge and Campbell, 2018](#)). Younger children typically spend most of their time with screens in passive experiences that may replace important parent-child interactions that are essential for cognitive and social development ([Hill and Ameenuddin, 2016](#)). There is also evidence of stronger correlations of screen time with negative outcomes among adolescents, namely higher likelihoods of anxiety and depression ([Twenge and Campbell, 2018](#)).

However, as discussed below, [Cunha and Heckman \(2007\)](#) suggest that adolescent skills remain sufficiently malleable to justify educational and policy efforts aimed at this age group.

2.3 Cognitive Mechanisms: Attention, Load, and Multitasking

Cognitive development is affected by use of mobile devices through attention and information processes. Cognitive load theory (CLT) explains how unremitting streams of stimuli from devices can exceed limited working memory capacity. Notifications and multitasking also create irrelevant cognitive load, which diminishes learning effectiveness and long-term memory formation (Sweller, 1988).

Similarly, media multitasking breaks up sustained attention and executive function. Ophir et al. (2009) demonstrate that individuals who engage more frequently in media multitasking have worse attentional control and are more distractible. Teenagers who multitask a lot (e.g., doing homework while texting) tend to have weaker sustained attention skills, a core ability important for academic achievement (Twenge and Campbell, 2018). Chronic inattention can result in cumulative memory, problem-solving, and academic learning decrements.

2.4 Socio-Emotional Mechanism: Social Exposure and Well-Being

Mobile phones affect emotional and social development primarily by displacing direct interpersonal contact. Reduced face-to-face interaction limits opportunities to develop social skills, empathy, and emotional regulation. Prior research documents that intensive use of media devices is associated with diminished social interaction, sleep disturbances, and, in turn, poorer language and socio-emotional development in young children (e.g., Twenge and Campbell, 2018).

Adolescents face additional risks linked to digital and screen-based interactions, including cyberbullying, social comparison, and psychological distress arising from exposure to curated social media content. Evidence shows that heavy users of digital media report greater loneliness, weaker social skills, and higher prevalence of depression, anxiety, and suicide-related outcomes (Twenge and Campbell, 2018, 2019). Mechanisms behind these associations in-

clude sleep deprivation, heightened social comparison, and online victimization, all of which undermine emotional well-being and academic adjustment.

While moderate device use for educational or supportive purposes can be beneficial, excessive or unregulated exposure amplifies socio-emotional risks (Twenge and Campbell, 2019). My conceptual model therefore views mobile devices as a medium that can influence children through cognitive overload, distraction, and socio-emotional displacement.

2.5 Mobile Devices and the Skill Formation Paradigm

These psychological processes also relate to Cunha and Heckman's (2007) economic model of skill formation. In their model, skill accumulation (cognitive skill and non-cognitive skill) are path-dependent, as initial skill growth improves the acquisition of later skill (self-productivity) and early investments are more productive for later investments (dynamic complementarity) (Cunha and Heckman, 2007).

Although Cunha and Heckman (2007) emphasize early childhood as the most critical and sensitive period for skill formation and intervention effectiveness, they also highlight adolescence as a stage in which skills remain sufficiently malleable. However, the returns to investments during adolescence are typically lower compared to those made during early childhood. This suggests that educational and policy interventions targeting adolescents can still be beneficial, albeit potentially less impactful than those directed at younger children.

Exposure to mobile devices harms cognitive functions primarily because it interferes with attentional and working memory attributes, both of which are critical in learning at school. Loose use diminishes the overall efficacy level of education inputs (school teaching, parent intervention) and weakens the rate of learning of academic content. Continuous disruption and cognitive overloading therefore erode the skill-forming return over time.

Non-cognitive skills – self-discipline, deferred gratification, social competence – are affected

as well. Electronic-screen time’s instant reward power lessens patience and persistence, which are self-regulation’s foundation. Less face-to-face interaction also makes for a less-developed socio-emotional skillset (empathy, conflict resolution), hindering overall non-cognitive formation (Twenge and Campbell, 2018). These cumulative negative inputs, especially early in life, result in persistent skill gaps, suggesting it may be important to think about the impact of mobile devices in the economic sectors relevant for human capital accumulation.

These mechanisms are summarized in Figure 1. Mobile devices affect cognitive and socio-emotional pathways as well as cognitive and non-cognitive skills that underpin educational performance. This multidimensional impact highlights the complexity of device influence on child development.

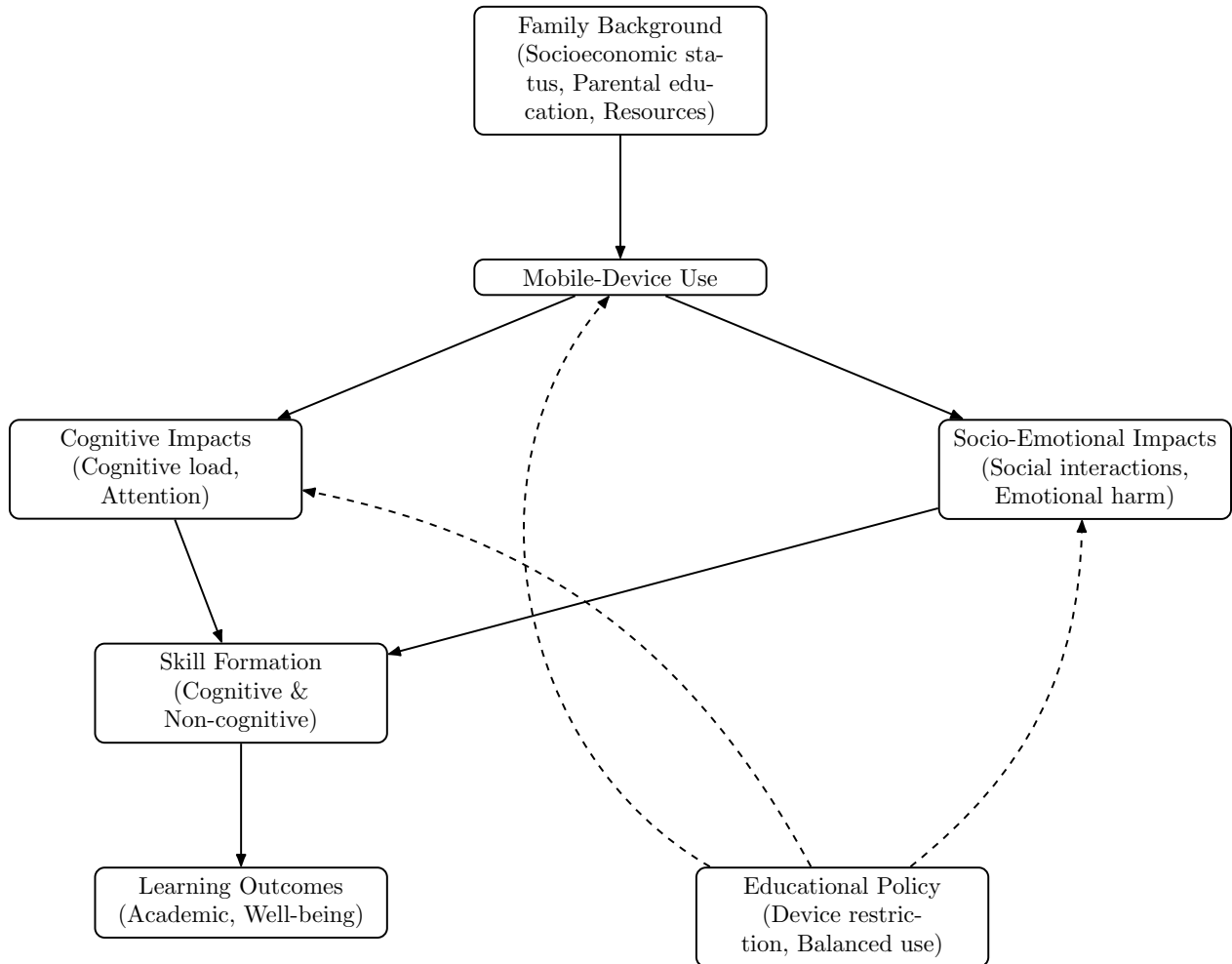
3 Literature Review

3.1 Effects of Mobile Devices on Child Development

The literature on the effects of mobile devices on children’s cognitive and socio-emotional development is expanding rapidly, with mixed and nuanced results.

Several recent meta-analyses have identified both positive and negative effects of children’s mobile-device use. Proekt et al. (2024), in a highest-level meta-analysis combining 29 earlier meta-analyses (2014–2023), report a statistically significant moderate positive association with education. This suggests that mobile devices can enhance learning when appropriately integrated into formal education settings. The results exhibit substantial heterogeneity, with effect sizes varying by type of intervention, educational context, and outcome measures, as documented in the subgroup analyses reported by the authors. However, the selection criteria for the included meta-analyses are not fully documented, making it difficult to assess the types of studies included or excluded and their identification strategies.

Figure 1: Conceptual framework: Mobile devices and child development



Note: Mobile-device use influences intermediate mechanisms (cognitive load/distraction and social/emotional factors), which affect the development of cognitive and non-cognitive skills. These skills in turn determine learning and developmental outcomes. Policy interventions (e.g., school device rules) can moderate the link between device use and these mechanisms.

On the other hand, some systematic reviews and meta-analyses have emphasized potential negative outcomes associated with excessive or unsupervised device usage. [Girela-Serrano et al. \(2024\)](#) systematically reviewed 25 observational studies – 10 cohort studies and 15 cross-sectional – finding suggestive evidence that prolonged mobile phone use is associated with poorer mental health, including more symptoms of anxiety and depression, as well as sleep problems among adolescents. The review follows PRISMA guidelines and provides the complete list of included studies, which facilitates the assessment of study characteristics.

Similarly, [Sohn et al. \(2019\)](#), in a meta-analysis of 41 studies – 3 cohort and 38 cross-sectional – reports that problematic smartphone use is significantly related to depression, anxiety, and poor sleep quality among young individuals. However, this review does not provide the full list of included studies, making it harder to fully evaluate study comparability. In both cases, the predominance of cross-sectional designs constrains the scope for causal inference.

Complementing these findings, [Sunday et al. \(2021\)](#) conduct a meta-analysis of 33 studies on smartphone addiction and academic performance, reporting a moderate and statistically significant negative correlation. This review explicitly states its inclusion and exclusion criteria – requiring clear definitions of smartphone addiction, quantitative measures of academic performance, and exclusion of non-English or purely theoretical studies – and provides the full list of included studies. The authors note that heterogeneity in measurement and the correlational nature of the evidence limit the strength of causal claims.

In a broader review of screen time impacts on child development, [Panjeti-Madan and Ranganathan \(2023\)](#) concluded that outcomes varied substantially depending on the type and context of screen exposure. Cognitive, linguistic, physical, and socio-emotional domains were all potentially influenced by mobile-device use, with educational and supervised interactions generally yielding positive outcomes. In contrast, unstructured, excessive, and unsupervised usage led to negative effects.

Most of the articles reviewed above analyze evidence for developed countries. At the global level, [Jain and Stemper \(2024\)](#) use PISA microdata from 82 countries and a difference-in-differences design exploiting the staggered rollout of 3G to show that expanded mobile internet access reduces achievement in mathematics, reading, and science by roughly 0.04–0.07 standard deviations (0.07 SD in math, 0.05 SD in reading, 0.04 SD in science). They also document declines in socio-emotional outcomes – lower reported ease of making friends and sense of belonging – on the order of 0.05–0.16 standard deviations.

In Latin America, [Celhay et al. \(2024\)](#) provide evidence from Chile showing dual effects of

exposure to mobile internet: Urban children experienced beneficial cognitive effects (e.g., receptive vocabulary) but also harmful socio-emotional effects (more behavior problems). In Uruguay, exposure to high-speed fiber-optic internet (FTTH) significantly reduced early childhood development scores, especially in interpersonal, problem-solving, and socio-emotional skills, with stronger effects for girls and children of highly educated caregivers (Colombo and Failache, 2023).¹

3.2 Effects of Mobile-Device Restrictions in Schools on Academic Performance and Mental Health

School-based mobile phone policies have received much attention from researchers and educators due to their potential effects on student learning and well-being. In a comprehensive scoping review, Campbell et al. (2024) synthesized evidence from 26 peer-reviewed empirical studies on school-based mobile phone restrictions, clearly documenting inclusion and exclusion criteria and providing a full list of the studies assessed. The review includes both longitudinal and cross-sectional designs, with substantial heterogeneity in contexts and methodologies. The authors report ambiguous findings regarding academic achievement: Some studies document gains – particularly for low-performing and low-SES students – consistent with reduced classroom distractions, while others find no significant effects. This suggests that the effectiveness of phone bans is highly context-dependent, potentially influenced by the strictness of enforcement and baseline levels of in-school device use.

