When the Household Becomes the School: Sibling Effects on Parental Attention and Educational Outcomes During School Closures

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This paper examines how family structure affects educational outcomes when unexpected shocks dramatically increase parental time requirements for children's learning. Using administrative and survey data from Peru, I employ a difference-in-differences strategy that compares children with siblings to only children before, during, and after school closures caused by Covid-19. Students with siblings experienced significantly larger learning losses of up to 0.06 standard deviations in GPA and 0.04 standard deviations in standardized exams, with effects intensifying as the number of siblings increased. These differential impacts persist after schools reopened and appear across diverse subpopulations. Evidence points to parental time constraints as the primary mechanism. Effects are largest during primary education when parental investment matters the most and in families with higher socio-economic resources who tend to spend more time with their children. Households without a computer or phone with internet show similar results which suggests siblings are not competing for access to resources. Regression discontinuity and instrumental variables methods provide further evidence of the negative cost of increased childcare and family size. Consistent with these results, parents of students with siblings also reduced their expectations that their children will achieve higher education by up to 3.2 percentage points. Overall, these findings reveal fundamental insights about family resource allocation under stress. When external education support disappears, the dilution of parental time across multiple children creates substantial disadvantages for larger families.
JEL Codes: I21, I24, D13

Economists have studied the relationship between family size and children's educational outcomes for many decades, with theoretical models suggesting a quantity-quality tradeoff in resource allocation and empirical evidence find mixed evidence. However, there is some evidence that this tradeoff exists when there are unexpected increases in family size such as twin births. Given a family size, parents can still face unexpected shocks in the amount of time required from them. When families face sudden childcare shocks, particularly during critical developmental periods, parents with multiple children may be less able to provide

quality education to all of them.

School closures during the COVID-19 pandemic provide a unique opportunity to examine family dynamics under extreme stress. In some countries, school closures lasted for over a year, forcing household's role in education production to increase dramatically. Learning losses persist even after school reopenings, with severe impacts on vulnerable populations including low-income students and those without internet access (Haelermans et al. (2022), Jakubowski, Gajderowicz and Patrinos (2023)). In this context, parents who have multiple children may experience different challenges in adapting to the new circumstances. However, the role of family structure in amplifying these effects remains largely unexplored.

This paper studies how family structure mediates the impact of educational shocks during nationwide lockdown and school closures. How do sibling presence and dynamics affect educational outcomes when households suddenly assume a bigger role in education? Specifically, I examine whether children with siblings experienced differential learning losses compared to only children from all grades. This setting provides crucial insights into how families reallocate scarce resources when parental time and attention suddenly become more demanded and constrained, and how larger families may be systematically less able to adapt under such circumstances.

I use administrative data on school progression and performance from Peru's education system, identifying siblings using anonymized parent IDs across all enrolled students from pre-K through 11th grade. This dataset is complemented by standardized national examinations administered in 2nd, 4th, and 8th grades, allowing me to demonstrate effects beyond grade point averages using comparable achievement measures. The ministry of education frequently coupled standardized tests with detailed parent and student surveys enabling rich heterogeneity analysis across household resources, parental time investments, socioeconomic status, and educational expectations. Additionally, I extend the analysis beyond immediate schooling outcomes by matching these data with college applications and enrollment records to study longer-term educational trajectories.

My identification strategy addresses endogeneity concerns by comparing families with multiple children, who arguably experienced larger childcare shocks, to those with only one child using a difference-in-differences framework. Although these groups differ in their performance, they exhibited parallel trends before school closures, allowing me to estimate how differentially varying exposure of parental time requirement shocks affected them. I specifically compare outcomes of first-born children in multi-child families (*more exposed*) versus only children (*less exposed*), eliminating biases from time-invariant family characteristics.

I strengthen this identification framework through two complementary quasi-experimental strategies. First, I exploit discontinuous variation generated by school starting age cutoffs, which determine whether younger siblings would normally attend school or remain home. This policy-induced variation creates an exogenous shock to household childcare demands: families with younger siblings

born just before enrollment cutoffs experience a sudden increase in home supervision requirements during closures, while those with siblings born just after cutoffs face relatively smaller disruptions. Second, I implement a difference-in-differences design comparing academic performance in the year of a sibling's birth versus the previous year, when parents arguably had greater time availability for educational support. I hypothesize that this performance gap widens during school closures, when reductions in parental investment in older siblings due to caring for a newborn have bigger consequences.

I find that students with siblings experienced significantly larger learning losses than only children across the full spectrum of academic measures. These differential effects are remarkably consistent across diverse subpopulations—appearing in both rural and urban areas, among low and high socioeconomic status families, and across varying levels of parental education. The magnitude of the sibling effect increases with the number of siblings, and the impacts are consistently more pronounced in elementary grades where parental input plays a more crucial role in academic development.

My results extend beyond immediate test scores to encompass broader educational trajectories. Using survey data on educational expectations, I find that parents of children with siblings became systematically more pessimistic about their children's long-term educational prospects, with decreased expectations for four-year college completion and increased predictions that high school would represent the maximum educational attainment. These expectation changes suggest that the immediate learning losses may have persistent effects on family educational investments even after schools reopen.

I explore alternative explanations to isolate the mechanisms driving my main results. First, to distinguish family size effects from birth order effects, I focus on first-born children when comparing only children with children who have siblings. Second, I investigate whether siblings directly disrupted each other through shared study environments or competition for technological resources. However, when focusing on families with large age gaps between siblings and households without computers or internet access results are similar, suggesting that direct sibling interference is not the primary mechanism. Third, the presence of siblings can also have indirect effects through their effect on parental time dilution. The evidence points strongly toward these indirect effects operating through parental time constraints as the dominant channel. My findings are consistently larger among elementary school children, where parental time investments are most critical for development. Using the school starting age discontinuity, I demonstrate that having a younger child remain home rather than attend school significantly reduces older siblings' academic performance and measured parental investment. Results vary systematically with parental education levels and family structure in ways consistent with time constraint mechanisms. Finally, larger families could also experience larger income shocks. However, I find no evidence of this during school closures, and my effects are actually strongest among high socioeconomic

status families who are best equipped to handle financial losses but typically invest more time in their children's education.

My results contribute to three strands of research. First, it relates to the literature of family structure and quality of education. Whether there is a quantity-quality tradeoff in the amount of children and the level of education they receive has been largely studied in economics (Becker and Tomes (1976), Black, Devereux and Salvanes (2005), Black, Devereux and Salvanes (2010), Angrist, Lavy and Schlosser (2010)). Research has shown that this is not always the case but that rather unexpected shocks can cause this tradeoff to exist. For instance, parents can plan and adapt to having a new child in a way that does not affect the quality of education received by other children but having twins may alter that balance. In a similar way, school closures act as an unexpected shock in increased childcare required from parents as well as increased time invested in education. This may cause a tradeoff to arise in larger families.

Second, it relates to the literature of health shocks and spillover effects in the family. Some of this work explains how increased parental time required by a child who experiences an adverse event can cause negative effects on the rest of the children. Black et al. (2021) finds that having a disabled child has negative spillovers on educational outcomes of their siblings.

Third, it relates to the literature about learning losses from the school closures led by the COVID-19 pandemic. There is ample evidence of large negative and persistent effects caused by school closures that are larger for more vulnerable populations(Haelermans et al. (2022), Jakubowski, Gajderowicz and Patrinos (2023), Goldhaber et al. (2023), Jack et al. (2023), Lichand et al. (2021) or Lichand and Doria (2024), Singh, Romero and Muralidharan (2022)). My results show a different aspect that sheds light on how part of this learning losses occurred: through the increased difficulties of translating education into the households when there are multiple children and limited parental time. Research from other fields have found positive effects of having siblings during the pandemic. Hughes et al. (2023), Lampis et al. (2023) show that siblings act as a buffering given the loss of other peers which lead to better linguistic and emotional-behavioral outcomes. Some of this though is early in the pandemic and not focused on educational outcomes. The potential multidimensional aspect of these effects is however an interesting area that requires further research.

These results shed light on the potential mechanisms that can drive learning losses when families face unexpected shocks that both constraint and increase the demand for time investments in the education of their children by showing how larger families can be more vulnerable in such circumstances. Furthermore, this is not something that families with higher resources may be able to overcome given the nature of the resource constraint that is driving the results: parental time. Extending our results to other settings, this can be causing persistent effects in several countries, developing and developed, particularly those who had longer periods of school closures also across countries (Figure 1), especially those most

affected by school closures. [1]

The paper proceeds as follows. Section II details the empirical approach. Section I describes the higher education system in Peru and linked administrative data. Section III presents results. Section IV discusses potential mechanisms. Section V concludes.

I. Data

I estimate the effects of family structure on educational outcomes before, during and after school closures using comprehensive school administrative and survey data matched with administrative college applications and enrollment. These data spans from 2014 to 2024 allowing me to explore effects even after schools re-opened

A. Sibling Identification

Our definition of exposure to school closures is based on family structure, or more precisely, on the number of children in the family. In order to do that, I use anonymized parent IDs to identify students who have the same mother as a proxy of them living together. I have this information for 98% of those enrolled from Pre-K to 11th grade.

In Table **??**, I show the means for the second grade population of first-born children during years 2015-2016, to provide a comparable population between the administrative data and the survey information from panels D, E and F. I show that 57% of first-born students are only children, 27.1% have one younger sibling, 12.2% have 2 younger siblings and 3.7% have 4 younger siblings. Overall, only children are very similar in their characteristics to children with one sibling. Children with 2 or 3 siblings are less similar, with them having higher rates of rural areas, public schools and overall lower socio-economic characteristics as see by their access to resources and parental education. Also, they have significantly lower academic performance and parental expectations.

