

Do children study longer depending on their parents' level of engagement? An analysis of factors related to Brazilian students' engagement

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Abstract

Purpose – The purpose of this article is to investigate factors related to the time students spent on remote activities during the coronavirus (COVID-19) pandemic in 2020. Specifically, it analyzes whether the school's relationship with the family and the guardians' support are associated with longer study times for children and youth.

Design/methodology/approach – This was performed using an ordered logit model on data from two waves of the survey Remote Education in the Perspective of Students and Their Families (PENP) with a nationally and regionally representative sample of Brazilian public school students.

Findings – Results show the importance of contact between the school and the family and, to a greater extent, the direct support of parents or guardians. The odds of learners spending more hours studying increase 36% when schools provide guidance for parents and guardians; in turn, when they provide support for students during activities, these odds increase 144%.

Originality/value – Moreover, students spend more time doing school activities in the later years of elementary school, high school and when they attend a state school.

Keywords Covid-19 pandemic, Study times, Brazilian public school students, Technologies

Paper type Research paper

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Data availability: The datasets generated and/or analyzed during the current study are not publicly available because data are not public but are available from the corresponding author upon request.



1. Introduction

By April 2020, 186 countries had to close their schools due to the pandemic of the novel coronavirus (COVID-19), which affected 74% of enrolled students worldwide (UNESCO - United Nations Educational, Scientific and Cultural Organization [1]). In Brazil, 48 million basic education students were affected. Brazil is also the fifth country where schools were closed for the longest: a total of 191 days with no in-person classes between March 2020 and February 2021 (Arias Ortiz, Dutra *et al.*, 2021; Todos Pela Educação, 2021; UNICEF, 2021).

Local governments and education managers faced various challenges, including the lack of Internet access and devices, teachers with no prior training on dealing with technologies and student difficulties related to the new context of remote learning. Recent studies have listed a broad range of consequences that closing schools had on student cohorts. The United Nations Educational, Scientific and Cultural Organization - UNESCO (2020) warns about imminent issues, e.g. teenagers who are uncertain whether they will continue studying and the growing risk of dropout, especially among students of low socioeconomic status. Other impacts are learning losses, future hardships to enter the job market and lower wages (Arias Ortiz *et al.*, 2021; Hanushek & Woessmann, 2020). Chetty, Friedman, and Stepner (2020) show that American students from low-income neighborhoods learned less during the pandemic. Hanushek and Woessmann (2020) point out that German students have spent less time on school activities, whereas the time spent watching TV, playing video games or using cellphones increased.

Moreover, the COVID-19 pandemic aggravated vulnerabilities even further. There have been difficulties adapting home environments to remote learning, especially among families of parents with a low level of education and limited access to resources (Brom *et al.*, 2020). The rate of families facing food insecurity and the consumption of foods with low nutritional value, i.e. junk food, have increased (Ashikkali, Carroll, & Johnson, 2020; Dondi *et al.*, 2020). According to Programa Alimentar Global, WFP (2020), there has been an increase in the odds of developing nutritional deficiencies without school meals. Likewise, without the safety net provided by schools, there has been an increase in domestic violence and child and youth abuse, which may potentially increase the odds of early pregnancy and child labor (Di Pietro, Biagi, Costa, Karpiński, & Mazza, 2020).

The pandemic also had indirect implications on the physical and mental health of children and youth: heightened stress levels, lack of focus, anxiety and depression-related symptoms in children, possibly resulting from the distancing from their social groups, isolation and their guardians' mental health (Ashikkali, Carroll, Di Pietro *et al.*, 2020; Orgilés, Morales, Delvecchio, Mazzeschi, & Espada, 2020; Russell, Hutchison, Tambling, Tomkunas, & Horton, 2020; Xie *et al.*, 2020).