Among the studies using stronger identification strategies, Beland and Murphy (2016) exploit a quasi-experimental design comparing student achievement before and after mobile phone

¹Although unrelated to mobile phones, other large-scale technology initiatives in Latin America also show mixed effects. In Ecuador, a randomized trial by Carrillo et al. (2011) on computer-assisted math instruction found positive but uneven impacts, stronger for higher-performing children and small for language. Peru’s widely publicized One Laptop per Child (OLPC) program yielded no gains in reading or math scores but small improvements in broader cognitive skills (Cristia et al., 2017). A comparable initiative in Costa Rica had no impact on academic learning despite increasing home computer use, which may have displaced homework and outdoor activities (Meza-Cordero, 2017).

bans across English schools. They find small but significant gains, concentrated among initially low-performing students, suggesting that reducing in-class distractions can help narrow achievement gaps. Similarly, [Abrahamsson \(2024\)](#) apply a staggered difference-in-differences event study to Norwegian middle schools based on self-reported smartphone ban implementation dates from school principals. They report mild reductions in psychological consultations among girls, lower bullying for both genders, and improvements in girls’ academic outcomes – especially in math and among those from lower socioeconomic backgrounds. However, many estimates are only marginally significant, and no robust effects are found for boys.

By contrast, other studies based on observational designs have found null or inconsistent results. For example, [Kessel et al. \(2020\)](#) examined the impact of bans on high-stakes test scores in Sweden and found no discernible effects on school-level average test outcomes.

With respect to mental health outcomes, the evidence is similarly mixed in [Campbell et al. \(2024\)](#). Some scholars posit that limiting mobile phone use at school may contribute to student well-being by reducing stress from constant connectivity and curbing cyberbullying during school hours. However, empirical support for these claims remains inconclusive. For example, the UK-based “SMART Schools” evaluation [Goodyear et al. \(2025\)](#) found no clear benefits of phone restrictions for students’ mental well-being and no improvements in overall phone/social-media use or academic outcomes. Although students reduced phone use during school hours, overall use did not decline – consistent with displacement to out-of-school periods. Given the cross-sectional design of SMART Schools (30 schools), the study cannot isolate causal effects, so its findings should be interpreted with caution.

In conclusion, while excessive or problematic smartphone use is associated with poorer academic performance and mental health outcomes ([Girela-Serrano et al., 2024](#); [Sohn et al., 2019](#); [Sunday et al., 2021](#)), the evidence on school-based restriction policies remains limited and mixed. The most consistent academic gains are observed among lower-achieving students, as shown in the UK context by [Beland and Murphy \(2016\)](#), and these benefits appear

strongest where bans are strictly enforced rather than merely announced (Campbell et al., 2024; Kessel et al., 2020; Goodyear et al., 2025). By contrast, clear and robust improvements in mental health outcomes have yet to be demonstrated.

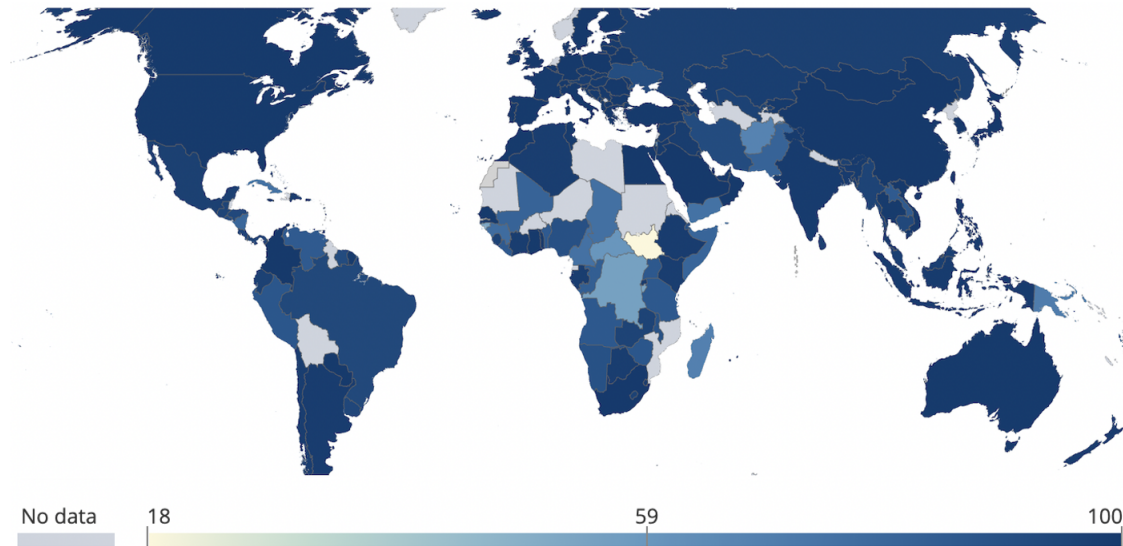
4 Contextual Background: Trends in LAC

4.1 The Local Digital Connectivity and Mobile Access Situation

Digital infrastructure in Latin America has seen significant growth over the last decade, with mobile network coverage reaching national scale. By 2023, the vast majority of countries in the region report more than 90% of their population living in areas served by at least a 3G mobile signal (Figure 2), on par with or higher in some cases than many global averages. This broad network coverage owes to huge investments in telecommunications, and it means that even the poorest or most isolated areas are as much as ever covered by basic mobile internet infrastructure. Around 96% of the population in Latin America have access to a mobile broadband network in 2021, consuming the majority of their internet traffic using mobile (GSMA, 2022).

With the turning tide of adoption, mobile devices are now nearly universal among all demographic cohorts. Mobile subscriptions, in Latin America, have long surpassed the population size, and records kept reveal that nearly 89% of 15-year-old students own smartphones, answering the question about today’s Latin America youth being the digital generation (Demombynes and Urbe, 2024). Yet even though the population is well-equipped with devices, the quality of mobile connections in actual use can differ widely by region and socioeconomic status.

Figure 2: Population Coverage, at least 3G in 2023 (World Bank)

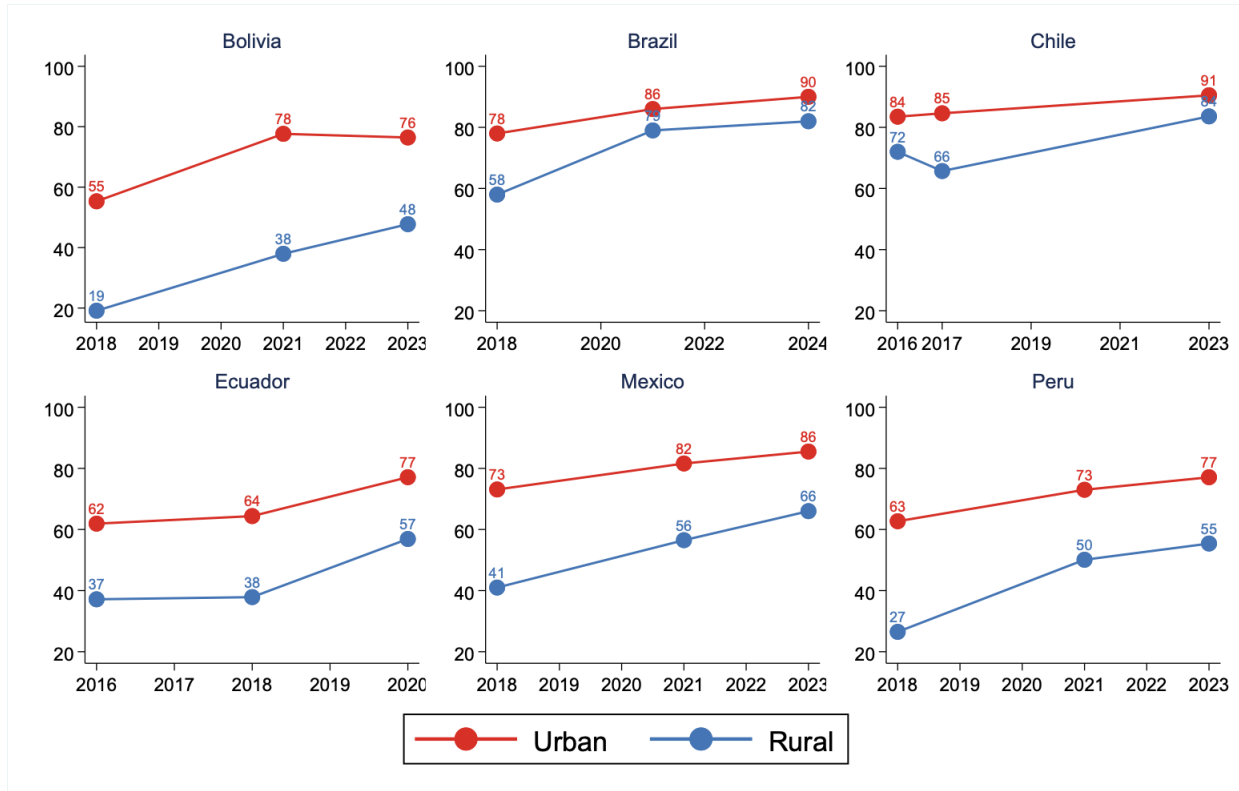


4.2 Urban-Rural and Socioeconomic Differences in Access

Although overall coverage has improved, Latin America continues to exhibit digital divides closely linked to geography and income. By 2020, only about 33% of the rural population had internet access, compared with 71% of the urban population, leaving roughly 77 million rural residents unconnected (Ziegler et al., 2020). As shown in Figure 3, rural connectivity remains substantially lower than in urban areas. In Bolivia and Peru, for example, rural internet use barely reached 55%, trailing urban rates by more than 20 percentage points. Encouragingly, the gap is smaller in countries such as Brazil and Chile (Ziegler et al., 2020).

Socioeconomic inequalities further deepen the digital divide. PISA results highlight a stark disparity in access to home technology: only 45% of underprivileged students report having internet at home, compared with 98% of their more privileged peers (OECD, 2019). These inequities became painfully evident during the COVID-19 pandemic, when it was clear that low-income and rural students faced significant barriers to accessing digital learning resources (Rieble-Aubourg and Viteri, 2020). The divide is not only about access to technology, but also about the skills required to use and navigate digital resources effectively, adding yet

Figure 3: Internet use in urban versus rural areas in selected countries



Sources: Encuesta de Hogares (Bolivia); Encuesta de Usos de Tecnologías de la Información y la Comunicación en los Hogares Brasileños (Brazil); VIII-X Encuesta de Acceso y Usos de Chile (Chile); Encuesta Multipropósito (Ecuador); Encuesta Nacional sobre Disponibilidad y Uso de Tecnologías de la Información en los Hogares (Mexico); Encuesta Residencial de Servicios de Telecomunicaciones (Peru).

Note: The graph shows the percentage of people who used the internet in the three months preceding the survey, except for Ecuador (12 months) and Peru (no reference period was set). The age range for the population included in the calculation of this statistic varies from country to country, ranging from people aged 5 years and older in Bolivia and Ecuador to over 16 years old in Chile.

another layer to existing educational inequities.

4.3 Schools and the Use of Technology and Devices

Access to technological tools is unequal globally, particularly in Latin America. Only about one-third of schools in the region report adequate internet bandwidth for educational purposes, with rural institutions experiencing even lower connectivity rates (Rieble-Aubourg and Viteri, 2020).

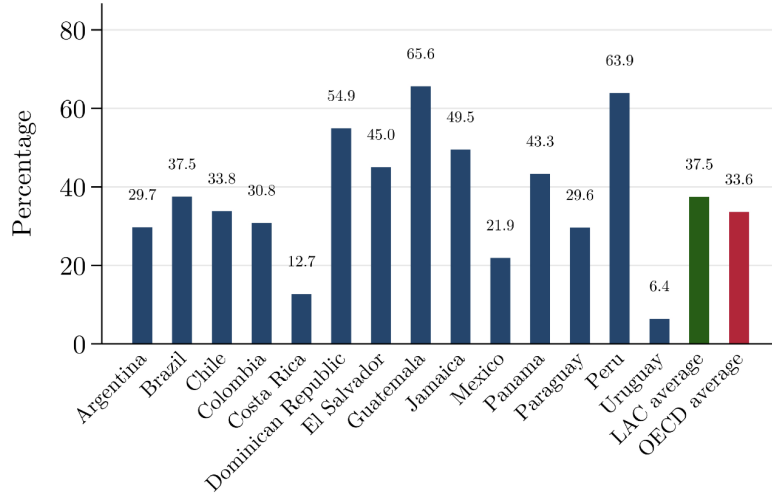
In Latin America, cellphone policies within schools are very diverse. Approximately 37% of students reported having attended schools where phone ban policies were in place – modestly above the OECD average (see Figure 4a). While countries like Uruguay seldom use cellphone bans, more widespread are those at the other end of the scale, ranging from Jamaica to Peru. Justification for these prohibitions often list distractions and cyberbullying; however, discussion also continues over the effectiveness and possible unintended negative consequences banning cellphones might have on digital skill sets.

As shown in Figure 4b, digital-device usage for learning among Latin American students averages 1.6 hours daily at school, below OECD averages (OECD, 2020). This limited integration stems partly from concerns about classroom distraction and, to a lesser extent, insufficient technical infrastructure and pedagogical frameworks in schools. The lack of in-service teacher training in digital education methods and curriculum integration further constrains the effective use of technology in educational settings.