B. Administrative data on school progression and GPA (SIAGIE)

From 2014 to 2024, I have access to data for all students enrolled in the schooling system from pre-k to 11th grade, in public and private schools. These data has information on academic grades by subject and overall grade progression. Additionally, it has information on the school characteristics, sex, parent's level of education and date of birth of students and parents. In Table 1, I show that 77.3% of students from the only children sample come from urban areas and 93.1% are promoted from second to third grade. There are some differences in

[1] Similarly, using data from Singh, Romero and Muralidharan (2022) I also find similar heterogeneity in learning losses. When replicatinbg their Table 1, I find that children with siblings had $0.1\sigma more in learning losses after 2 years of school closures. I show that in Table A.11$

the average GPA, with the children with one sibling having higher averages than the rest and those with three siblings having lower levels. Also, in Figure 2 I show that both populations, although at different levels of academic achievement, had parallel trends before school closures and after that, an additional gap emerges.

C. *Standardized National Examinations (ECE)*

Students were tested through standardized tests in specific grades and years. [2] This allows a measure of learning losses that is not dependent on within school-grade variations. These tests are standardized with mean 0 and standard deviation of 1 in the base year of 2007, in order to have comparable measures across time. [3] In Table 1, I show that only children score 0.067 standard deviations lower than children with one sibling in standardized mathematics examinations and 0.058 standard deviations higher than children with two siblings. The percentage of students who did 3 years of pre-k is similar between these groups.

D. *Surveys*

In some of the years were students were tested by ECE, a survey was taken to teachers, principals, parents (in 2nd and 4th grade) and students (in 8th grade). These include information from socio-economic status, parent's mother tongue, expectations for educational attainment, parental investment in education, access to internet and a PC, number of bedrooms, etc. In Table 1, I show that most parents have high expectations for the maximum level of education that their children will achieve. 79.1% of parents of only children expect that to be college education or higher, similar to 81.7% of parents of children with one sibling.

II. Empirical Strategy

My research approach is to carry out a simple difference-in-differences design: I compare first-born children from families with one versus multiple children. The basic idea underlying the research design is that, because of school closures, children remained at home and a lot of the burden of education relied on parents monitoring and spending more time with their children which given the limited time they had, meant that families with more children had less time to invest in each of them when there was no in-person school to substitute for that reduced investment. However, first-born children from families with different sizes may have different outcomes. I therefore look at the variation between these two groups over time as a way of separating the family structure effect from the effect of differences in exposure to the school closures. Put differently, the comparisons

[2] Second grade students were tested from 2007 to 2016 nationally and then in smaller samples in in 2019 and 2022. Fourth grades students were tested nationally in 2016, 2018 and 2024 and in smaller samples in 2019, 2022 and 2023. Eight grade students were tested nationally in 2015, 2016, 2018 and 2019 and in smaller samples in 2022 and 2023.

[3] Exams are scaled across years based on a control sample that takes both.

in Table 1 make it clear that families with one children are different in some ways from families with multiple children, especially as the number of children increases. My research design accounts for those differences across families by making comparisons between them across time.

Our main regression equation is the following:

$$Y_{isgt} = \alpha + \delta_1 \text{Post}_{it} + \delta_2 \text{S}_i + \boldsymbol{\beta} \text{Post}_{it} \text{S}_i + \gamma \mathbf{X}_{ist} + \lambda_s + \mu_g + \tau_t + \varepsilon_{isgt} \tag{1}$$

$$\begin{aligned} Y_{isgt} = \alpha + \delta_1 \text{Post}_{it} + \delta_2 \text{S}_i + \sum_{k=-5}^{-2} \delta_k (\mathbb{I}[t = 2020 + k] \text{S}_i) \\ + \sum_{k=0}^{4} \beta_k (\mathbb{I}[t = 2020 + k] \text{S}_i) + \gamma \mathbf{X}_{ist} + \lambda_s + \mu_g + \tau_t + \varepsilon_{isgt} \end{aligned} \tag{2}$$

where Y denotes a student's standardized test scores, grade point average (normalized to have mean zero and standard deviation one at the school-grade-year level), passing rates and other educational outcomes. S is an indicator variable taking the value one if the individual has siblings, henceforth is *'more exposed'*, *Post* is an indicator variable taking the value one if the year is 2020 and over, to account for the beginning of school closures. X is a set of controls that depending on the analysis can be sex, parental education, parents' age and baseline characteristics of the student and the household. I also include a set of school (λ), grade (μ) and time (τ) fixed effects. The coefficient of interest is captured by β, which represents difference in achievement gaps for *more exposed* versus *less exposed* children, that is, between children with siblings and only children. I also use an event study specification for a similar analysis.

Even if I find a differential effect between both groups, one concern is that the effect captured reflects only the heterogeneity on another dimension correlated with family size such as previous academic performance and socio-economic status. In order to address this I take two different approaches. First, taking advantage of the large administrative data, in Figure 3 I estimate the TWFE for different subsamples of the population and find that results are generally robust to all groups. Second, using additional information from standardized national examinations taken at different years to the same group of students, I estimate effects while controlling for baseline achievement and socioeconomic levels. Also, by using information from baseline surveys, I can perform more precise heterogeneity analysis that sheds some light into potential mechanisms. Table 3 and Table 4 .

I estimate the main regression equation (1) for the entire sample of first-borns as well as for several subgroups defined by school characteristics (rural, public, etc), student characteristics (sex, grade, etc), sibling characteristics (age gap, etc)

and parent characteristics (mother's education, living with both parents, etc).

III. Results

The main results are shown in Figure 3. The event study estimates in Figure 3a show clearly that previous to school closures, each of the *more exposed* groups trends similarly compared to the *less exposed* group of only children before school closures. It is after schools closed that I start seeing a break in the trend with larger effects for children with more siblings. After schools reopened, students with only one sibling return to their pre-pandemic levels relative to only children but those with two or more siblings show persistent effects.

A. Learning Losses

GPA

Given the administrative data has information on school grades on every subject, most of my analysis is based on standardized GPA at the school-grade-year level. In this way, by controlling for school grade and year fixed effects, the analysis is based on the relative differences between only children and children with siblings at the classroom level. Overall, I find significant negative effects in the reductions of GPA. In Figure 3b I show how these results are consistent for different subgroups of the population. Particularly interesting is how effects are significantly larger for primary school students than for secondary school students. Results are explored in more depth in Figure A.3, Figure A.4, Figure A.5, and Figure A.6.

Standardized Exams

In Table 2 I show significant effects on national standardized examinations taken in 2022 and 2023, when schools had already re-opened. The effect of these effects is big and significant, especially on lower grades, consistent with the analysis by GPA.

Expectations over educational attainment

In Table 2 I show significant reductions in parental expectations over their children reaching a 4 year college degree. These effects are more clearly present in 4th grade students, were losses in academic achievement are the largest.

IV. Mechanisms

I have found a general pattern, present in many different segments of the population in Peru, that students with siblings exhibited larger learning losses during school closures when compared to only children. Even more, the size of the

learning loss is increasing with the number of siblings. There are a number of plausible explanations for why this pattern would exist. First, to address any potential birth order effects, all the estimates that have been discussed compare first-born children. Second, siblings could be having a direct effect either by having to share common resources like computers or study rooms or by being a distraction to each other. Third, siblings could be affecting each other indirectly through the dilution of parental time available to each children. Fourth, bigger families could experience bigger income shocks due to the general lockdown and potential job loss. This could then have a negative effect on those families.

A. Birth Order

To separate birth order from family size effects, I have considered only estimates using first-born children. Results are however consistent when considering other children in the *more exposed* group. This allows for different potential analysis, such as the effect by age of the oldest sibling although this may increase concerns about the comparison with only children given the increasing differences between both samples.

B. Sibling disruptions

If siblings were being detrimental for learning through disruptive behaviour, I would expect this to be more prevalent when siblings are close in age gap. However, in Figure A.5 I show that results are similar when the students with siblings considered for the estimation are those with siblings close relative in age (0-2 years of age gap) or with large age gaps (6 years or more). [4] Additionally, results do not seem to be caused by siblings fighting for material resources either. In panel D and E of Table 3 I show that the negative effects are present even in households with neither a computer or internet to access remote education easily.

C. Parental time and investment

I find that the most likely mechanism driving these results is parental time and investment in their children's education. Given the reduced role of schools and teachers in the education production function through school closures, parents role becomes more prevalent and relevant. But they face constraints and can only allocate so much of their time to their children, and less so the more children they have.

Consistent with this hypothesis, in Figure A.4 I see results are larger for lower grades, when parental investments are more important. Additionally, in Table 3 I show that the negative effects are driven mostly from high performing students and students whose parents have higher expectations from parental education.

[4] However, parent's may be able to read or study to children of the similar age at the same time which may be counteracting this negative effect.

Even more, when looking at students whose baseline achievement was in the bottom quartile, I see no negative effect in the population of students with only one sibling when compared to only children. There are two potential explanations for this. On one hand, families with higher ability students or those that have higher expectations, tend to invest more of their time in the education of their children and hence these causes a dilution effect when there is more than one children while there is no effect in families who do not spend as much time. On the other hand, this could be suggestive of potential compensating effects, that is, parents unequally dividing their time focusing more on students who are doing worse. The latter would point in an opposite direction of what was found in recent research by Giannola (2024).