Different strategies have been implemented to ensure that students keep learning even with the schools closed. Municipal and state education departments have implemented various strategies to ensure access to activities, e.g. video classes, instructions via WhatsApp, classes over TV and radio and even sending printed materials (União Nacional dos Dirigentes Municipais de Educação, 2020). According to Barberia, Plümper, and Whitten (2021), the Brazilian Government failed to coordinate the implementation of remote teaching, leaving it to the states and municipalities instead. This caused delays in the implementation of remote teaching programs. On average, there was a delay of 34 days between issuing the decree to close schools and the start of remote teaching (Barberia *et al.*, 2021). Additionally, the COVID-19 pandemic has exacerbated existing inequalities between individuals. The low percentage of students with access to broadband Internet has reduced the effectiveness of remote teaching interventions, as many strategies rely on the Internet to offer online classes. Finally, it is important to note that many programs require improvements in terms of supporting student learning and providing access to platforms.

Two months after Brazilian schools closed, 74% of students had been assigned to some kind of remote activity (Itaú Social, Fundação Lemman, & Imaginable Futures, 2020).

However, other challenges emerged, like the low level of student engagement in the context of remote learning. Meanwhile, the following questions arose: Are the students able to perform the proposed activities? How are families supporting this process? What are the impacts of this context on student learning?

The literature on online teaching shows that some aspects are necessary to ensure proper student functioning and learning, including parental monitoring (Ahn & Mceachin, 2017; Gulosino & Miron, 2017; Rouse & Krueger, 2004; Woodworth *et al.*, 2015). Parental monitoring has always been essential for a successful learning experience, even before the pandemic. Evidence has shown the importance of family engagement to further ensure proper learning (Mapp & Bergman, 2019). However, this is even more relevant for remote teaching like the one the pandemic imposes, given that parents are the ones who have to deal directly with the challenges students face while performing the activities. Nonetheless, they are also the ones who receive the least support, given the difficulties faced by schools and teachers (Hoffman & Miller, 2020; Sintema, 2020; Yarrow, Masood, & Afkar, 2020).

As Hanushek and Woessmann (2020) show, the connection between teaching staff and students has weakened, especially among low-income students. Contact with teachers would have a more significant effect amidst the pandemic if they could provide individual instruction, answer queries and keep students motivated. However, many teachers feel disconnected from their students due to the lack of support on how to use digital tools and platforms, leaving them confused and frustrated (Di Pietro *et al.*, 2020). This reinforces the importance of parental support and of the parents' relationship with the school to reduce the challenges that students are facing in the learning process (Pajarianto, Kadir, Galugu, Sari, & Febuanti, 2020; Yarrow, Masood, & Afkar, 2020).

Based on the above, one central question guides this article: How much time have students spent on remote school activities during the pandemic in 2020 and what factors have correlated with increasing or reducing that time? We sought to explore associated factors, specifically whether a stronger family-school relationship in the learning process ensures longer study hours. To answer these questions and understand the Brazilian educational scenario during the COVID-19 pandemic, the survey "Remote Education in the Perspective of Students and Their Families" (PENP) was carried out with a nationally and regionally representative sample of guardians of basic education students in the Brazilian public education system. This survey is an initiative of the Lemann Foundation, Itaú Social and Imaginable Futures, with operational and technical support from Datafolha and the *conhecimento* social organization.

To achieve this, we used an ordered logit model to determine the odds ratio of a given factor, increasing or decreasing the number of hours spent on remote activities. We studied the family-school relationship using the proxy variable of school communication that provides families with information or guidance (including the quality of this guidance); guardians engagement in the learning process, considering whether they are able to support students in their daily school activities, and the influence of parents and students' socioeconomic status.

The findings contribute to the literature on remote teaching and to the context of student learning from home during the pandemic in 2020. These data are new and present evidence that can inform discussions with education managers and guide public policies on what aspects may improve learning, e.g. bringing guardians closer to the school context and to the learning process, both in remote education and in the return of in-person classroom teaching. Betthäuser, Bach-Mortensen, and Engzell (2023) have highlighted that students lost out on 35% of their learning during the pandemic, with the most significant impact being on those from lower socioeconomic backgrounds. Moscoviz and Evans (2022) have found similar results in their systematic review, particularly for students with lower socioeconomic status, regardless of whether the country is low-, medium- or high-income.