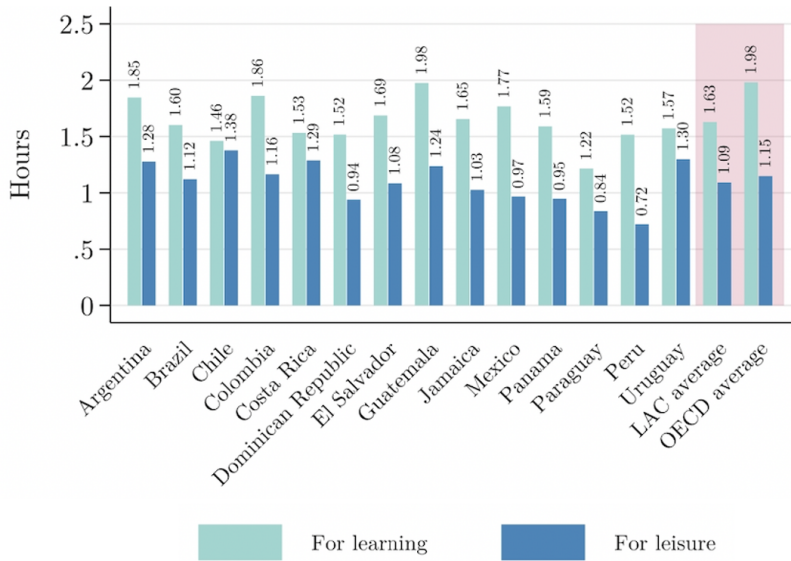
In addition, such initiatives to foster digital literacy and device integration in education, like Uruguay’s “Plan Ceibal”, have been of mixed success depending on the country in which they were implemented, the readiness of the infrastructure, and the support from institutions. These experiments illustrate the promise of technology-mediated instruction, but they also point to daunting challenges that can be addressed only through coherent policymaking and sustained investment in infrastructure and people.

In other words, the educational landscape of Latin America is one where digital connectivity is broadly available but unevenly distributed. Despite rapid advances to infrastructure that expand opportunities for digital participation, persistent inequities, low levels of digital literacy, and incomplete integration in schools still hamper efforts to ensure that educational technology is adopted in an equitable way. To meet these challenges, special policy interventions, infrastructure investments, and teacher training are needed to make the most of the potential of digital technology.

Figure 4: Cellphone bans and digital-device usage in Latin America



(a) Cellphone Ban Policies



(b) Digital-Device Usage at School

5 Data and Methods

5.1 Data

This paper uses data from the 2022 Programme for International Student Assessment (PISA), a cross-national assessment administered by the OECD. The sample covers the 15-year-old student population across 81 countries.

An important feature of PISA 2022 is its rich microdata: Beyond standardized test scores in reading, mathematics, and science, it includes a comprehensive student questionnaire on behavioral, socio-emotional, and digital-device use aspects. I focus on seven constructs: self-reported anxiety about mobile-device separation (*anxious*); feeling pressured to respond to messages during class (*pressured*); classroom distraction due to device use (*distracted*); visible phone use during school hours (*open cell*); turning off notifications from social networks and apps during class (*notifications*); total screen time at school for leisure reasons (*screen time*); and life satisfaction. Except for *screen time* (measured in hours), variables are recoded as binary indicators for interpretability; life satisfaction is measured on a 0–10 scale. The exact item definitions are in Appendix Table [A.1](#).

These variables provide a multidimensional view of how mobile-device use may affect students. Self-reported anxiety about device use (*anxious*) and feeling pressured to respond to messages during class (*pressured*) captures mechanisms related to the fear of missing out (FOMO), which has been linked to problematic smartphone use and psychological distress ([Przybylski et al., 2013](#); [Yildirim and Correia, 2015](#); [Elhai et al., 2016](#)). Classroom distraction (*distracted*) measures attentional costs associated with multitasking and interruptions. Open cellphone use during school hours (*open cell*) indicates the visibility and frequency of device use in the school context, regardless of institutional rules. Screen time for leisure purposes at school (*screen time*) provides an overall indicator of exposure intensity, complementing behavioral measures. Finally, the inclusion of life satisfaction is motivated by the significant

drop in life satisfaction among Latin American students participating in PISA between 2015 and 2022 and its potential relationship with the increase in the adoption of smartphones (Demombynes and Urbe, 2024).

Table 1 shows some descriptive statistics of the estimation sample. The public-use student file contains 613,744 records with valid weights; my analytic sample – after merging with the school questionnaire and applying listwise deletion of missing covariates – includes 517,213 students. Notably, approximately 50% of students reported anxiety or nervousness due to separation from their mobile phones, indicating that mobile phone separation was widespread among adolescents. Complementarily, approximately 61% of students stated that they were frequently distracted by digital devices while in class, thus confirming that the consideration of distraction as a barrier to classroom learning was particularly relevant. Even though 73% of students reported turning off notifications, 57% checked their cellphones and spent 1.1 hours for leisure purposes at school.

The PISA 2022 survey has another advantage in that it is able to collect detailed school-level data via principal questionnaires, with the explicit inclusion of information on school policies on mobile phone use. Specifically, principals indicate whether their school has a policy banning cellphones. About 42% of schools in the sample (7,867 out of 18,445) declare that the use of cellphones is prohibited at school. This is a key variable in my study as it measures institutions’ implementation of ways to reduce mobile phone distractions.

In addition, the detailed data enables an analysis of completion behavior. Indeed, for instance, despite bans in place, 29% of students report using their phone “lots” at school, emphasizing how policy enforcement is faced with realistic challenges and that what counts is not policy alone, but actual behavior next to policy.

The wide and rich PISA 2022 dataset provides some advantages for the analysis. The detailed well-being and behavioral measures, the direct mobile-media-use measures, and the rich school-level policy information enables implementation of a sound observational empir-

Table 1: Descriptive statistics by region (PISA 2022)

	ALL		LATAM		OECD	
	Mean	SE	Mean	SE	Mean	SE
<i>Panel A: Outcome variables</i>						
Anxious	0.505	0.001	0.440	0.002	0.477	0.001
Pressured	0.386	0.002	0.275	0.002	0.317	0.001
Distracted	0.613	0.001	0.731	0.003	0.579	0.002
Open cell	0.572	0.002	0.596	0.002	0.552	0.002
Screen time (hours)	1.109	0.003	1.068	0.006	0.998	0.003
Notifications	0.732	0.001	0.706	0.002	0.769	0.001
Life satisfaction	6.875	0.006	6.928	0.010	6.556	0.006
Math	422.163	98.258	390.940	74.073	471.820	98.753
Reading	423.850	107.516	418.743	92.764	476.895	102.195
Science	435.867	103.546	414.598	86.321	486.406	102.430
<i>Panel B: Covariates</i>						
Students' age	15.812	0.001	15.838	0.001	15.801	0.001
Male student	0.490	0.001	0.480	0.001	0.492	0.001
ESCS index	-0.000	0.004	-0.176	0.006	0.479	0.004
Student-teacher ratio	18.337	0.090	24.490	0.224	16.166	0.114
Private school	0.216	0.002	0.202	0.003	0.203	0.002
% of full-time teachers	82.649	0.174	64.766	0.446	84.804	0.201
% of fully certified teachers	73.365	0.253	66.382	0.558	78.116	0.359
Average minutes in a class	57.996	0.206	62.395	0.423	55.266	0.179
School: Urban location	0.430	0.003	0.493	0.006	0.507	0.004
School: Town location	0.464	0.004	0.417	0.006	0.443	0.004
School: Rural location	0.106	0.003	0.091	0.004	0.050	0.002
Observations	517213		64123		256755	

Notes: weighted statistics with PISA 2022 survey design. OECD reference group comprises all OECD members that participated in PISA 2022 (i.e., all except Luxembourg). The Latin America and Caribbean (LATAM) subsample includes Argentina, Brazil, Chile, Colombia, Costa Rica, the Dominican Republic, Guatemala, Jamaica, Mexico, Panama, Peru, Paraguay, El Salvador, and Uruguay.

ical strategy. Controlling for a rich set of individual, school, family, and student factors, including family income, parental education, school resources, educational practices, and country fixed effects, this study disaggregates the association between school mobile phone policies and student outcomes.

Moreover, a standardized administration of questionnaires is conducted in all countries participating in the study, which guarantees comparability and coherence of the collected data and thus increases my confidence in cross-national analyses. The structure of the dataset allows for the use of fixed-effects regression techniques, thereby helping to control for biases associated with unobserved confounders.

Table 2 presents descriptive statistics comparing characteristics of schools with and without cellphone ban policies. While several differences are statistically significant, most are relatively small in magnitude. Schools with cellphone bans have lower student-teacher ratios (17.3 vs 19.1, significant at 1%), serve populations with slightly lower average socioeconomic status (ESCS: -0.061 vs 0.009, significant at 5%), and have shorter class periods (56.5 vs 59.0 minutes, significant at 1%). They are also more likely to be private institutions (28.5% vs 16.9%, significant at 1%). These differences suggest that ban adoption varies across school types, but the magnitudes are generally modest (except for private/non-private schools) and all these characteristics are controlled for in the regression analyses.

In conclusion, the broad coverage, detailed behavioral data, explicit policy indicators, and multi-level nature of the PISA 2022 dataset make it particularly well-suited for examining the relationship between school mobile phone policies and student behaviors, emotional health, and academic attainment.

Table 2: Balance Table, schools with and without cellphone bans

Variable	Ban=0	(SE)	Ban=1	(SE)	Dif.	(SE)
Age (years)	15.815	(0.002)	15.808	(0.003)	-0.007	(0.004)
		[280,702]		[200,627]		
Male student	0.486	(0.003)	0.495	(0.005)	0.009	(0.006)
		[280,663]		[200,613]		
Grade level (international)	9.774	(0.008)	9.710	(0.011)	-0.065***	(0.017)
		[272,236]		[194,789]		
Socioeconomic status (ESCS index)	0.009	(0.016)	-0.061	(0.021)	-0.071**	(0.032)
		[279,491]		[199,820]		
Student-teacher ratio	19.100	(0.258)	17.261	(0.292)	-1.839***	(0.418)
		[251,019]		[185,635]		
Ratio of full-time teachers	81.940	(0.486)	83.737	(0.633)	1.797**	(0.861)
		[253,218]		[189,493]		
Ratio of certified teachers	74.359	(0.810)	71.910	(1.053)	-2.449	(1.546)
		[229,352]		[172,500]		
Private school	0.169	(0.008)	0.285	(0.013)	0.116***	(0.019)
		[262,406]		[186,516]		
Minutes per class	58.964	(0.594)	56.489	(0.599)	-2.475***	(0.869)
		[277,059]		[197,042]		
Urban school	0.443	(0.010)	0.413	(0.012)	-0.030*	(0.017)
		[276,905]		[197,279]		
School located in town	0.471	(0.011)	0.447	(0.012)	-0.024	(0.017)
		[276,905]		[197,279]		

Notes: Number of observations in square brackets. Robust standard errors in parentheses computed using PISA's balanced repeated replication (BRR) with Fay's adjustment factor = 0.5 and 80 replicate weights. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

5.2 Methods

My empirical strategy follows a standard observational approach in the education literature (see, e.g., [Beland and Murphy, 2016](#)) and consists of estimating ordinary least squares (OLS) regression models with country fixed effects. In particular, I exploit within-country variation in schools' cellphone policies to identify the association between a ban and student outcomes, while netting out cross-country differences in educational contexts.

Formally, the regression model can be represented as follows:

$$Y_{ijc} = \alpha + \beta \text{Ban}_{jc} + \mathbf{X}'_{ijc} \mathbf{\Gamma} + \mathbf{Z}'_{jc} \mathbf{\Phi} + \lambda_c + \varepsilon_{ijc}, \quad (1)$$

where Y_{ijc} denotes the outcome for student i in school j located in country c . The variable Ban_{jc} is a binary indicator equal to one if school j implements a cellphone ban policy and zero otherwise. The parameter β represents the average difference in outcomes between students in schools with a cellphone ban and those without, conditional on the control variables and country fixed effects.

The student-level controls \mathbf{X}_{ijc} include the student's age (in months), sex, grade (year of schooling at age 15), and socioeconomic status, as measured by PISA's index of economic, social, and cultural status (ESCS). The school-level controls \mathbf{Z}_{jc} encompass a rich set of characteristics that could confound the relationship between phone policy and outcomes: These include the school type (an indicator for private vs. public school), the student-teacher ratio, the percentage of teachers in the school who are employed full-time, the percentage of teachers holding formal teaching certification, the school's location (urban vs. rural), and the average class length (duration of class periods). By conditioning on this wide range of covariates, I account for many observed differences in student background and school resources or environment that might influence both the likelihood of implementing a phone ban and student outcomes. In addition, the inclusion of country fixed effects λ_c absorbs all

unobserved heterogeneity across countries – such as differences in national education policies, cultural norms, or other country-specific factors – so that the estimator for β leverages only within-country comparisons of students in schools with differing cellphone policies. Thus, the identification relies on contrasting students between ban vs. non-ban schools within the same country, after purging systematic differences due to observable characteristics.

The identifying assumption underlying this OLS strategy is that, conditional on the exhaustive set of controls and country fixed effects, the assignment of a cellphone ban policy at the school level is exogenous to unobserved determinants of the student outcomes. While this assumption is untestable, I mitigate concerns about selection bias by controlling for an unusually rich array of covariates captured in the PISA dataset. It is worth noting that my approach is cross-sectional (since PISA 2022 provides a one-time snapshot), and thus I rely on “selection on observables” rather than on a natural experiment or panel variation.

The analysis employs balanced repeated replication (BRR) with Fay’s adjustment (coefficient = 0.5) to account for PISA’s complex sampling design ([OECD, 2023](#)). BRR-based standard errors implicitly and robustly account for intra-cluster correlation within schools without assuming a specific correlation structure. In contrast, conventional clustered standard errors explicitly assume arbitrary correlation among observations within clusters and independence across clusters ([Cameron and Miller, 2015](#)).