To further this analysis, I explore a different strategy by exploiting school starting ages (SSA) in Peru. In Table 5 I show how delaying school has a negative effect in the older sibling when schools operate normally, potentially showing the effects of increased childcare of having a younger sibling stay at home. During school closures, the student born before the cutoff would have to also stay at home rather than go to school. Even more, the potential spillover of having a younger sibling stay at home is likely larger during this period given the increased importance of parental investment. This results are also somewhat significant when looking at standardized test score in Table 6. But does this mean that having a younger sibling stay at home reduces parental investment in older siblings? Column 5 of Table 6 shows a reduction of 0.035 standard deviations in an parental time in education investment index based on how much they help their child with school work, study, homework, etc.

However, there are some results that are not consistent with this. I would expect single parents to be even more constrained in their time. However in Figure A.6 I show that results are similar for students that live with both parents or with only one parent.

D. Income

There is no information on income but rather a socio-economic index based on household characteristics. In Table 2 I show results on 2022 and 2023 socio-economic status index based on household characteristics from the survey. There are positive small but significant differences in some cases, although pointing in a direction opposite to negative income shocks as a mechanisms. That is, the socioeconomic status of larger families has slightly improved relative to that of only children. One caveat is that this index is more rigid than income and families could be potentially experiencing income shocks without an immediate effect in the socio-economic index, which is based on house materials, access to services and material belongings.

Additionally, I explore heterogeneous results on GPA by looking at households based on their baseline socio-economic status. In Table 3 I show that results are larger in households from the top quartile of SES, consistent with them being the

ones who often spend more time in education of their children. Still, results in the bottom quartile of SES are still significant and large, although present only when students have 2 or 3 siblings.

V. Conclusions

This paper has found evidence of a so far overlooked issue regarding family structure and school closures: That larger families struggled more to fill the role left by schools, that the losses caused by this are persistent and that they are likely caused by parents being unable to substitute the role of teachers given time constraints that become more prevalent when having to attend multiple children.

Peru was one of the countries that was most affected by the pandemic, both in death rates and in restrictive measures taken by the government. This begs the question about how valid are these results in other contexts. Based on the change in PISA test scores from 2012 to 2022 and the severity of school closures, in Figure 1 I see that most countries experienced a similar pattern of larger losses for children with sibligns and even more, I see these losses were larger in countries with longer school closures. This pattern occurs for both developing and developed countries.

REFERENCES

Angrist, Joshua, Victor Lavy, and Analia Schlosser. 2010. "Multiple Experiments for the Causal Link between the Quantity and Quality of Children." *Journal of Labor Economics*, 28(4): 773–824. Publisher: [The University of Chicago Press, Society of Labor Economists, NORC at the University of Chicago].

Becker, Gary S., and Nigel Tomes. 1976. "Child Endowments and the Quantity and Quality of Children." *Journal of Political Economy*, 84(4, Part 2): S143–S162. Publisher: The University of Chicago Press.

Black, Sandra E., Paul J. Devereux, and Kjell G. Salvanes. 2005. "The More the Merrier? The Effect of Family Size and Birth Order on Children's Education*." *The Quarterly Journal of Economics*, 120(2): 669–700.

Black, Sandra E., Paul J. Devereux, and Kjell G. Salvanes. 2010. "Small Family, Smart Family?: Family Size and the IQ Scores of Young Men." *Journal of Human Resources*, 45(1): 33–58. Publisher: University of Wisconsin Press Section: Articles.

Black, Sandra E, Sanni Breining, David N Figlio, Jonathan Guryan, Krzysztof Karbownik, Helena Skyt Nielsen, Jeffrey Roth, and Marianne Simonsen. 2021. "Sibling Spillovers." *The Economic Journal*, 131(633): 101–128. 18 citations (Crossref) [2024-08-03].

Giannola, Michele. 2024. "Parental Investments and Intra-household Inequality in Child Human Capital: Evidence from a Survey Experiment." *The Economic Journal*, 134(658): 671–727.

Goldhaber, Dan, Thomas J. Kane, Andrew McEachin, Emily Morton, Tyler Patterson, and Douglas O. Staiger. 2023. "The Educational Consequences of Remote and Hybrid Instruction during the Pandemic." *American Economic Review: Insights*, 5(3): 377–392.

Haelermans, Carla, Madelon Jacobs, Rolf van der Velden, Lynn van Vugt, and Sanne van Wetten. 2022. "Inequality in the Effects of Primary School Closures Due to the COVID-19 Pandemic: Evidence from the Netherlands." *AEA Papers and Proceedings*, 112: 303–307.

Hughes, Claire, Luca Ronchi, Sarah Foley, Caoimhe Dempsey, Serena Lecce, and I.-Fam Covid Consortium. 2023. "Siblings in lockdown: International evidence for birth order effects on child adjustment in the Covid19 pandemic." *Social Development*, 32(3): 849–867. _eprint: https://onlinelibrary.wiley.com/doi/pdf/10.1111/sode.12668.

Jack, Rebecca, Clare Halloran, James Okun, and Emily Oster. 2023. "Pandemic Schooling Mode and Student Test Scores: Evidence from US School Districts." *American Economic Review: Insights*, 5(2): 173–190.

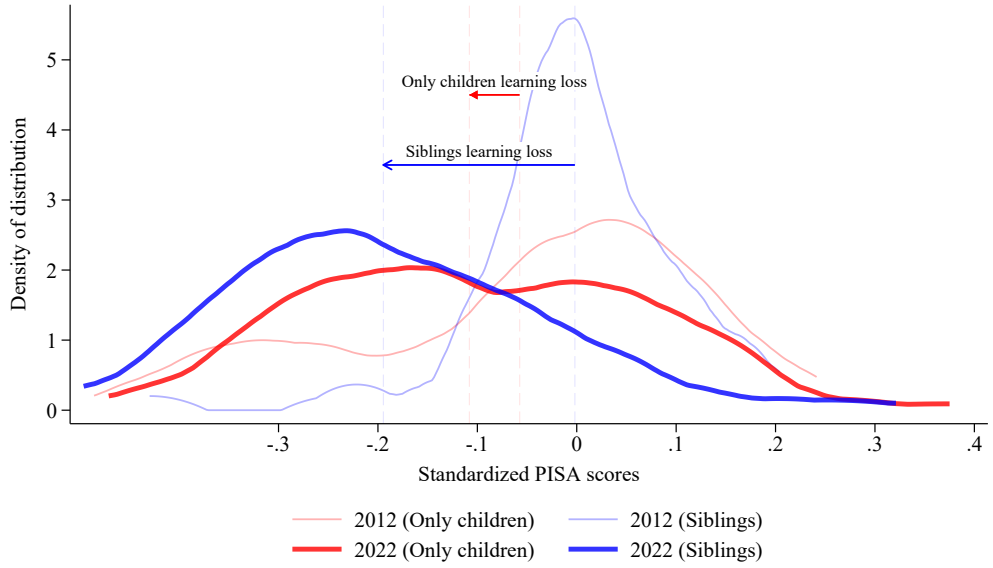
Jakubowski, Maciej, Tomasz Gajderowicz, and Harry Anthony Patrinos. 2023. "Global learning loss in student achievement: First estimates using comparable reading scores." *Economics Letters*, 232: 111313.

Lampis, Valentina, Sara Mascheretti, Chiara Cantiani, Valentina Riva, Maria Luisa Lorusso, Serena Lecce, Massimo Molteni, Alessandro Antonietti, and Marisa Giorgetti. 2023. "Long-Lasting Effects of Changes in Daily Routine during the Pandemic-Related Lockdown on Preschoolers' Language and Emotional–Behavioral Development: A Moderation Analysis." *Children*, 10(4): 656. Number: 4 Publisher: Multidisciplinary Digital Publishing Institute.

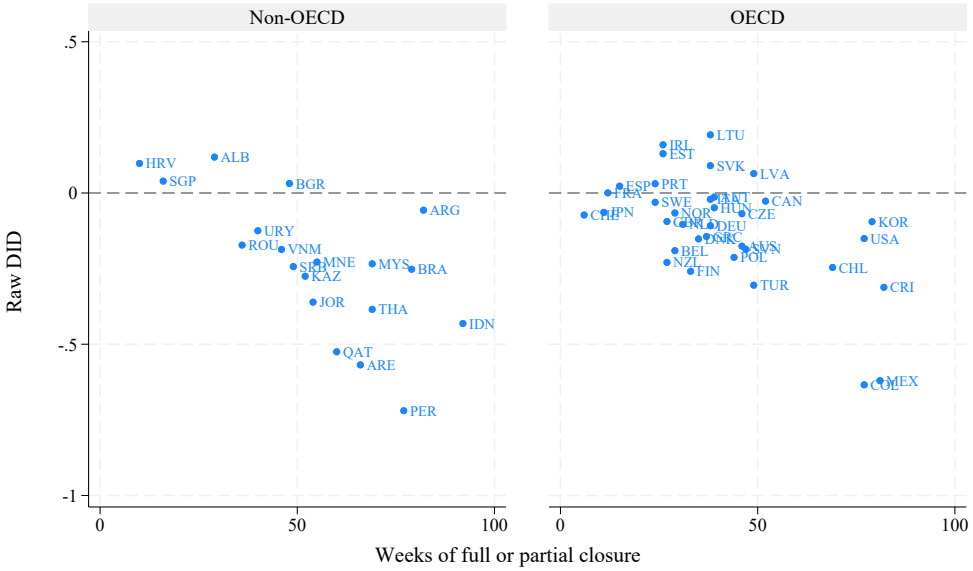
Lichand, Guilherme, and Carlos Alberto Doria. 2024. "The lasting impacts of remote learning in the absence of remedial policies: Evidence from Brazil." *Proceedings of the National Academy of Sciences*, 121(22): e2316300121. Publisher: Proceedings of the National Academy of Sciences.

Lichand, Guilherme, Carlos Alberto Dória, Onicio Leal Neto, and João Cossi. 2021. "The Impacts of Remote Learning in Secondary Education: Evidence from Brazil during the Pandemic." *IDB Publications*. Publisher: Inter-American Development Bank.

Singh, Abhijeet, Mauricio Romero, and Karthik Muralidharan. 2022. "Covid-19 Learning Loss and Recovery: Panel Data Evidence from India."

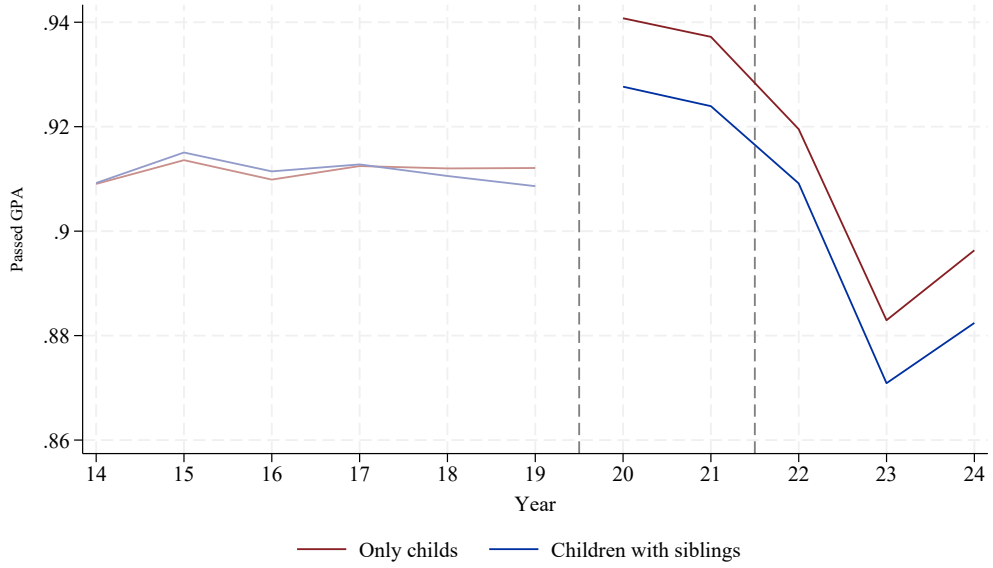


(a) Learning gaps in Mathematics between 2012 and 2022 for only children and children with siblings

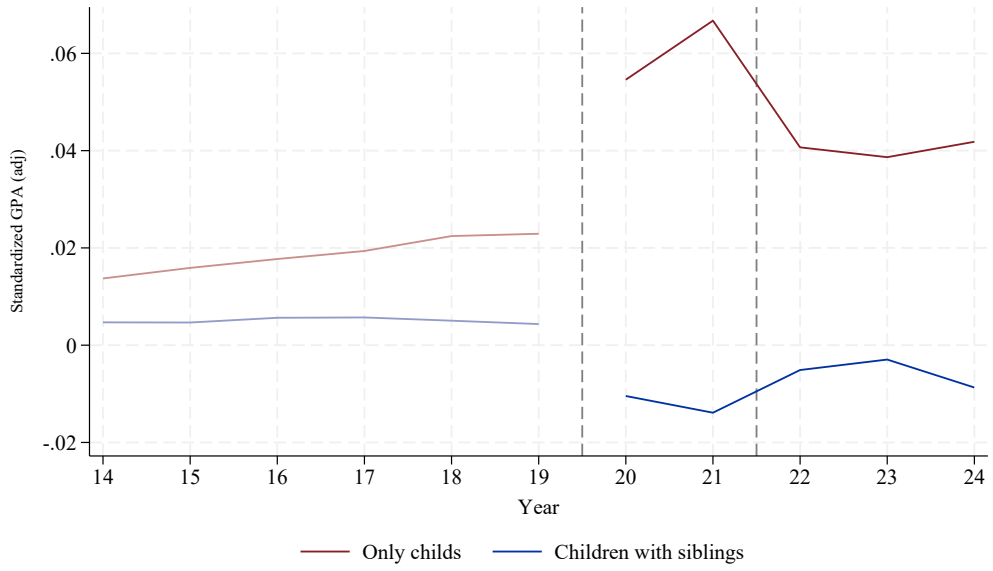


(b) Change in learning gaps by duration of school closure for OECD and Non-OECD countries.

Figure 1. : Learning gaps around the world

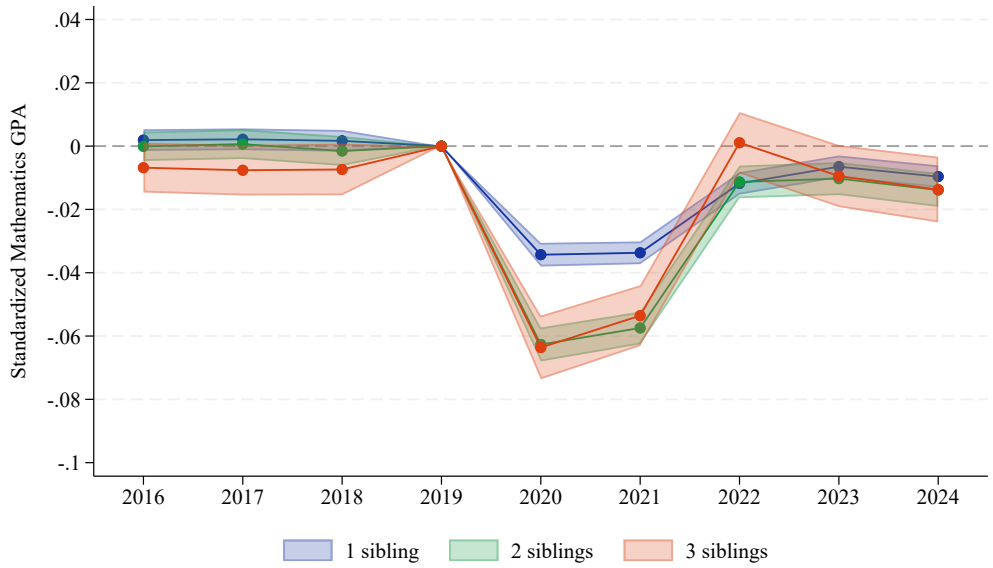


(a) % of students with a A in Mathematics from 1st-6th grade

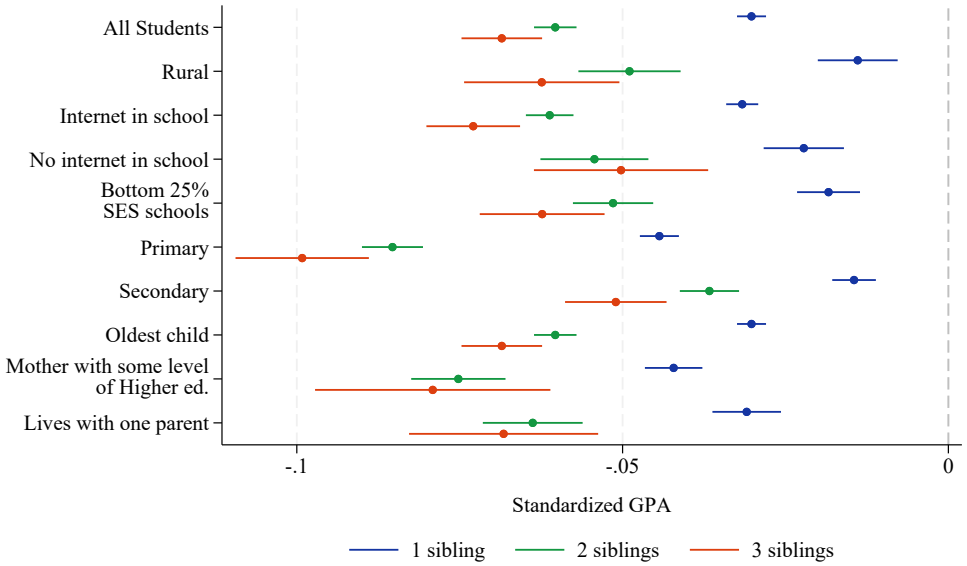


(b) Average GPA standardized within school-grade-year from 1st-6th grade

Figure 2. : Trends in education outcomes for only children and children with siblings



(a) Event Study - Learning losses compared to only children by number of siblings