My empirical strategy is consistent with the literature on the educational effects of digital-technology policies. Multiple of the studies included in a recent review by [Campbell et al. \(2024\)](#) rely on observational fixed-effects strategies (or quasi-experimental designs) to identify the effects of school mobile phone bans. That review, which summarized evidence from 22 studies of cellphone bans (mostly in high-income countries), found that banning students’ phones does not necessarily increase academic performance in the classroom, though the impact will be different between contexts and subgroups of students.

6 Results

6.1 Non-Cognitive and Behavioral Outcomes

The analysis reported in Table 3 examines the association between school policies on banning cellphones and several dimensions of students' well-being and on their behavioral outcomes, using data from the 2022 round of PISA. As described in section 5.2 within a regression model, the estimates account for an extensive set of student background variables (age, gender, socioeconomic status) as well as school-level characteristics (student-teacher ratio, school type, ratio of full-time and certified teachers, international grade level, urban vs. rural), and class-level characteristics (class duration). Country fixed effects are also included to control for unobservable heterogeneity within countries.

The outcome variables analyzed are screen time at school for leisure (screen time), having the device open in class to take notes or search for information (open cell), turning off notifications from social networks and apps during class (notifications), anxiety when a digital device is not nearby (anxious), distraction in mathematics class due to peers' use of digital devices (distracted), feeling pressured to be online and answer messages during class (pressured), and overall life satisfaction on a 0–10 scale (life satisfaction).

The findings suggest that school cellphone-ban policies are significantly associated with student outcomes. Cellphone bans correlate negatively with screen time, how many times students open their cellphones in class (open cell), the frequency of turning off notifications from social networks and apps during class (notifications), student anxiety when digital devices are not near, distraction in math class due to use of digital devices (distracted), and feeling pressured to be online and answer messages in class (pressured). On the other hand, I find no significant correlation between cellphone bans and life satisfaction. The largest effect sizes are on screen time and how many times the student open their cellphones with estimated effects of -0.102 and -0.101, respectively, that are significant at the 1% level. The decrease in

Table 3: Effect of cellphone bans on student behavior and well-being, all countries

Panel A: Without covariates							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Screen Time	Open Cell	Notifications	Anxious	Distracted	Pressured	Life Satisfaction
Cellphone ban	-0.187*** (0.015)	-0.162*** (0.008)	-0.036*** (0.006)	-0.031*** (0.005)	-0.108*** (0.007)	-0.067*** (0.008)	-0.105*** (0.029)
R-squared	0.003	0.026	0.002	0.001	0.012	0.004	0.000
Observations	481329	357367	360707	362033	325470	348414	424267
Panel B: With covariates							
Cellphone ban	-0.172*** (0.018)	-0.155*** (0.008)	-0.034*** (0.006)	-0.030*** (0.006)	-0.086*** (0.008)	-0.065*** (0.009)	-0.102*** (0.032)
R-squared	0.009	0.037	0.025	0.013	0.031	0.014	0.030
Observations	359781	264385	267256	268430	243800	257051	339973
Panel C: With covariates and country fixed effects							
Cellphone ban	-0.102*** (0.017)	-0.101*** (0.007)	-0.023*** (0.007)	-0.033*** (0.006)	-0.067*** (0.008)	-0.047*** (0.006)	0.028 (0.025)
R-squared	0.042	0.088	0.049	0.051	0.113	0.107	0.073
Observations	359781	264385	267256	268430	243800	257051	339973
Mean of dependent variable							
	1.109	0.572	0.732	0.505	0.613	0.386	6.875

Notes: Panel A reports results without control variables. Panel B includes control variables: age, gender, international grade level, socioeconomic status (ESCS), student-teacher ratio, share of full-time teachers, share of certified teachers, private school indicator, minutes per class, and school location (urban/town). Panel C adds country fixed effects to the specification in Panel B. All regressions use PISA survey weights and account for the complex survey design. Standard errors in parentheses. *p<0.10, **p<0.05, ***p<0.01.

distraction (-0.067), pressure (-0.047), and anxiety (-0.033), though of lower point estimates, are also statistically significant at 1%.

Appendix Table B.1 reports results for Latin American (LATAM) countries, which mirror the full-sample pattern except for notifications, where the correlation is not statistically significant.

In sum, the analysis highlights that introducing cellphone-ban policies in schools is correlated with measurable gains in student well-being and classroom conduct, mainly due to reductions in distraction, stress, pressure, and anxiety, according to the variable definitions provided earlier. These findings provide policymakers and practitioners working with students empirical support for improving learning environments through focused interventions.

6.2 Academic Achievement Outcomes

Next, I examine the relationship between cellphone bans and academic performance. Table 4 presents regression estimates for students' standardized test scores in science, reading, and math. As can be seen, there is no evidence of any improvement in test scores associated with school cellphone bans. In the full sample (columns 1–3 of Table 4), the coefficients on the ban indicator are negative (around -1.6 to -2.4 PISA points in each subject) and not statistically significant. These point estimates are very small, on the order of 0.02 standard deviations given PISA's scale, and cannot be distinguished from zero. The Latin American subsample shows a similar lack of clear academic benefits: The estimated effects on science and reading scores in Latin America are also near zero and not significant. For math scores in Latin America, the ban coefficient is about -5 points, which corresponds to 0.05 standard deviations, and is marginally significant at the 10% level. However, this isolated slight negative correlation should be interpreted with caution, as it may reflect noise or context-specific factors rather than a robust impact. Overall, the results suggest that prohibiting student cellphone use (as declared by school principals) at school has no significant short-run

effect on standardized academic achievement in reading, math, or science.

My null effects on test scores are consistent with [Campbell et al. \(2024\)](#), who, in a recent review of 22 studies, report that banning phones *per se* does not consistently boost academic performance across contexts. However, earlier quasi-experimental evidence from high-income settings had pointed to potential academic gains from restricting phone access. For example, [Beland and Murphy \(2016\)](#) found that banning mobile phones in UK secondary schools led to significant increases in student exam scores, with particularly large benefits for low-achieving students.

One plausible explanation for the absence of significant test score improvements in response to cellphone bans relates to the potential challenges associated with enforcing cellphone ban policies effectively. In practice, comprehensive and continuous monitoring of students' cellphone usage can pose significant difficulties for teachers, particularly in classrooms that are large or resource-constrained, as is common in many educational settings in Latin America ([Cristia and Vlaicu, 2022](#); [Ravizza et al., 2016](#)). For instance, [Ravizza et al. \(2016\)](#) document that despite formal prohibitions, students often continue to engage in off-task digital activities, limiting the academic effectiveness of technology-related policies. Moreover, [Gentile et al. \(2012\)](#) highlight the complexities of regulating digital-device usage among adolescents, who might circumvent restrictions or demonstrate resistance to policy enforcement. As a result, partial or inconsistent enforcement of cellphone restrictions may dilute their intended academic benefits, implying that the observed effects in my analysis could underestimate the true potential of rigorously enforced bans.

In Appendix Table [C.1](#), I present the results for alternative specifications with no covariates, covariates only, and covariates plus country fixed effects.

Table 4: Effect of cellphone bans on student test scores

	ALL			LATAM		
	Science	Reading	Math	Science	Reading	Math
Age (years)	-2.170*	-2.757**	-1.974*	-3.995	-2.802	-2.523
	(1.263)	(1.247)	(1.025)	(2.503)	(2.469)	(2.055)
Male student	-0.115	-20.665***	4.232***	13.917***	-8.555***	14.779***
	(0.892)	(0.747)	(0.645)	(1.305)	(1.404)	(1.110)
Socioeconomic status (ESCS index)	21.165***	22.187***	20.521***	18.393***	20.154***	16.392***
	(0.453)	(0.480)	(0.418)	(0.762)	(0.841)	(0.673)
Cellphone ban in school	-2.127	-1.616	-2.406	-4.408	-5.293	-5.210*
	(1.852)	(1.952)	(1.858)	(3.020)	(3.270)	(2.674)
International grade level	23.398***	27.676***	22.848***	25.134***	29.140***	23.450***
	(1.110)	(1.103)	(0.939)	(1.262)	(1.651)	(1.006)
Student-teacher ratio	0.172**	0.260***	0.166**	-0.062	-0.004	-0.028
	(0.087)	(0.100)	(0.081)	(0.091)	(0.112)	(0.087)
Ratio of full-time teachers	0.129***	0.168***	0.134***	0.081**	0.122***	0.085**
	(0.034)	(0.035)	(0.030)	(0.036)	(0.040)	(0.035)
Ratio of certified teachers	0.061**	0.050**	0.053**	-0.045	-0.044	-0.024
	(0.024)	(0.025)	(0.024)	(0.039)	(0.041)	(0.032)
Private school	7.372***	9.915***	6.689***	34.393***	36.268***	33.785***
	(2.187)	(2.287)	(1.963)	(3.376)	(3.519)	(3.039)
Minutes per class period	-0.050	-0.059*	-0.042	-0.014	0.013	-0.002
	(0.031)	(0.031)	(0.028)	(0.054)	(0.051)	(0.045)
Urban school	21.247***	24.434***	18.817***	22.350***	26.121***	16.933***
	(2.767)	(2.815)	(2.609)	(3.756)	(4.503)	(3.437)
School located in town	6.506**	7.018***	4.476*	6.848**	8.368**	5.214
	(2.530)	(2.582)	(2.419)	(3.410)	(3.982)	(3.189)
Constant	181.171***	136.588***	176.368***	219.408***	160.312***	180.627***
	(19.815)	(20.983)	(16.342)	(39.789)	(42.463)	(32.637)
R-squared	0.409	0.415	0.453	0.212	0.221	0.235
Observations	359781	359781	359781	45764	45764	45764

Notes: Coefficients and standard errors from regression estimates using PISA plausible values (Math, Reading, Science). Standard errors are robust and computed using balanced repeated replication (BRR) with Fay's adjustment (0.5). *p<0.10, **p<0.05, ***p<0.01.

All regressions include controls and country fixed effects.

6.3 Academic Achievement Outcomes with Effective Cellphone Ban Policies

Motivated by a suggestion from Jonathan Haidt (personal communication), I focus specifically on schools that are more likely to enforce cellphone bans. Haidt emphasizes the importance of clearly distinguishing policies in which students’ phones are physically removed during school hours. Given data limitations in PISA 2022, which lacks explicit information on physical phone removal, I empirically approximate effective enforcement by combining three conditions: (1) principals explicitly report a cellphone ban policy; (2) students report low daily usage of digital resources for leisure at school (below the median, i.e., about 39 minutes); and (3) students report rarely having their digital device open during class for taking notes or searching for information (below the median, i.e., about 14% of the time).² This refined definition yields a sample of 3,169 schools out of 18,445 total, encompassing 85,809 students (approximately 17% of schools in the main sample).

This analysis requires stronger methodological assumptions and should be interpreted as exploratory. My definition of “effective cellphone bans” uses post-policy student behaviors to identify treatment, introducing endogeneity concerns. Schools achieving low student device usage may systematically differ in unobserved characteristics that independently affect outcomes. Results should be viewed as suggestive associations rather than definitive causal estimates.

It is important to acknowledge that while the school policy explicitly refers to bans on cellphone use, the PISA student questionnaire broadly references “digital devices”. Although this measure is somewhat broader than cellphone usage alone, the fact that 93.1% of students report owning a smartphone (PISA 2022) – a device frequently used for leisure purposes – strongly supports using this variable as a valid proxy for actual cellphone use in evaluating

²The question about how often student have their digital device open in class is measured in intervals: never or almost never, less than half of the time, half of the time, more than half of the time and all or almost all of the time. I create a continuous measure using the midpoint of the intervals.

the enforcement of school bans.

As shown in Table 5, schools with strict or effective cellphone bans exhibit significantly higher test scores in science, math, and reading. The effects are statistically significant (p -value <0.05) and sizable, ranging from 0.09 to 0.1 standard deviations in the sample that includes all countries. When focusing on Latin America (only 9 countries reported information on cellphone use), the effects vanishes.

6.4 Sensitivity Analysis of Cellphone Ban Definitions

To evaluate the robustness of the relationship between effective cellphone bans and student achievement, I conduct a sensitivity analysis varying the threshold defining “effective enforcement” based on student-reported cellphone usage during school hours. Specifically, I calculate the association between cellphone bans and test score for different enforcement criteria, moving from the strictest definition (lowest 10th percentile of cellphone usage) to less restrictive definitions, ultimately including all schools declaring a cellphone ban regardless of actual student usage (100th percentile).

Figure 5 shows that when focusing on the few schools with bans where student use their digital devices 17 minutes or less (lowest 10th percentile of usage) the correlation between cellphone bans and PISA test scores is highly significant, around 0.2 SD (all countries). The numeric labels indicate average minutes per day of student cellphone use for leisure reasons at school. Then, as the definition becomes less strict – allowing greater average cellphone usage for leisure during school hours – the estimated positive effect on PISA scores progressively declines, eventually becoming statistically insignificant when the average use is 47 minutes (70th percentile).