(b) Change in gap between children with siblings and only childs

Figure 3. : Learning gap between only childs and siblings

Table 1—: Descriptive Statistics

	Only children	1 sibling	2 siblings	3 siblings
	(1)	(2)	(3)	(4)
% of sample	0.570	0.271	0.122	0.037
Panel A: School and student characteristics				
% Urban	0.773	0.800	0.741	0.621
% Public School	0.657	0.660	0.749	0.852
% Male	0.513	0.514	0.511	0.514
Panel B: Academic characteristics				
% Grade promotion	0.931	0.952	0.934	0.897
% Grade promotion without recovery	0.878	0.903	0.884	0.848
Standardized GPA (Mathematics)	0.025	0.097	0.030	-0.061
Standardized GPA (Reading)	0.030	0.099	0.032	-0.060
Panel C: Parent's characteristics				
% Lives with both parents	0.583	0.649	0.618	0.575
% Lives with one parent	0.197	0.184	0.189	0.193
% Lives with Mother	0.807	0.821	0.798	0.764
% Lives with Father	0.698	0.740	0.719	0.687
% Father without complete secondary	0.324	0.278	0.348	0.480
% Father with complete secondary	0.416	0.438	0.436	0.391
% Father with some level of higher ed.	0.259	0.284	0.215	0.129
% Mother without complete secondary	0.368	0.331	0.413	0.563
% Mother with complete secondary	0.395	0.418	0.408	0.346
% Mother with some level of higher ed.	0.237	0.251	0.178	0.090
Panel D: Household Resources (2nd grade: 2015, 2016)				
SES	0.102	0.065	-0.130	-0.394
% Radio	0.831	0.822	0.789	0.758
% Internet	0.334	0.300	0.234	0.149
% PC	0.345	0.317	0.243	0.160
% Laptop	0.308	0.284	0.219	0.141
% 6+ books	0.567	0.521	0.450	0.370
% Quiet room to study	0.859	0.854	0.827	0.794
Panel E: Academic Performance (2nd grade: 2015, 2016)				
standardized Reading score	0.930	0.997	0.872	0.661
standardized Mathematics score	0.883	0.995	0.883	0.676
Did 3 years of Pre-K	0.656	0.665	0.640	0.566
Has repeated a grade	0.043	0.033	0.044	0.071
Panel F: Parent's Characteristics (2nd grade: 2015, 2016)				
% Mother with complete secondary	0.245	0.273	0.276	0.261
% Mother with some level of higher ed	0.375	0.397	0.309	0.192
% Spanish	0.866	0.862	0.847	0.829
%Education expectation: High School	0.096	0.080	0.105	0.163
%Education expectation: 4-year college	0.791	0.817	0.765	0.668

Table 2—: TWFE on Standardized Exams, Expectations and Socio-Economic Status

	TWFE		
	1 sibling	2 siblings	3 siblings
	(1)	(2)	(3)
Panel A: 2nd grade students			
Mathematics	-0.018*	-0.074***	-0.082***
	(0.009)	(0.011)	(0.016)
Reading	-0.014	-0.058***	-0.069***
	(0.009)	(0.010)	(0.015)
Max Expectation: Finish school	0.007***	0.000	-0.003
	(0.002)	(0.003)	(0.005)
Max Expectation: 4-year college	-0.012***	-0.002	0.012
	(0.003)	(0.005)	(0.008)
SES	-0.015**	-0.035***	-0.045***
	(0.007)	(0.009)	(0.013)
Panel B: 4th grade students			
Mathematics	-0.025***	-0.076***	-0.124***
	(0.004)	(0.005)	(0.007)
Reading	-0.042***	-0.095***	-0.137***
	(0.004)	(0.004)	(0.006)
Max Expectation: Finish school	0.001	0.002	0.006**
	(0.001)	(0.001)	(0.003)
Max Expectation: 4-year college	-0.010***	-0.021***	-0.034***
	(0.002)	(0.002)	(0.003)
SES	-0.026***	-0.033***	-0.046***
	(0.003)	(0.004)	(0.005)
Panel C: 8th grade students			
Mathematics	-0.013**	-0.035***	-0.046***
	(0.006)	(0.007)	(0.010)
Reading	0.004	-0.018***	-0.028***
	(0.006)	(0.007)	(0.010)
Max Expectation: Finish school	-0.005	-0.007	0.001
	(0.014)	(0.015)	(0.017)
Max Expectation: 4-year college	-0.010	0.015	0.016
	(0.016)	(0.017)	(0.019)
SES	0.009*	0.020***	0.044***
	(0.005)	(0.006)	(0.009)

Table 3—: TWFE on GPA by baseline resources

	TWFE		
	1 sibling	2 siblings	3 siblings
	(1)	(2)	(3)
Panel A: All studentes			
Mathematics	-0.028***	-0.061***	-0.080***
	(0.004)	(0.005)	(0.009)
Reading	-0.018***	-0.044***	-0.052***
	(0.004)	(0.005)	(0.009)
Observations	1,285,073	1,038,874	906,608
Panel B: Low SES Households (Q1)			
Mathematics	-0.009	-0.028***	-0.061***
	(0.007)	(0.009)	(0.014)
Reading	-0.003	-0.016*	-0.040***
	(0.007)	(0.009)	(0.014)
Observations	312,464	264,200	226,444
Panel C: High SES Households (Q4)			
Mathematics	-0.037***	-0.065***	-0.113***
	(0.008)	(0.014)	(0.034)
Reading	-0.029***	-0.070***	-0.017
	(0.008)	(0.014)	(0.034)
Observations	257,212	199,735	179,355
Panel D: Households with no PC or Internet			
Mathematics	-0.032***	-0.079***	-0.067***
	(0.006)	(0.009)	(0.019)
Reading	-0.023***	-0.056***	-0.051***
	(0.006)	(0.009)	(0.019)
Observations	454,966	366,342	320,367
Panel E: Households with both PC and Internet			
Mathematics	-0.023***	-0.035***	-0.098***
	(0.006)	(0.009)	(0.015)
Reading	-0.008	-0.039***	-0.061***
	(0.006)	(0.009)	(0.015)
Observations	438,221	355,035	307,508

Table 4—: TWFE on GPA by baseline achievement and expectations

	TWFE		
	1 sibling	2 siblings	3 siblings
	(1)	(2)	(3)
Panel A: All studentes			
Mathematics	-0.028***	-0.061***	-0.080***
	(0.004)	(0.005)	(0.009)
Reading	-0.018***	-0.044***	-0.052***
	(0.004)	(0.005)	(0.009)
Observations	1,285,073	1,038,874	906,608
Panel B: Student in bottom quartile of achievement			
Mathematics	0.001	-0.042***	-0.106***
	(0.007)	(0.010)	(0.015)
Reading	0.009	-0.036***	-0.064***
	(0.008)	(0.010)	(0.016)
Observations	261,349	220,666	193,655
Panel C: Student in top quartile of achievement			
Mathematics	-0.045***	-0.101***	-0.140***
	(0.007)	(0.011)	(0.023)
Reading	-0.032***	-0.069***	-0.090***
	(0.007)	(0.011)	(0.023)
Observations	364,927	282,401	245,220
Panel D: Max Expectation: Finish school			
Mathematics	-0.003	-0.030	-0.054*
	(0.014)	(0.019)	(0.030)
Reading	-0.027*	-0.031	-0.059*
	(0.015)	(0.019)	(0.031)
Observations	84,652	71,387	61,974
Panel E: Max Expectation: 4-year college or grad school			
Mathematics	-0.033***	-0.067***	-0.095***
	(0.004)	(0.006)	(0.011)
Reading	-0.022***	-0.049***	-0.073***
	(0.004)	(0.006)	(0.011)
Observations	1,039,027	830,658	724,846

Table 5—: Effects of younger sibling delaying school on older sibling standardized exams - 1 - m - a - - 365

	Standardized GPA		
	Pre-Covid 2018-2019	Covid 2020-2021	Post-Covid 2022-2023
	(1)	(2)	(3)
Younger sibling goes to school	0.020***	-0.001	0.024***
	(0.007)	(0.007)	(0.006)
Local Linear	Yes	Yes	Yes
Observations	340,377	332,879	416,931
Counterfactual mean	0.047	0.027	0.037
Bandwidth	365	365	365

Table 6—: Effects of younger sibling delaying school on older sibling standardized exams and parental investment

	Pre-Covid 2018-2019		Post-Covid 2022-2024		
	Mathematics (1)	Reading (2)	Mathematics (3)	Reading (4)	Parental Investment (5)
Younger sibling goes to school	0.025*	0.023*	0.010	0.013	0.039***
	(0.014)	(0.012)	(0.013)	(0.010)	(0.013)
Local Linear	Yes	Yes	Yes	Yes	Yes
Observations	86,649	86,646	105,848	105,928	95,963
Counterfactual mean	-0.047	0.029	0.229	0.329	-0.012
Bandwidth	365	365	365	365	365

Appendix: NOT FOR PUBLICATION

Appendix A: Additional Tables and Figures

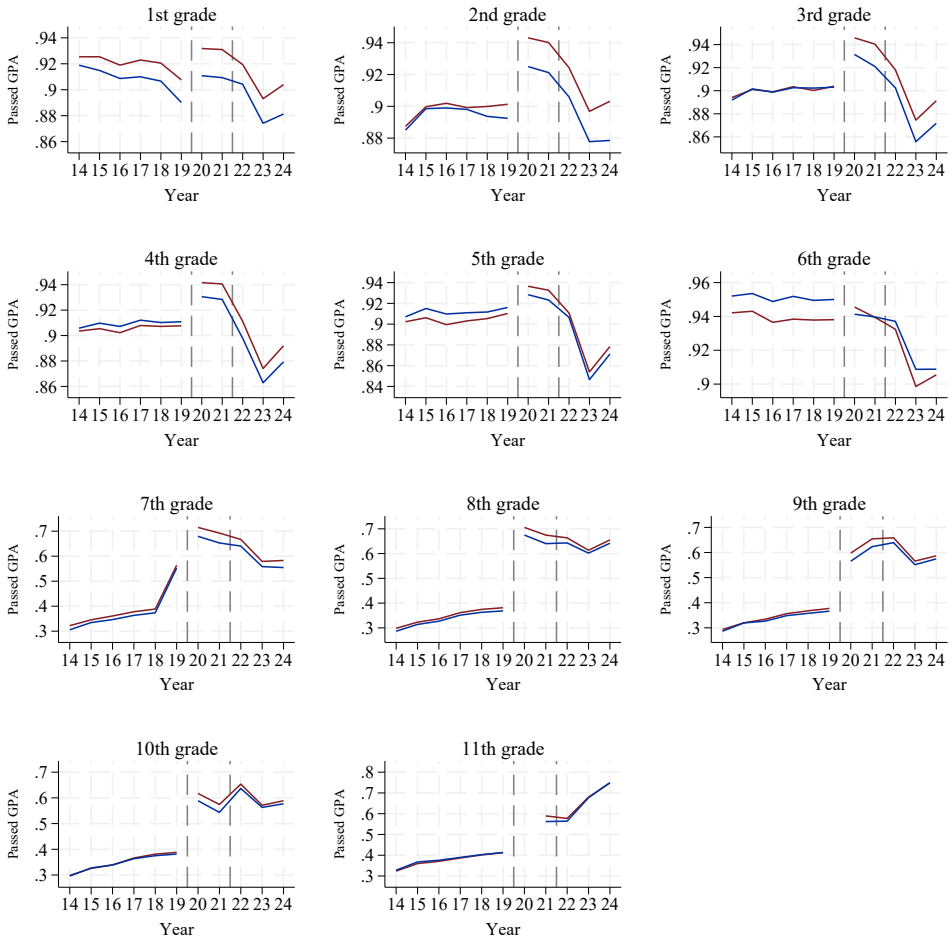


Figure A.1. : % of students with an A in Mathematics for each grade 1st-1th

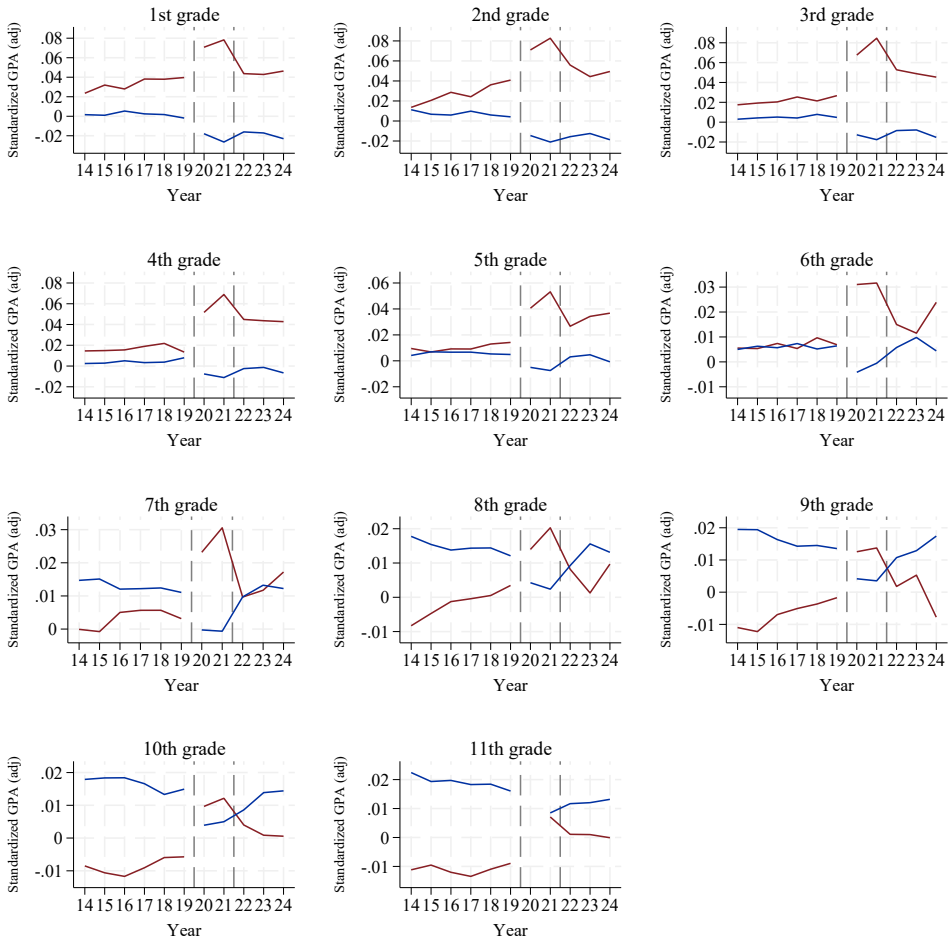


Figure A.2. : Average GPA standardized within school-grade-year for each grade 1st-1th