When analyzing Latin America countries only, the effects vanish rapidly when moving through the mobile usage distribution, as seen in Figure 6. The results are statistically significant

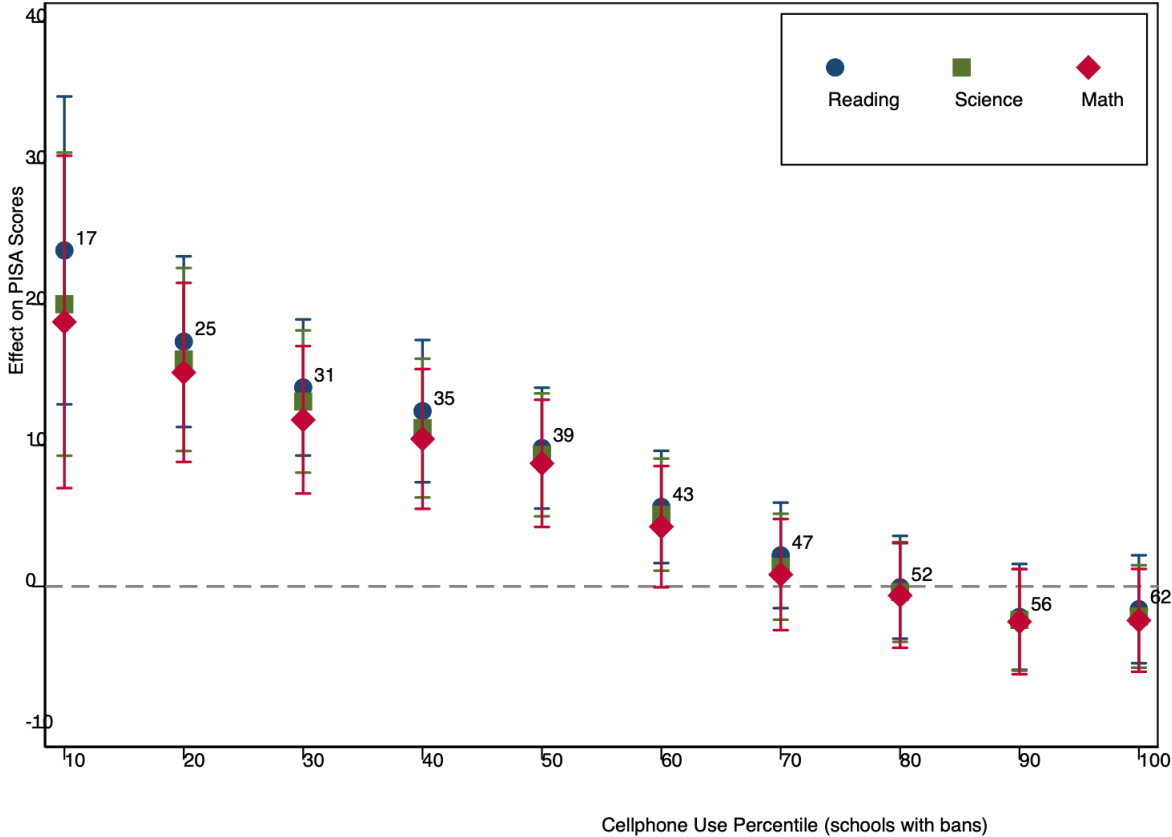
Table 5: Effect of effective cellphone bans on student test scores

	ALL			LATAM		
	Science	Reading	Math	Science	Reading	Math
Age (years)	-1.953 (1.274)	-2.542** (1.265)	-1.761* (1.047)	-4.018 (2.497)	-2.829 (2.461)	-2.545 (2.050)
Male student	0.005 (0.888)	-20.538*** (0.738)	4.345*** (0.638)	13.894*** (1.310)	-8.583*** (1.402)	14.750*** (1.110)
Socioeconomic status (ESCS index)	21.192*** (0.455)	22.211*** (0.479)	20.550*** (0.417)	18.453*** (0.767)	20.225*** (0.852)	16.455*** (0.680)
Effective cellphone ban	9.324*** (2.223)	9.801*** (2.185)	8.721*** (2.300)	1.358 (3.626)	1.443 (4.086)	0.510 (3.207)
Grade level	23.942*** (1.088)	28.207*** (1.084)	23.385*** (0.906)	25.295*** (1.264)	29.327*** (1.643)	23.608*** (0.993)
Student-teacher ratio	0.173** (0.086)	0.261*** (0.099)	0.168** (0.081)	-0.054 (0.092)	0.006 (0.114)	-0.019 (0.089)
Ratio of full-time teachers	0.124*** (0.034)	0.163*** (0.035)	0.129*** (0.030)	0.078** (0.037)	0.119*** (0.040)	0.083** (0.036)
Ratio of certified teachers	0.060** (0.024)	0.049* (0.025)	0.052** (0.024)	-0.049 (0.039)	-0.048 (0.040)	-0.028 (0.032)
Private school	6.192*** (2.174)	8.808*** (2.289)	5.495*** (1.916)	33.261*** (3.487)	34.931*** (3.638)	32.579*** (3.155)
Minutes per class	-0.047 (0.031)	-0.056* (0.031)	-0.039 (0.028)	-0.014 (0.055)	0.013 (0.051)	-0.002 (0.046)
Urban school	22.056*** (2.708)	25.215*** (2.761)	19.620*** (2.531)	22.254*** (3.805)	25.999*** (4.570)	16.787*** (3.497)
School located in town	6.966*** (2.449)	7.451*** (2.504)	4.941** (2.329)	6.466* (3.445)	7.915** (4.007)	4.794 (3.229)
Constant	151.873*** (20.099)	107.087*** (21.462)	147.585*** (16.778)	204.131*** (39.756)	143.437*** (42.342)	166.727*** (32.601)
R-squared	0.410	0.415	0.454	0.212	0.220	0.234
Observations	359781	359781	359781	45764	45764	45764

Notes: Coefficients and standard errors from regression estimates using PISA plausible values (Math, Reading, Science). Standard errors are robust and computed using balanced repeated replication (BRR) with Fay's adjustment (0.5). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

All regressions include controls and country fixed effects.

Figure 5: Effects of bans on test scores, different levels of ban effectiveness (all countries)



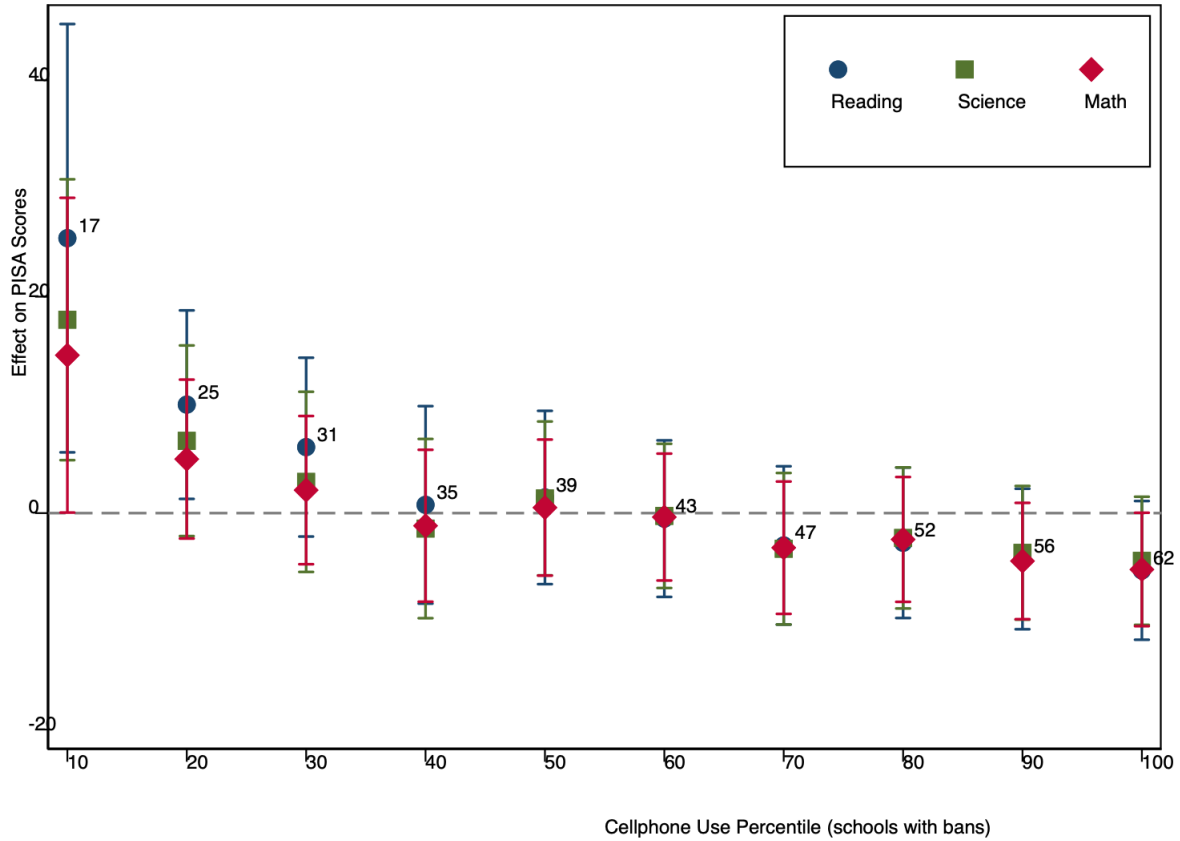
Note: This figure shows the effects of various definitions of cellphone bans on PISA test scores. The x-axis represents different percentiles of students’ cellphone use for “leisure” reasons at schools that declare having an explicit cellphone ban. The numbers near the symbols are the average minutes of use per day at school.

only for schools with cellphone bans with a usage of 17 minutes at school per day (10th percentile). For upper percentiles, cellphone bans in Latin America do not correlate with PISA test scores.

These results provide empirical support for the critical role of effective enforcement in the success of school cellphone bans: Merely declaring a policy without strict enforcement does not yield measurable academic benefits. However, a valid question about these new results is how different are these schools with “effective” cellphone bans?

Appendix Table D.1 shows descriptive statistics comparing schools with and without effective

Figure 6: Effects of bans on test scores, different levels of ban effectiveness (Latin America)



Note: This figure shows the effects of various definitions of cellphone bans on PISA test scores. The x-axis represents different percentiles of students’ cellphone use for “leisure” reasons at schools that declare having an explicit cellphone ban. The numbers near the symbols are the average minutes of use per day at school.

cellphone ban policies. Overall, the differences between the two groups are generally modest. Students in schools with cellphone bans are very similar to those without bans in age, gender, grade level, socioeconomic status, urban location, and the proportion of certified teachers. Although some statistically significant differences emerge – such as slightly lower student-teacher ratios, shorter class duration, a somewhat higher proportion of private schools, and a higher ratio of full-time teachers in schools with effective bans – the magnitude of these differences is relatively small. Nevertheless, I control for these covariates in all regression analyses to ensure robust estimates of the policy effects.

Regarding the relationship between student well-being (anxiety, pressure, and distraction) and this alternative measure of effective cellphone bans in schools, Appendix Table E.1 shows that the association becomes substantially stronger. Interestingly, the relationship between “effective” cellphone ban and life satisfaction is now positive and statistically significant at 5%.

In the subsequent analysis, I use the effective cellphone ban definition previously introduced in all countries: schools explicitly declaring a cellphone prohibition on school premises and whose students report a daily usage of digital resources for leisure purposes at school below the median usage and report having their digital device open during class below the median value.

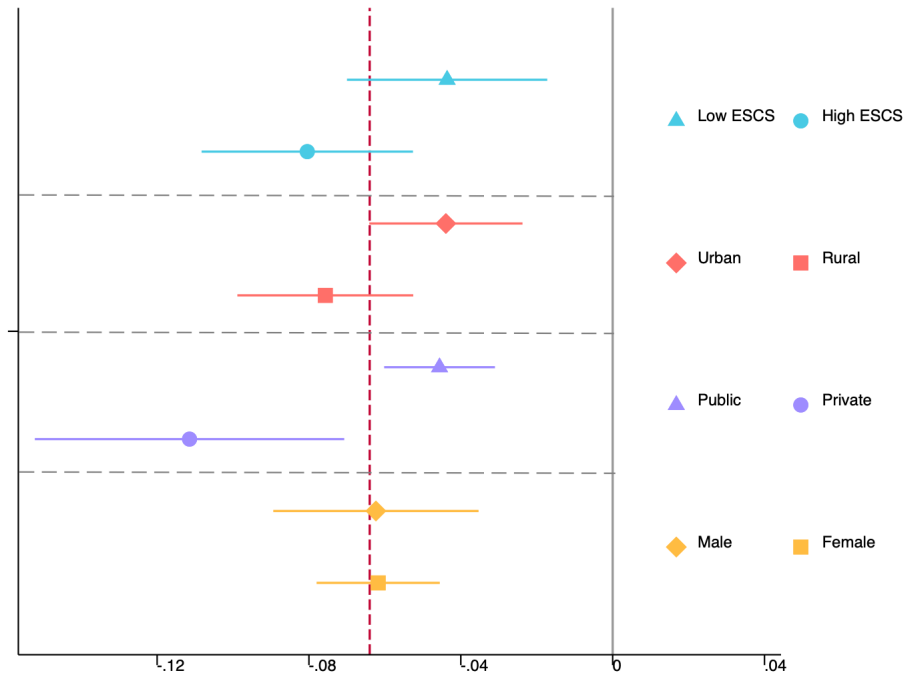
6.5 Heterogeneity: ESCS, Urban/rural, Private/Public School, and Gender

I now analyze heterogeneous effects of school ban policies on some student outcomes (anxious, pressure, and distraction). In Figure 7, I show the results for anxiety. As can be seen, the effects on anxiety are stronger in private compared to public schools. Differences across socioeconomic status, urban versus rural schools, and gender groups remain minor, with confidence intervals extensively overlapping.

Figure 8 examines differences in the effectiveness of cellphone bans on feeling pressured to be online and answer messages when in class. Overall, results demonstrate very limited heterogeneity, with substantial overlap in confidence intervals across all subgroups.

Figure 9 presents heterogeneous effects regarding student distraction. Again, there is little evidence of substantial heterogeneity across socioeconomic backgrounds, school type, location, or gender. Confidence intervals overlap considerably, indicating no statistically significant differences between subgroups. The policy thus appears similarly effective in reducing dis-

Figure 7: Heterogeneous effects of effective cellphone bans on anxiety

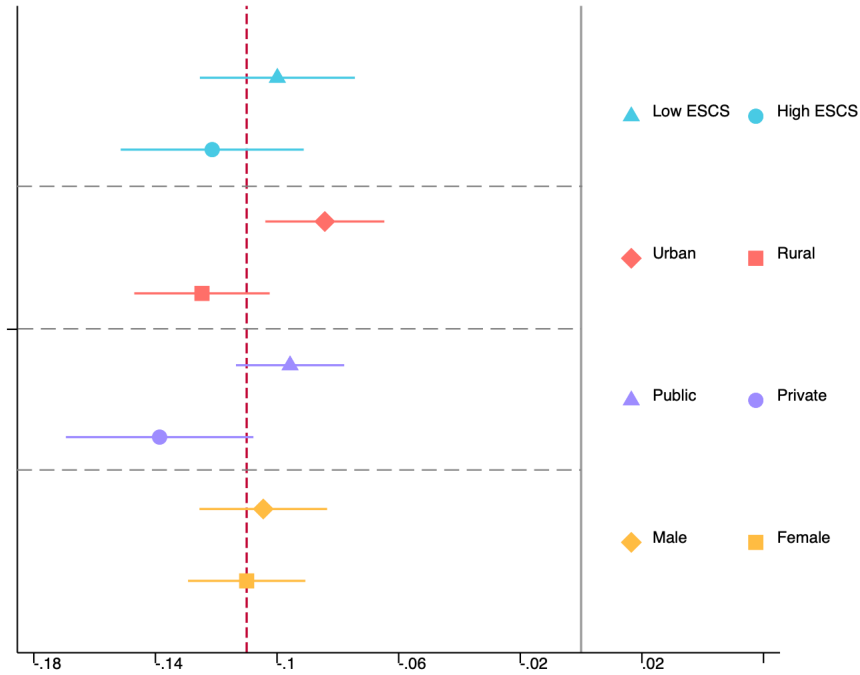


Note: Heterogeneous effects of effective cellphone bans on anxiety (I feel anxious when I don't have my digital device near me).

traction for diverse student groups, consistent with prior studies reporting uniform benefits of cellphone restrictions on classroom attentiveness (Campbell et al., 2024).

Regarding heterogeneous effects in PISA test scores, I did not find any significant effect. Please see Appendix F.

Figure 8: Heterogeneous effects of effective cellphone bans on pressure



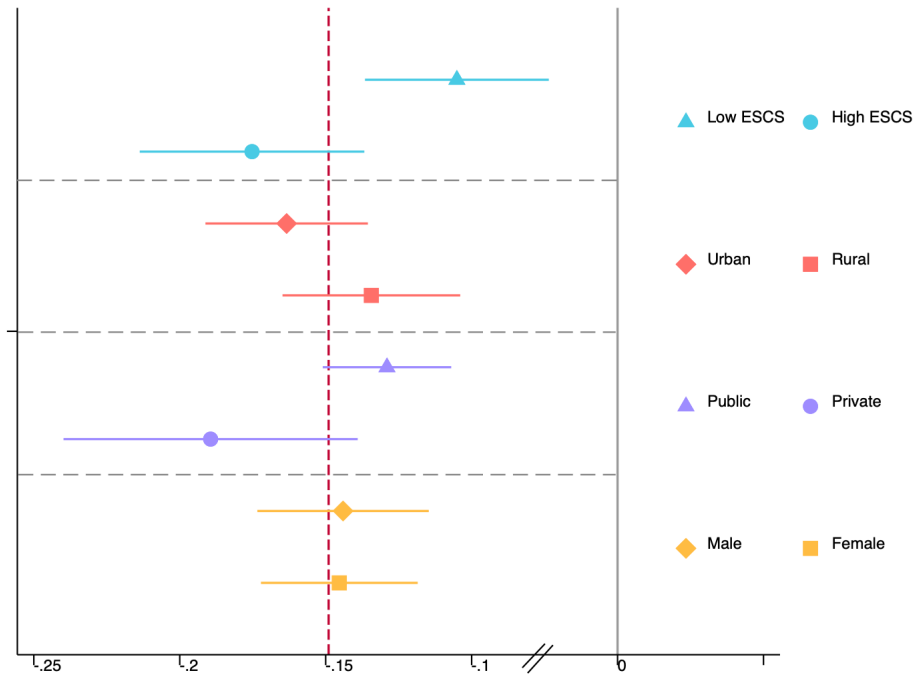
Note: Heterogeneous effects of effective cellphone bans on pressure (I feel pressured to be online and answer messages when I am in class).

7 Policy Examples and Recommendations

7.1 Developed Countries: National Mobile Phone Restrictions in Schools

Several developed country governments have implemented national (or nearly national) bans or constraints on mobile-device use at school, motivated by concerns that this technology is distracting, used for cyberbullying, and negatively affecting academic outcomes (Campbell et al., 2024; UNESCO, 2023). Indeed, in a recent UNESCO report, smartphone bans in schools were explicitly recommended globally with evidence of a “negative link” made between too much digital technology and student performance and well-being among children

Figure 9: Heterogeneous effects of effective cellphone bans on distraction



Note: Heterogeneous effects of effective cellphone bans on distraction (Students get distracted by other students who are using digital resources, e.g., smartphones, website apps.).

(UNESCO, 2023).

7.1.1 Selected National Policies

Key features of specific national policies are summarized in Table 6. In a broad sense, the general trend in European and other OECD countries is to either de facto ban mobile devices altogether for school-age children or categorically ban them for certain age groups, with an eye to increasing classroom focus. Yet some educators warn that absolute bans could impede students' ability to learn how to self-regulate their phone use – or goad students to sneak their phone use “underground” (House of Lords Library, 2023). This section reviews policies in a number of developed countries, examining why they have been introduced and discussing how they relate to empirical dimensions: academic achievement on the one hand and classroom

disruption and overall well-being for students on the other.

France. France was among the first high-income countries to implement a school phone ban. The 2018 Law No. 2018-698 bans the use of mobile phones and other electronic devices of the kind for every pupil in kindergartens and primary and secondary schools (until nearly the age of 15 years old) (Beardsley, 2018). France had previously prohibited phones during class time in 2010, but the 2018 law extended the ban to encompass free time as well, including breaks, lunch, and recess, and to effectively ban mobile phone use anywhere on school grounds. There are strict exceptions, for example, for educational activities supervised by teachers, and for provisions for disabled children. The purpose of this law is to create an atmosphere that allows for better concentration, enhanced reflection, and less digital distraction (Beardsley, 2018). Preliminary evaluations indicate successful results, particularly in terms of how students treat each other, incidents of cyberbullying dropping dramatically, and classroom focus and attention being improved (Campbell et al., 2024; Beland and Murphy, 2016). And, finally, the French Directorate for Schools implemented special training for teachers and leaders in order to promote successful application and holistic understanding by teachers and families.

Italy. Following the French example, Italy implemented stricter nationwide regulations starting late 2023, explicitly banning smartphone use in elementary and lower secondary classrooms. This policy stipulates that students must store devices securely even during breaks and recess periods, aiming to minimize distractions throughout the entire school day (Ferri, 2024). The Italian approach notably balances regulation with educational initiatives aimed at fostering responsible phone usage and digital literacy. Schools at the higher education level are encouraged to allow controlled smartphone usage, emphasizing teaching self-regulation skills to students and integrating digital responsibility into their broader educational framework (Ferri, 2024).

Table 6: Detailed summary of national mobile phone policies in selected countries

Country	Policy Level	Key Features and Implementation Details
France	Nationwide	Total ban for K-9 including breaks; exceptions allowed for educational purposes and disabilities.
Italy	Nationwide	Ban in elementary and middle schools; regulated and controlled use permitted in high schools.
Australia	Nationwide	Regional policies unified; mandatory storage in lockers or secure pouches during school hours.
Canada (Ontario)	Provincial	Classroom usage bans; standardizing regulations, concerns about enforcement noted by educators.
China	Nationwide	Complete ban on bringing phones without explicit parental consent; rigorous enforcement practices.
Israel	Nationwide (Elementary)	Ban at elementary levels; supervised and regulated usage permitted at secondary education levels.
Uruguay	National (Debate ongoing)	Integration via Plan Ceibal with debates on restricting personal smartphone usage in classes.
Argentina (Buenos Aires)	Regional	Classroom bans for all levels; recess bans for younger students, emphasizing responsible digital use.
Brazil	Nationwide	Comprehensive ban across basic education schools; exceptions permitted only for supervised educational purposes.
Chile	National (Under approval)	Tiered policy banning phone use for younger students, allowing controlled educational use in higher grades.

Australia. Historically characterized by decentralized educational governance, Australia unified regional policies into a comprehensive national strategy by 2024. This unified policy requires students to store mobile phones in designated lockers or secure pouches during school hours, significantly reducing classroom distractions and improving student behavior ([Australian Department of Education, 2025](#)). Complementary measures have included extensive engagement campaigns with parents and detailed guidelines for schools on policy implementation, enforcement, and student discipline. Initial assessments report positive outcomes, such as enhanced classroom management, reduced incidents of cyberbullying, and improved academic performance indicators.

Canada. Canada's mobile phone policy varies considerably by province, with Ontario leading the implementation of comprehensive classroom usage restrictions. Ontario's policy is designed to standardize expectations across schools, requiring mobile phones to be stored away during instructional hours except for teacher-approved educational purposes ([Callan and D'Mello, 2024](#)). Despite clear regulations, initial feedback highlighted mixed reactions from educators and parents, citing challenges with policy enforcement, consistent compliance, and concerns over the practicality of managing such restrictions effectively in large school environments. Ontario's approach is supplemented by continuous evaluations and community engagement activities to enhance the policy's efficacy.

China. In 2021, China adopted an aggressive nationwide stance to prohibit mobile phone usage in schools, motivated by growing concerns over student distraction, digital addiction, and adverse health outcomes such as vision problems. The policy mandates that students may only bring phones to school under explicit parental consent, accompanied by stringent enforcement protocols including regular checks and potential penalties for violations ([Wakefield, 2021](#)). The policy has been supported by extensive public awareness campaigns targeting screen addiction and health education. Although initial public reception acknowl-

edged significant potential benefits such as reduced distractions and improved student focus, implementation challenges remain, notably regarding consistent enforcement across diverse school environments ([Campbell et al., 2024](#)).

Israel. In 2019, Israel’s Education Ministry implemented restrictions on mobile phone usage specifically targeting elementary schools nationwide. The policy strictly bans mobile phone use throughout the entire school day for younger students, while allowing regulated and supervised use in middle and high schools to support digital literacy and responsible phone management among older students ([Wootliff, 2019](#)). This differentiated approach aims to balance immediate educational benefits with longer-term goals of teaching responsible digital behavior. Schools report improvements in social interactions among younger students and reduced issues related to inappropriate phone usage, demonstrating the initial effectiveness of these targeted measures.

7.2 Latin America: Emerging Policies and Debates

Uruguay. Uruguay historically promoted technology integration through Plan Ceibal, providing laptops and tablets to all students to foster digital inclusion. However, recent concerns about distraction and declining academic focus have led to legislative proposals to restrict smartphone usage during school hours ([Caras y Caretas, 2025](#)). The current policy debate is centered around balancing digital innovation with student attentiveness and emotional health, potentially influencing broader regional practices.

Argentina. Buenos Aires initiated strict policies limiting smartphone use, completely banning their use during classes and recess periods for primary students. This policy emphasizes digital responsibility and aims to enhance students’ social interactions and reduce cyberbullying incidents ([Marín, 2024](#)). While national legislation has stalled due to implementation

concerns, Buenos Aires serves as a significant pilot case, potentially influencing nationwide decisions based on demonstrated effectiveness.

Brazil. In 2025, Brazil introduced a comprehensive national policy prohibiting mobile phone use in all basic education institutions, with the aim of addressing issues of mental health, academic performance, and social interaction. The Brazilian policy includes clear and strict enforcement guidelines, complemented by educational initiatives focused on digital literacy, responsible social media use, and reducing screen addiction among youth ([Agencia Senado, 2025](#)). The policy is intended to serve as a benchmark for other Latin American countries considering similar measures.

Chile. Chile’s pending legislation proposes a tiered restriction model, banning smartphone use outright for younger students and progressively allowing regulated use in older grades. This policy is designed to balance immediate academic and social benefits with longer-term digital literacy goals, involving extensive parent and community engagement to support effective implementation. Recent research identifying clear links between excessive smartphone use and lower academic outcomes has strongly influenced policy formulation ([Cooperativa.cl, 2024](#); [Leiva and Camussetti, 2024](#)).