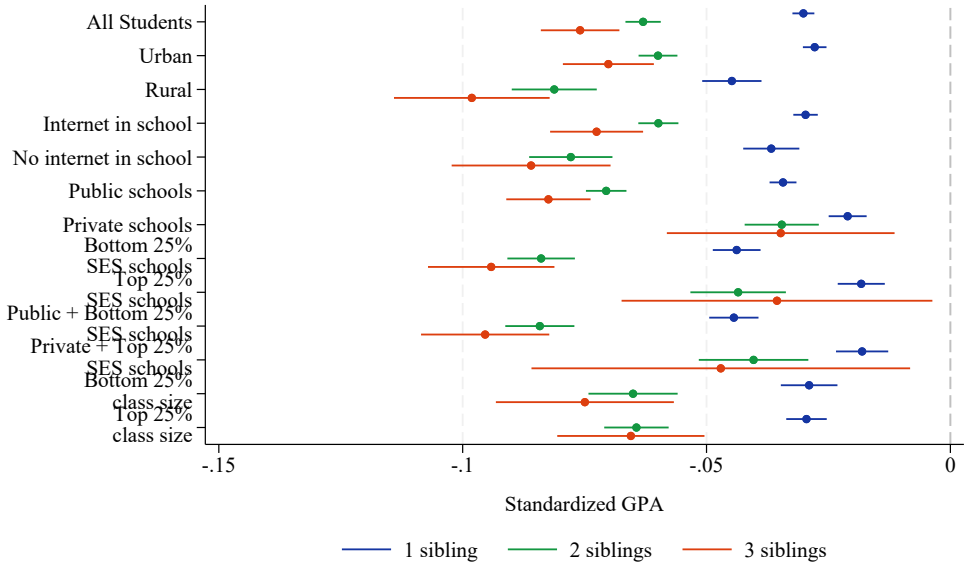


Figure A.3. : Change in gap between children with siblings and only childs

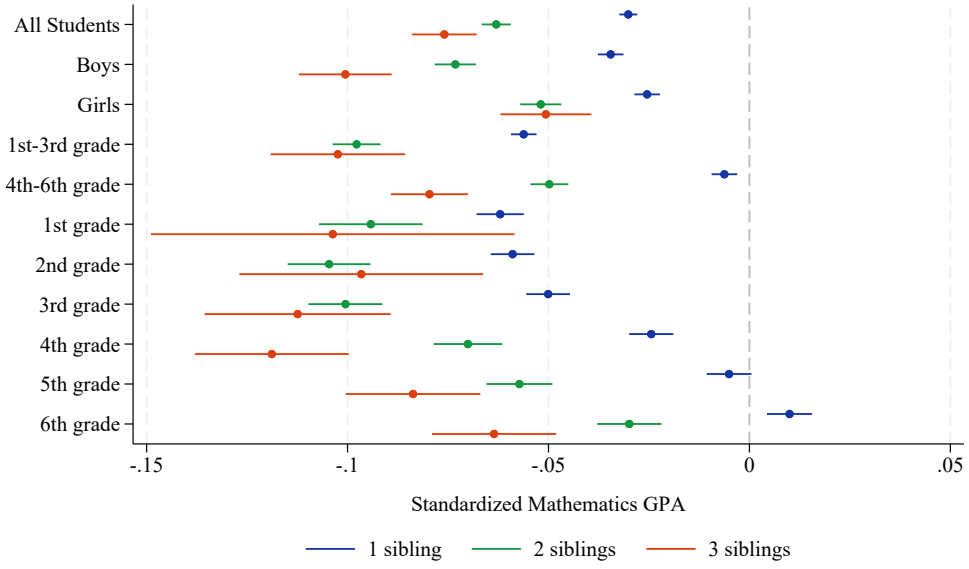


Figure A.4. : Change in gap between children with siblings and only childs

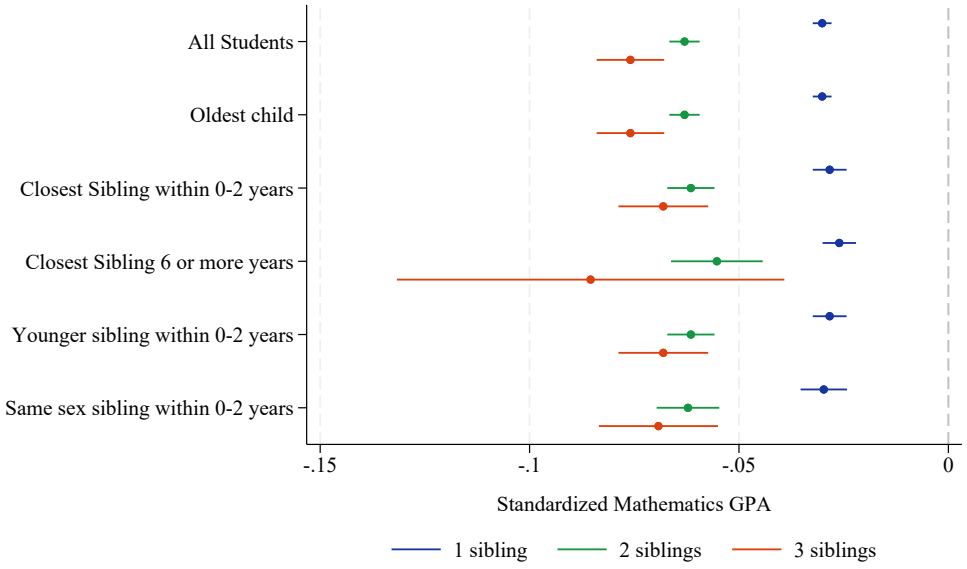


Figure A.5. : Change in gap between children with siblings and only childs

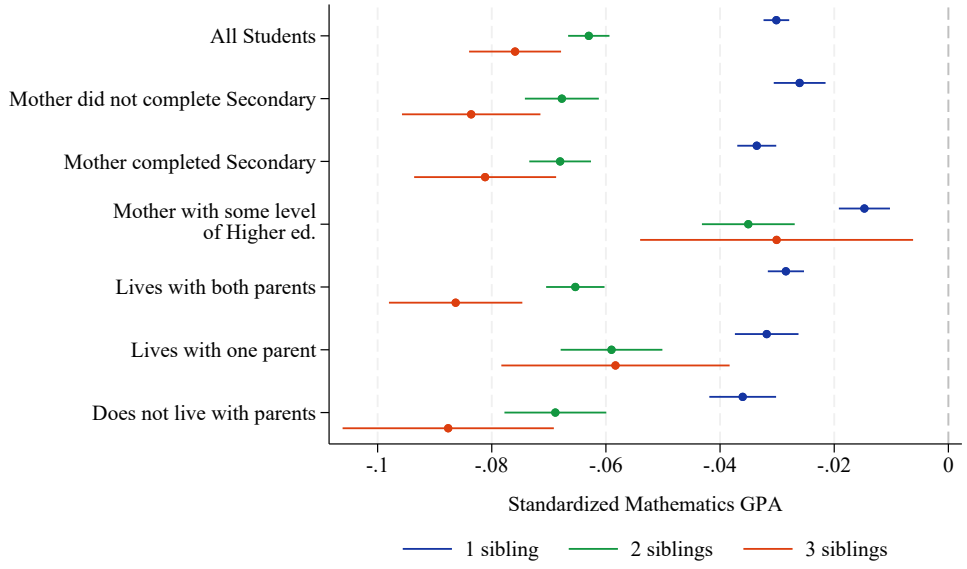


Figure A.6. : Change in gap between children with siblings and only childs

Table A.1—: Effects of younger sibling delaying school on older sibling standardized exams - K - m - a - - 365

	Standardized GPA		
	Pre-Covid 2018-2019	Covid 2020-2021	Post-Covid 2022-2023
	(1)	(2)	(3)
Younger sibling goes to school	0.001	0.010	0.003
	(0.006)	(0.007)	(0.006)
Local Linear	Yes	Yes	Yes
Observations	396,650	349,500	458,321
Counterfactual mean	0.050	0.031	0.040
Bandwidth	365	365	365

Table A.2—: Effects of younger sibling delaying school on older sibling standardized exams - 2 - m - a - - 365

	Standardized GPA		
	Pre-Covid 2018-2019	Covid 2020-2021	Post-Covid 2022-2023
	(1)	(2)	(3)
Younger sibling goes to school	-0.005	0.011	-0.001
	(0.008)	(0.008)	(0.007)
Local Linear	Yes	Yes	Yes
Observations	256,412	271,892	332,337
Counterfactual mean	0.061	0.025	0.056
Bandwidth	365	365	365

Table A.3—: TWFE on 6th grade GPA by 2nd grade baseline resources

	TWFE		
	1 sibling	2 siblings	3 siblings
	(1)	(2)	(3)
Panel A: All studentes			
Mathematics	-0.046***	-0.078***	-0.077**
	(0.013)	(0.018)	(0.035)
Reading	-0.023*	-0.035*	-0.072**
	(0.013)	(0.018)	(0.035)
Observations	108,585	85,464	72,938
Panel B: Low SES Households (Q1)			
Mathematics	-0.026	-0.029	-0.166***
	(0.026)	(0.033)	(0.057)
Reading	0.001	-0.001	-0.133**
	(0.026)	(0.034)	(0.058)
Observations	25,600	20,717	17,069
Panel C: High SES Households (Q4)			
Mathematics	-0.069**	0.013	0.034
	(0.034)	(0.056)	(0.155)
Reading	-0.026	-0.045	0.279*
	(0.034)	(0.056)	(0.153)
Observations	18,418	13,891	12,219
Panel D: Households with no PC or Internet			
Mathematics	-0.057***	-0.113***	-0.058
	(0.020)	(0.027)	(0.051)
Reading	-0.036*	-0.033	-0.069
	(0.020)	(0.027)	(0.051)
Observations	46,281	36,305	30,041
Panel E: Households with both PC and Internet			
Mathematics	-0.013	0.015	0.307**
	(0.034)	(0.056)	(0.146)
Reading	0.009	0.006	0.505***
	(0.035)	(0.056)	(0.147)
Observations	18,086	13,736	12,097

Table A.4—: TWFE on 6th grade GPA by 4th grade baseline resources

	TWFE		
	1 sibling	2 siblings	3 siblings
	(1)	(2)	(3)
Panel A: All studentes			
Mathematics	-0.024***	-0.062***	-0.110***
	(0.007)	(0.010)	(0.019)
Reading	-0.014**	-0.064***	-0.077***
	(0.007)	(0.010)	(0.020)
Observations	341,265	272,263	236,637
Panel B: Low SES Households (Q1)			
Mathematics	-0.014	-0.048**	-0.131***
	(0.015)	(0.019)	(0.031)
Reading	-0.004	-0.050***	-0.073**
	(0.015)	(0.019)	(0.031)
Observations	73,524	61,008	51,297
Panel C: High SES Households (Q4)			
Mathematics	-0.038**	-0.041	-0.203***
	(0.016)	(0.028)	(0.073)
Reading	-0.029*	-0.047*	-0.043
	(0.016)	(0.028)	(0.074)
Observations	70,576	54,091	48,686
Panel D: Households with no PC or Internet			
Mathematics	-0.027*	-0.054**	-0.084*
	(0.014)	(0.021)	(0.048)
Reading	-0.015	-0.054***	-0.057
	(0.014)	(0.021)	(0.048)
Observations	104,804	84,220	73,029
Panel E: Households with both PC and Internet			
Mathematics	-0.036***	-0.032*	-0.144***
	(0.012)	(0.019)	(0.041)
Reading	-0.027**	-0.051***	-0.064
	(0.013)	(0.019)	(0.042)
Observations	125,843	98,884	85,077

Table A.5—: TWFE on 7th grade GPA by 4th grade baseline resources

	TWFE		
	1 sibling	2 siblings	3 siblings
	(1)	(2)	(3)
Panel A: All studentes			
Mathematics	-0.024***	-0.070***	-0.060***
	(0.007)	(0.010)	(0.018)
Reading	-0.021***	-0.045***	-0.033*
	(0.007)	(0.010)	(0.018)
Observations	365,702	292,698	254,104
Panel B: Low SES Households (Q1)			
Mathematics	-0.000	-0.020	-0.005
	(0.014)	(0.017)	(0.028)
Reading	-0.012	-0.006	0.004
	(0.014)	(0.017)	(0.028)
Observations	90,252	75,485	63,910
Panel C: High SES Households (Q4)			
Mathematics	-0.026*	-0.091***	-0.106
	(0.016)	(0.027)	(0.071)
Reading	-0.031**	-0.097***	-0.066
	(0.016)	(0.027)	(0.072)
Observations	73,259	56,234	50,652
Panel D: Households with no PC or Internet			
Mathematics	-0.018	-0.107***	-0.084*
	(0.013)	(0.020)	(0.046)
Reading	-0.021	-0.077***	-0.107**
	(0.013)	(0.020)	(0.047)
Observations	113,464	91,731	79,607
Panel E: Households with both PC and Internet			
Mathematics	-0.007	-0.023	-0.003
	(0.012)	(0.018)	(0.040)
Reading	0.006	-0.030*	-0.016
	(0.012)	(0.018)	(0.040)
Observations	136,957	108,035	92,888