8 Conclusions and Policy Recommendations

This study contributes to the ongoing debate regarding the effects of cellphone usage in schools, addressing important gaps identified in the existing literature and theoretical frameworks. Previous studies provided inconclusive evidence regarding the impact of mobile-device restrictions on student outcomes, highlighting the complexity and variability of these relationships across different contexts and outcomes.

Using data from the 2022 Programme for International Student Assessment (PISA) for 81 countries, I provide new evidence to contribute to this crucial debate. I specifically study student well-being (anxiety, distraction, and pressure) and standardized test scores across different school cellphone policies in terms of degree of enforcement.

Using linear regression models with an extensive set of controls for potential confounders and country fixed effects, I find statistically significant associations between cellphone bans and lower classroom distraction, as well as improvements in student well-being: specifically, reduced anxiety and less pressure to respond to messages during class. These associations are observable even under mild reported enforcement, highlighting the policy's potential for meaningful impact beyond strictly enforced conditions.

My analysis also demonstrates significant positive correlation between cellphone bans and academic achievement, measured by PISA 2022 standardized test scores, when focusing explicitly on schools with effectively enforced cellphone bans. These results indicate that effective enforcement is a key factor determining the academic benefits of cellphone restrictions, clarifying previous inconclusive findings in the literature.

Additionally, I explored heterogeneity across student groups, generally finding limited differences. Nonetheless, some exceptions emerged regarding anxiety, where students in private schools experienced significantly greater benefits compared to those in public schools.

Based on the empirical findings, conceptual framework, and extensive literature review of this paper, some policy recommendations can be derived:

1. **Cellphone ban policies and effective enforcement.** While the debate on the effectiveness of school bans is far from being ended, the evidence provided in this paper favors the beneficial impact of these policies on well-being and academic performance, in specific contexts. Hence, if educational authorities or individual schools decide to implement cellphone ban policies, the results of this paper indicate that enforcement

is critical. Policies that are effectively enforced correlate with measurable (and statistically significant) improvements in standardized test performance.

As highlighted by [Campbell et al. \(2024\)](#), the effectiveness of mobile-device policies depends heavily on consistent enforcement and clear communication. Schools should establish explicit guidelines on acceptable usage and regular monitoring to ensure compliance.

Regarding student well-being outcomes, this paper's evidence consistently shows positive impacts associated with cellphone bans, even when enforcement is relatively mild. Under these policies, students report reductions in anxiety, distraction, and pressure regarding digital-device usage. These well-being effects are robust, providing an additional consideration for policymakers and educators deliberating on adopting cellphone bans or restrictions.

- 2. Ongoing Evaluation:** Continuous monitoring and evaluation of cellphone policies are necessary. Schools should regularly assess the effectiveness of policies and adapt them to evolving technological and educational environments. While it is particularly worth remarking that the evidence provided in this paper is for 81 countries, the lack of identification strategies with higher internal validity, such as randomized control trials, put a note of caution when deriving conclusions of policy evaluations based on observational studies.

References

- Abrahamsson, S. (2024). Smartphone bans, student outcomes and mental health. Discussion Paper 1, NHH Dept. of Economics.
- Agencia Senado (2025). Sancionada lei que restringe uso de celular em escolas de todo o país.
- Australian Department of Education (2025). School behaviour improving after mobile phone ban and vaping reforms.
- Beardsley, E. (2018). France moves to ban smartphones in schools. *NPR News*.
- Beland, L.-P. and Murphy, R. (2016). Ill communication: Technology, distraction & student performance. *Labour Economics*, 41:61–76.
- Beneito, P. and Vicente-Chirivella, Ó. (2022). Banning mobile phones in schools: Evidence from regional-level policies in Spain. *Applied Economic Analysis*, 30(90):153–175.
- Callan, I. and D’Mello, C. (2024). Ontario to ban cellphones in classrooms. What’s changing and how will it work? *Global News*.
- Cameron, A. C. and Miller, D. L. (2015). A practitioner’s guide to cluster-robust inference. *Journal of Human Resources*, 50(2):317–372.
- Campbell, M. A., Edwards, E. J., Pennell, D., Poed, S., Lister, V., Gillett-Swan, J., Kelly, A., Zec, D., and Nguyen, T.-A. (2024). Evidence for and against banning mobile phones in schools: A scoping review. *Journal of Psychologists and Counsellors in Schools*, 34(3):242–265.
- Caras y Caretas (2025). Uruguay avanza en proyecto de ley para prohibir uso de celulares en escuelas. *Caras y Caretas*.

- Carrillo, P., Onofa, M., and Ponce, J. (2011). Information technology and student achievement: Evidence from a randomized experiment in Ecuador. IDB Working Paper Series IDB-WP-223, Inter-American Development Bank.
- Celhay, P., Daniel, F., and Rau, T. (2024). Behind the screens: The effects of mobile internet exposure on children development. Mimeo, Pontificia Universidad Católica de Chile.
- Chen, Q. and Yan, Z. (2016). Does multitasking with mobile phones affect learning? A review. *Computers in Human Behavior*, 54:34–42.
- Colombo, K. and Failache, E. (2023). Exposure to high-speed internet and early childhood development. Working paper GEAR 2023-01, Universitat Autònoma de Barcelona.
- Cooperativa.cl (2024). Cámara aprobó proyecto que prohíbe los celulares en los colegios hasta sexto básico. *Cooperativa.cl*.
- Cristia, J., Ibarra, P., Cueto, S., Santiago, A., and Severin, E. (2017). Technology and child development: Evidence from the One Laptop per Child program. *American Economic Journal: Applied Economics*, 9(3):295–320.
- Cristia, J. and Vlaicu, R. (2022). Digitalizar los servicios públicos oportunidades para américa latina y el caribe. Latin American and Caribbean Microeconomic Report, Inter-American Development Bank.
- Cunha, F. and Heckman, J. (2007). The technology of skill formation. *American Economic Review*, 97(2):31–47.
- Demombynes, G. and Urbe, J. P. (2024). Are smartphones a problem for teen mental health in developing countries? World Bank Blogs.
- Elhai, J. D., Levine, J. C., Dvorak, R. D., and Hall, B. J. (2016). Fear of missing out, need for touch, anxiety and depression are related to problematic smartphone use. *Computers in Human Behavior*, 63:509–516.

- Ferri, P. (2024). Smartphone vietati a scuola fino ai 14 anni: i controsensi della decisione italiana. *Agenda Digitale*.
- Gentile, D., Swing, E., Lim, C. G., and Khoo, A. (2012). Video game playing, attention problems, and impulsiveness: Evidence of bidirectional causality. *Psychology of Popular Media Culture*, 1(1):62–70.
- Girela-Serrano, B. M., Spiers, A. D. V., Ruotong, L., Gangadia, S., Toledano, M. B., and Di Simplicio, M. (2024). Impact of mobile phones and wireless devices use on children and adolescents' mental health: A systematic review. *European Child & Adolescent Psychiatry*, 33(6):1621–1651.
- Goodyear, V. A., Randhawa, A., Adab, P., Al-Janabi, H., Fenton, S., Jones, K., Michail, M., Morrison, B., Patterson, P., Quinlan, J., Sitch, A., Twardochleb, R., Wade, M., and Pallan, M. (2025). School phone policies and their association with mental wellbeing, phone use, and social media use (SMART Schools): A cross-sectional observational study. *The Lancet Regional Health - Europe*, 51:101211.
- GSMA (2022). The mobile economy: Latin America 2022.
- Guldvik, M. K. and Kvinnsland, I. (2018). Smarter without smartphones? Effects of mobile phone bans in schools on academic performance, well-being, and bullying. Master's thesis, Norwegian School of Economics.
- Hill, D. and Ameenuddin, N. (2016). Media and young minds. *Pediatrics*, 138(5):e20162591.
- House of Lords Library (2023). Mobile phones in schools: Mandating a ban? UK Parliament Library Briefing.
- Jain, R. and Stemper, S. (2024). 3G internet and human capital development. Working paper 453, University of Zurich.

- Kessel, D., Hardardottir, H. L., and Tyrefors, B. (2020). The impact of banning mobile phones in Swedish secondary schools. *Economics of Education Review*, 77(C):102009.
- Leiva, R. and Camussetti, D. K. (2024). Asociación entre el uso del teléfono inteligente y el rendimiento académico de escolares chilenos. *Anuario Electrónico de Estudios en Comunicación, Educación y Sociedad*, 17(2).
- Marín, L. (2024). Decisión de la ciudad: los alumnos de primaria y secundaria no podrán usar el celular en clase. *La Nación*.
- Meza-Cordero, J. A. (2017). Learn to play and play to learn: Evaluation of the One Laptop per Child program in Costa Rica. *Journal of International Development*, 29(1):3–31.
- OECD (2019). *PISA 2018 Results (Volume II): Where All Students Can Succeed*. OECD Publishing, Paris.
- OECD (2020). *PISA 2018 Results (Volume III): What School Life Means for Students' Lives*. OECD Publishing, Paris.
- OECD (2023). *PISA 2022 Technical Report*. OECD Publishing, Paris.
- OECD's Programme for International Student Assessment (PISA) (2022). Tables and figures in PISA Volumes I and II. Available at <https://www.oecd.org/en/data/datasets/pisa-2022-database.html#tables>.
- Ophir, E., Nass, C., and Wagner, A. D. (2009). Cognitive control in media multitaskers. *Proceedings of the National Academy of Sciences*, 106(37):15583–15587.
- Panjeti-Madan, V. N. and Ranganathan, P. (2023). Impact of screen time on children's development: Cognitive, language, physical, and social/emotional domains. *Multimodal Technologies and Interaction*, 7(5):52.

- Proekt, Y. L., Spasskaya, E. B., Ivanushkina, N. O., and Bocharova, O. S. (2024). Assessing the impact of using mobile devices on school students' educational outcomes: A second-order meta-analysis. *Russian Psychological Journal*, 21(2):35–59.
- Przybylski, A. K., Murayama, K., DeHaan, C. R., and Gladwell, V. (2013). Motivational, emotional, and behavioral correlates of fear of missing out. *Computers in Human Behavior*, 29(4):1841–1848.
- Radesky, J. S., Schumacher, J., and Zuckerman, B. (2015). Mobile and interactive media use by young children: The good, the bad, and the unknown. *Pediatrics*, 135(1):1–3.
- Ravizza, S. M., Uitvlugt, M. G., and Fenn, K. M. (2016). Logged in and zoned out: How laptop internet use relates to classroom learning. *Psychological Science*, 28(2):171–180.
- Rieble-Aubourg, S. and Viteri, A. (2020). COVID-19: Are we prepared for online learning? CIMA Brief 20, Inter-American Development Bank.
- Sohn, S. Y., Rees, P., Wildridge, B., Kalk, N. J., and Carter, B. (2019). Prevalence of problematic smartphone usage and associated mental health outcomes amongst children and young people: A systematic review, meta-analysis and GRADE of the evidence. *BMC Psychiatry*, 19:356.
- Sunday, O. J., Adesope, O. O., and Maarhuis, P. L. (2021). The effects of smartphone addiction on learning: A meta-analysis. *Computers in Human Behavior Reports*, 4:100114.
- Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. *Cognitive Science*, 12(2):257–285.
- Twenge, J. M. and Campbell, W. K. (2018). Associations between screen time and lower psychological well-being among children and adolescents: Evidence from a population-based study. *Preventive Medicine Reports*, 12:271–283.

- Twenge, J. M. and Campbell, W. K. (2019). Media use is linked to lower psychological well-being: Evidence from three datasets. *Psychiatric Quarterly*, 90:311–331.
- UNESCO (2023). Global education monitoring report 2023: Technology in education: A tool on whose terms? Report, UNESCO, Paris.
- Wakefield, J. (2021). China bans children from using mobile phones at school. *BBC News*.
- Wootliff, R. (2019). Education minister announces elementary school cellphone ban. *Times of Israel*.
- Yildirim, C. and Correia, A.-P. (2015). Exploring the dimensions of nomophobia: Development and validation of a self-reported questionnaire. *Computers in Human Behavior*, 49:130–137.
- Ziegler, S., Arias Segura, J., Bosio, M., and Camacho, K. (2020). Rural connectivity in Latin America and the Caribbean. A bridge to sustainable development during a pandemic. Technical report, Inter-American Institute for Cooperation on Agriculture, San Jose, Costa Rica.