Table A.6—: TWFE on 9th grade GPA by 8th grade baseline resources

	TWFE		
	1 sibling	2 siblings	3 siblings
	(1)	(2)	(3)
Panel A: All studentes			
Mathematics	-0.032***	-0.053***	-0.074***
	(0.006)	(0.008)	(0.014)
Reading	-0.018***	-0.035***	-0.045***
	(0.006)	(0.008)	(0.014)
Observations	466,128	384,809	339,142
Panel B: Low SES Households (Q1)			
Mathematics	-0.018	-0.023	-0.044**
	(0.012)	(0.015)	(0.021)
Reading	-0.002	-0.006	-0.045**
	(0.012)	(0.015)	(0.022)
Observations	119,170	103,085	90,231
Panel C: High SES Households (Q4)			
Mathematics	-0.039***	-0.074***	-0.091*
	(0.013)	(0.021)	(0.050)
Reading	-0.026*	-0.057***	-0.027
	(0.013)	(0.022)	(0.050)
Observations	91,916	72,508	64,890
Panel D: Households with no PC or Internet			
Mathematics	-0.032***	-0.059***	-0.063**
	(0.009)	(0.014)	(0.029)
Reading	-0.021**	-0.036**	0.004
	(0.010)	(0.014)	(0.030)
Observations	186,154	149,785	133,378
Panel E: Households with both PC and Internet			
Mathematics	-0.031***	-0.042***	-0.095***
	(0.010)	(0.013)	(0.020)
Reading	-0.005	-0.030**	-0.066***
	(0.011)	(0.013)	(0.021)
Observations	153,436	130,307	113,257

Table A.7—: TWFE on 6th grade GPA by 2nd grade baseline achievement and expectations

	TWFE		
	1 sibling	2 siblings	3 siblings
	(1)	(2)	(3)
Panel A: All studentes			
Mathematics	-0.046***	-0.078***	-0.077**
	(0.013)	(0.018)	(0.035)
Reading	-0.023*	-0.035*	-0.072**
	(0.013)	(0.018)	(0.035)
Observations	108,585	85,464	72,938
Panel B: Student in bottom quartile of achievement			
Mathematics	-0.028	-0.073*	-0.160**
	(0.032)	(0.041)	(0.072)
Reading	0.018	-0.026	-0.095
	(0.032)	(0.042)	(0.073)
Observations	14,632	11,987	10,145
Panel C: Student in top quartile of achievement			
Mathematics	-0.061**	-0.103***	0.030
	(0.026)	(0.038)	(0.083)
Reading	-0.049*	-0.044	0.009
	(0.026)	(0.038)	(0.084)
Observations	34,500	26,134	22,113
Panel D: Max Expectation: Finish school			
Mathematics	0.004	-0.078	-0.222
	(0.063)	(0.083)	(0.141)
Reading	0.037	0.004	-0.250*
	(0.064)	(0.085)	(0.145)
Observations	5,127	4,075	3,422
Panel E: Max Expectation: 4-year college or grad school			
Mathematics	-0.048***	-0.073***	-0.041
	(0.015)	(0.021)	(0.042)
Reading	-0.030**	-0.031	-0.041
	(0.015)	(0.021)	(0.043)
Observations	87,535	67,871	57,831

Table A.8—: TWFE on 6th grade GPA by 4th grade baseline achievement and expectations

	TWFE		
	1 sibling	2 siblings	3 siblings
	(1)	(2)	(3)
Panel A: All studentes			
Mathematics	-0.024***	-0.062***	-0.110***
	(0.007)	(0.010)	(0.019)
Reading	-0.014**	-0.064***	-0.077***
	(0.007)	(0.010)	(0.020)
Observations	341,265	272,263	236,637
Panel B: Student in bottom quartile of achievement			
Mathematics	-0.013	-0.052***	-0.084**
	(0.015)	(0.020)	(0.035)
Reading	-0.005	-0.049**	-0.078**
	(0.015)	(0.020)	(0.035)
Observations	64,124	52,974	45,942
Panel C: Student in top quartile of achievement			
Mathematics	-0.038**	-0.094***	-0.098**
	(0.015)	(0.022)	(0.048)
Reading	-0.022	-0.071***	-0.095*
	(0.015)	(0.023)	(0.049)
Observations	97,944	74,571	64,319
Panel D: Max Expectation: Finish school			
Mathematics	-0.021	-0.064*	0.062
	(0.030)	(0.039)	(0.065)
Reading	-0.004	-0.082**	-0.018
	(0.030)	(0.039)	(0.065)
Observations	22,087	18,509	15,822
Panel E: Max Expectation: 4-year college or grad school			
Mathematics	-0.028***	-0.061***	-0.136***
	(0.008)	(0.012)	(0.024)
Reading	-0.018**	-0.062***	-0.106***
	(0.008)	(0.012)	(0.024)
Observations	270,591	212,753	184,893

Table A.9—: TWFE on 7th grade GPA by 4th grade baseline achievement and expectations

	TWFE		
	1 sibling	2 siblings	3 siblings
	(1)	(2)	(3)
Panel A: All studentes			
Mathematics	-0.024***	-0.070***	-0.060***
	(0.007)	(0.010)	(0.018)
Reading	-0.021***	-0.045***	-0.033*
	(0.007)	(0.010)	(0.018)
Observations	365,702	292,698	254,104
Panel B: Student in bottom quartile of achievement			
Mathematics	0.022	-0.009	-0.101***
	(0.015)	(0.019)	(0.033)
Reading	0.020	-0.005	-0.015
	(0.015)	(0.020)	(0.034)
Observations	76,396	63,590	55,311
Panel C: Student in top quartile of achievement			
Mathematics	-0.046***	-0.118***	-0.166***
	(0.014)	(0.021)	(0.045)
Reading	-0.042***	-0.081***	-0.062
	(0.014)	(0.021)	(0.045)
Observations	100,921	76,928	66,386
Panel D: Max Expectation: Finish school			
Mathematics	0.018	-0.033	-0.035
	(0.029)	(0.037)	(0.060)
Reading	-0.085***	-0.057	-0.051
	(0.029)	(0.037)	(0.060)
Observations	26,308	22,144	19,072
Panel E: Max Expectation: 4-year college or grad school			
Mathematics	-0.032***	-0.087***	-0.092***
	(0.008)	(0.011)	(0.022)
Reading	-0.024***	-0.057***	-0.076***
	(0.008)	(0.011)	(0.023)
Observations	287,508	226,685	196,682

Table A.10—: TWFE on 9th grade GPA by 8th grade baseline achievement and expectations

	TWFE		
	1 sibling	2 siblings	3 siblings
	(1)	(2)	(3)
Panel A: All studentes			
Mathematics	-0.032***	-0.053***	-0.074***
	(0.006)	(0.008)	(0.014)
Reading	-0.018***	-0.035***	-0.045***
	(0.006)	(0.008)	(0.014)
Observations	466,128	384,809	339,142
Panel B: Student in bottom quartile of achievement			
Mathematics	0.001	-0.043***	-0.104***
	(0.012)	(0.015)	(0.023)
Reading	0.012	-0.049***	-0.079***
	(0.012)	(0.016)	(0.024)
Observations	100,937	86,703	76,726
Panel C: Student in top quartile of achievement			
Mathematics	-0.062***	-0.100***	-0.171***
	(0.012)	(0.018)	(0.037)
Reading	-0.030**	-0.065***	-0.091**
	(0.012)	(0.018)	(0.037)
Observations	127,522	100,695	88,372
Panel D: Max Expectation: Finish school			
Mathematics	0.028	0.033	-0.071
	(0.025)	(0.032)	(0.052)
Reading	0.017	0.060*	-0.031
	(0.026)	(0.034)	(0.056)
Observations	25,985	21,700	18,777
Panel E: Max Expectation: 4-year college or grad school			
Mathematics	-0.036***	-0.061***	-0.084***
	(0.007)	(0.009)	(0.016)
Reading	-0.019***	-0.043***	-0.059***
	(0.007)	(0.009)	(0.016)
Observations	389,469	319,269	281,150

Table A.11—: Learning loss between August 2019 and December 2021

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel B: Learning loss in regression form												
	Math score (in SD)						Tamil score (in SD)					
Wave 1 (Dec 2021)	-.73***	-.74***	-.76***	-.75***	-.68***	-.71***	-.35***	-.35***	-.37***	-.38***	-.32***	-.34***
	(.031)	(.038)	(.042)	(.049)	(.037)	(.046)	(.02)	(.023)	(.027)	(.029)	(.024)	(.031)
Male × Dec 21		.023						-.0074				
		(.041)						(.022)				
Mother Edu: Gr. 9-11 × Dec 21			.019			.021			.0015			.004
			(.053)			(.053)			(.03)			(.03)
Mother Edu: Gr. 12+ × Dec 21			.09*			.084*			.06**			.057**
			(.049)			(.049)			(.025)			(.025)
SES Decile × Dec 21				.0046						.0061		
				(.0075)						(.0039)		
Has Siblings (2-10 yrs old) × Dec 21					-.11**	-.10**					-.065**	-.062**
					(.041)	(.041)					(.025)	(.026)
N. of obs.	13,083	13,083	13,083	13,083	13,083	13,083	13,083	13,083	13,083	13,083	13,083	13,083
R-squared	.33	.33	.33	.33	.33	.33	.31	.31	.31	.31	.31	.31

Notes: Panel A presents, for children of different ages, the raw IRT score in wave 0 (Aug 2019) and wave 1 (Dec 2021), as well as the difference between the two (the absolute learning loss in standard deviations), and the developmental lag (i.e., how much longer, in months, it took a student in 2021 to achieve the same score as a student in 2019). Panel B estimates the learning loss following Equation **??**. The estimation sample is restricted to individuals tested in Aug 2019 (Wave 0) or December 2021 (Wave 1) who were aged between 55–95 months at the time of the test. All regressions in Panel B include village fixed effects and control for age, gender, maternal education, and SES percentile. Test scores are normalized for age 60–72 months in 2019. Standard errors are clustered at the village level. Statistical significance at the 1, 5, 10% levels is indicated by ***, **, and *.