Appendix

A PISA 2022 Items Used

Table A.1: PISA 2022 student questionnaire items used in the paper

Label (paper)	PISA code	Item wording (original, as displayed)	Response scale
Screen time	ST326Q04JA	This school year, about how many hours a day do you usually use <digital resources> in the following situations? For leisure at school	Categorical - None / Up to 1 hour / >1-2 hours / >2-4 hours / >4-6 hours / >6-8 hours / >8 hours
Open cell	ST322Q04JA	Think about your use of <digital devices>. How often do you feel or act the following ways? I have my <digital device> open in class so I can take notes or search for information.	Likert - Never or almost never / A few times a year / About once a month / About once a week / Every day or almost every day / Several times a day
Notifications	ST322Q01JA	I turn off notifications from social networks and apps on my <digital devices> during class.	Likert - Never or almost never / A few times a year / About once a month / About once a week / Every day or almost every day / Several times a day
Anxious	ST322Q07JA	I feel nervous/anxious when I don't have my <digital device> near me.	Likert - Strongly disagree / Disagree / Agree / Strongly agree
Distracted	ST273Q07JA	Students get distracted by other students who are using <digital resources> (e.g. smartphones, websites, apps).	Likert - Never or hardly ever / A few times a year / About once a month / About once a week / Every day or almost every day / Several times a day
Pressured	ST322Q06JA	I feel pressured to be online and answer messages when I am in class.	Likert - Strongly disagree / Disagree / Agree / Strongly agree
Life satisfaction	ST016Q01NA	Overall, how satisfied are you with your life as a whole these days?	Numeric scale - 0 (not at all satisfied) to 10 (completely satisfied)

B Effect of Cellphone Bans on Student Behavior and Well-Being, Latin America

Table B.1: Effect of cellphone bans on student behavior and well-being, LATAM

Panel A: Without covariates							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Screen Time	Open Cell	Notifications	Anxious	Distracted	Pressure	Life Satisfaction
	b/se	b/se	b/se	b/se	b/se	b/se	b/se
Cellphone ban	-0.480*** (0.023)	-0.284*** (0.012)	0.003 (0.011)	-0.061*** (0.010)	-0.206*** (0.023)	-0.096*** (0.009)	-0.101* (0.052)
R-squared	0.012	0.039	0.000	0.002	0.026	0.006	0.000
Observations	61427	44999	45701	44940	38995	43534	58988
Panel B: With covariates							
	b/se	b/se	b/se	b/se	b/se	b/se	b/se
Cellphone ban	-0.457*** (0.025)	-0.264*** (0.017)	0.006 (0.013)	-0.051*** (0.011)	-0.205*** (0.023)	-0.083*** (0.011)	-0.158*** (0.058)
R-squared	0.019	0.059	0.008	0.024	0.049	0.023	0.039
Observations	45764	33409	33938	33506	29364	32436	44128
Panel C: With covariates and country fixed effects							
	b/se	b/se	b/se	b/se	b/se	b/se	b/se
Cellphone ban	-0.402*** (0.028)	-0.223*** (0.017)	-0.011 (0.014)	-0.041*** (0.011)	-0.167*** (0.024)	-0.059*** (0.012)	0.082 (0.055)
R-squared	0.023	0.080	0.018	0.046	0.075	0.044	0.050
Observations	45764	33409	33938	33506	29364	32436	44128
Mean of dependent variable							
	1.068	0.596	0.706	0.440	0.731	0.275	6.924

Notes: Panel A reports results without control variables. Panel B includes control variables: age, gender, international grade level, socioeconomic status (ESCS), student-teacher ratio, share of full-time teachers, share of certified teachers, private school indicator, minutes per class, and school location (urban/town). Panel C adds country fixed effects to the specification in Panel B. All regressions use PISA survey weights and account for the complex survey design. Standard errors in parentheses. *p<0.10, **p<0.05, ***p<0.01

C Alternative Specifications for Test Scores Equations

Table C.1: Effect of cellphone bans on test scores

	All countries			Latin America		
	Science	Reading	Math	Science	Reading	Math
Panel A: Without covariates						
Cellphone ban	-8.612*** (2.357)	-10.117*** (2.570)	-7.998*** (2.406)	-2.860 (2.862)	-3.788 (3.223)	-3.245 (2.424)
R-squared	0.002	0.002	0.002	0.000	0.000	0.000
Observations	481329	481329	481329	61427	61427	61427
Panel B: With covariates						
Cellphone ban	-5.817*** (1.862)	-5.505*** (1.899)	-5.818*** (1.883)	-4.618 (2.867)	-5.030 (3.119)	-5.041** (2.458)
R-squared	0.282	0.298	0.308	0.208	0.218	0.225
Observations	359781	359781	359781	45764	45764	45764
Panel C: With covariates and country fixed effects						
Cellphone ban	-2.127 (1.852)	-1.616 (1.952)	-2.406 (1.858)	-4.408 (3.020)	-5.293 (3.270)	-5.210* (2.674)
R-squared	0.409	0.415	0.453	0.212	0.221	0.235
Observations	359781	359781	359781	45764	45764	45764
Mean of dependent variable						
	435.9	423.8	422.2	414.6	418.8	390.9

Notes: Panel A reports results without control variables. Panel B includes control variables: age, gender, socioeconomic status (ESCS), international grade level, student-teacher ratio, share of full-time teachers, share of certified teachers, private school indicator, minutes per class, and school location (urban/town). Panel C adds country fixed effects to the specification in Panel B. Test scores are estimated using plausible values with proper PISA methodology (repest). Standard errors account for the complex survey design and measurement error in plausible values. *p<0.10, **p<0.05, ***p<0.01.

D Balance Table

Table D.1 compares characteristics of schools with and without “effective” cellphone bans defined as those schools in which (1) principals explicitly report a cellphone ban policy; (2)

students report low daily usage of digital resources for leisure at school (below the median, i.e., about 39 minutes); and (3) students report rarely having their digital device open during class for taking notes or searching for information (below the median, i.e., about 14% of the time). Although several differences are statistically significant (p-value < 0.05), their magnitudes are small.

Table D.1: Balance table, schools with and without effective cellphone bans

Variable	Ban=0	(SE)	Ban=1	(SE)	Dif.	(SE)
Age (years)	15.812	(0.002)	15.811	(0.005)	-0.002	(0.005)
		[395,520]		[85,809]		
Male student	0.492	(0.002)	0.478	(0.009)	-0.015	(0.009)
		[395,473]		[85,803]		
Grade level (international)	9.740	(0.006)	9.786	(0.025)	0.046	(0.028)
		[382,320]		[84,705]		
Socioeconomic status (ESCS index)	-0.009	(0.012)	-0.062	(0.035)	-0.052	(0.042)
		[393,829]		[85,482]		
Student-teacher ratio	18.663	(0.213)	17.002	(0.398)	-1.661***	(0.472)
		[356,338]		[80,316]		
Ratio of full-time teachers	81.993	(0.424)	85.651	(0.882)	3.658***	(1.064)
		[359,874]		[82,837]		
Ratio of certified teachers	73.028	(0.613)	74.864	(1.375)	1.836	(1.612)
		[325,168]		[76,684]		
Private school	0.204	(0.005)	0.270	(0.020)	0.066***	(0.022)
		[369,638]		[79,284]		
Minutes per class	58.730	(0.497)	54.532	(0.879)	-4.198***	(1.059)
		[389,819]		[84,282]		
Urban school	0.434	(0.009)	0.416	(0.019)	-0.018	(0.023)
		[389,193]		[84,991]		
School located in town	0.463	(0.009)	0.452	(0.020)	-0.011	(0.024)
		[389,193]		[84,991]		

Notes: Number of observations in square brackets. Robust standard errors in parentheses computed using PISA's balanced repeated replication (BRR) with Fay's adjustment factor = 0.5 and 80 replicate weights. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

E Effective Cellphone Bans and Student Outcomes

Table E.1: Effect of effective cellphone bans on student behavior and well-being, all countries

Panel A: Without covariates							
	(1)	(2)	(3)	(4)	(5)	(7)	
	Screen Time	Open Cell	Notifications	Anxious	Distracted	Pressured	Life Satisfaction
Cellphone ban	-0.558*** (0.013)	-0.327*** (0.007)	-0.021** (0.009)	-0.047*** (0.006)	-0.214*** (0.009)	-0.164*** (0.006)	-0.274*** (0.040)
R-squared	0.018	0.061	0.000	0.001	0.029	0.016	0.002
Observations	481329	357367	360707	362033	325470	348414	424267
Panel B: With covariates							
Cellphone ban	-0.544*** (0.015)	-0.316*** (0.008)	-0.031*** (0.008)	-0.053*** (0.007)	-0.193*** (0.010)	-0.164*** (0.007)	-0.208*** (0.044)
R-squared	0.023	0.069	0.024	0.014	0.045	0.025	0.031
Observations	359781	264385	267256	268430	243800	257051	339973
Panel C: With covariates and country fixed effects							
Cellphone ban	-0.443*** (0.016)	-0.246*** (0.010)	-0.026*** (0.010)	-0.064*** (0.008)	-0.149*** (0.012)	-0.110*** (0.008)	0.090** (0.036)
R-squared	0.050	0.107	0.049	0.052	0.120	0.110	0.074
Observations	359781	264385	267256	268430	243800	257051	339973
Mean of dependent variable							
	1.109	0.572	0.732	0.505	0.613	0.386	6.875

Notes: Panel A reports results without control variables. Panel B includes control variables: age, gender, international grade level, socioeconomic status (ESCS), student-teacher ratio, share of full-time teachers, share of certified teachers, private school indicator, minutes per class, and school location (urban/town). Panel C adds country fixed effects to the specification in Panel B. All regressions use PISA survey weights and account for the complex survey design. Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

F No Heterogeneous Effects of Cellphone Bans On PISA Test Scores

Test Scores

Figure F.1: Heterogeneous effects of effective cellphone bans on PISA Reading test scores

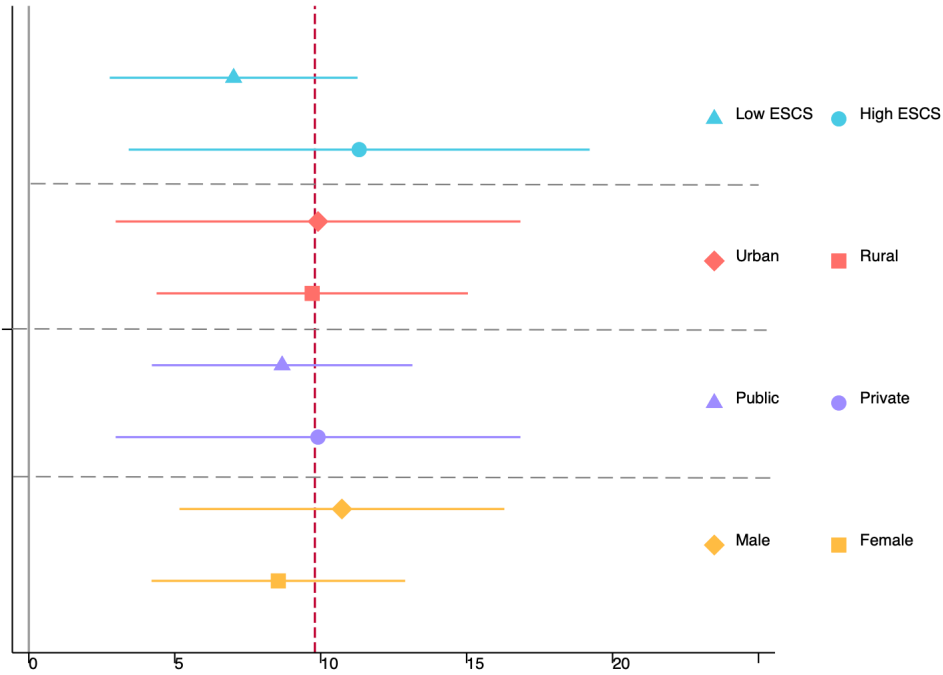


Figure F.2: Heterogeneous effects of effective cellphone bans on PISA Math test scores

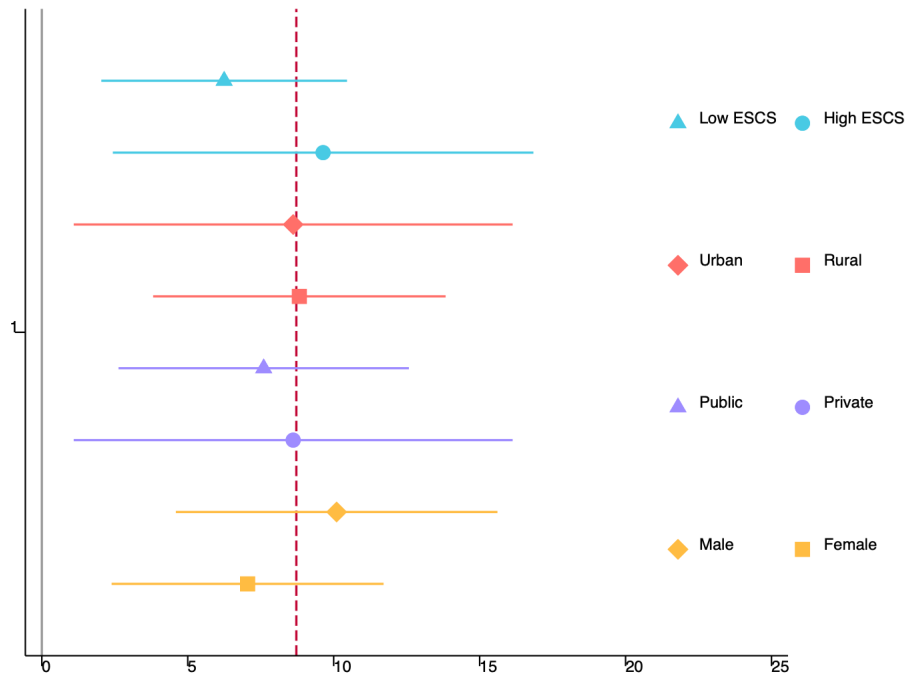


Figure F.3: Heterogeneous effects of effective cellphone bans on PISA Science test scores