Lichand, Doria, Leal-Neto, and Fernandes (2022) found similar results while analyzing students from the state of São Paulo when comparing the performance of the 2019 and 2020 cohorts. The study found that students in remote education were at a higher risk of dropping out, and their test performance decreased by 0.32 standard deviations when compared to those with face-to-face classes. The authors also note an inequality in the effects, with girls, non-white students, those from lower socioeconomic backgrounds and students from schools with no prior experience with remote teaching being the most affected during the period without face-to-face classes.

In addition to this introduction, this article is divided into six sections. The second section deals with the empirical literature on online teaching and the importance of the family–school relationship. The third section describes the sample and database used in this study. The fourth section describes the methodology. The fifth section presents and discusses the main results of the research. Finally, the last section includes our final considerations.

2. Online teaching and the importance of the family–school relationship

The literature on education indicates that families and schools do not have separate, independent roles in the development of children and youth; the key is, in fact, the interaction between these two environments and their different agents: parents, guardians, teachers, principals and education professionals in general (Mapp & Bergman, 2019). Furthermore, scientific evidence shows that when these two environments complement each other, students achieve better outcomes in terms of skills and competencies and are more motivated in the learning process (Gunnarsson, Orazem, Sánchez, & Verdisco, 2009; Kraft, 2017; Young, Austin, & Growe, 2013).

Based on an extensive literature review, Reynolds, Teddlie, Chapman, and Stringfield (2015) identify the involvement of parents in their children’s school life as one of the factors that contribute to school effectiveness. This means that when the schools work independently from the family, it is more challenging to achieve efficient levels of student learning.

Some ways in which parents and guardians can participate in school dynamics are (1) directly interacting with their children to support daily activities and model the value of education (Alves, Nogueira, Nogueira, & Resende, 2013), (2) interacting with teachers, principals and other members of the school community and (3) actively participating in meetings and other educational activities (Young, Austin, & Growe, 2013).

Programs that encourage family–school involvement have shown positive economic and social results in terms of impact assessment (Avvisati, Gurgand, Guyon, & Maurin, 2014; Bergman, 2015; Bergman, Edmond-Verley, & Notario-Risk, 2018; Kraft & Rogers, 2015). An experiment by Avvisati *et al.* (2014) identified that students whose parents attended school meetings developed better socioemotional skills, including better demeanor in the classroom, improved discipline and good behavior. Additionally, the study also reported a reduction in dropout and an increase in school attendance.

Some programs that positively affected parent-school involvement included the possibility of monitoring progress online or through electronic messages (Bergman, 2016; Gallego, Malamud, & Pop-Eleches, 2020). Bergman (2016) found that these actions impacted student performance: communication between school and parents increases and, consequently, the interaction and relationship between parents and children improve as parents become more engaged in their children’s lives (Gallego, Malamud, & Pop-Eleches, 2020).

When analyzing the effect of parent visits to school and a text message program, Bergman, Edmond-Verley and Notario-Risk (2018) found different effects based on the

students' grades. Reading and math grades improved for students with above-average performance; for students with poor performance, there was an increase in retention. For Kraft and Rogers (2015), this might be related to the information passed on to parents and the students' level of education.

In general, this literature indicates that the success of technology-based initiatives depends on parents receiving high-quality instructions about how to use that technology, how to follow their children's school routine and how to support them in different stages, considering the learning difficulties and characteristics of each student.

However, education technology and online educational models were already an option before the pandemic. Nonetheless, the empirical literature on (pre-pandemic) remote teaching methodologies found divergent results. In online teaching models, evidence indicates that *e-school* students in elementary school have poor performance in math and reading (Ahn & Mceachin, 2017; Rouse & Krueger, 2004; Woodworth *et al.*, 2015).

Compared to in-person classes, the online format is even worse among students with poorer performance (lower tertile) (Ahn & Mceachin, 2017). In addition, the graduation rate is lower in online schools compared to traditional schools (Gulosino & Miron, 2017). Lichand *et al.* (2022) found that students in state schools in São Paulo who were in municipalities that remained in remote education had poorer academic performance and a higher dropout rate than those who were attending face-to-face classes. Patrinos, Vegas, and Carter-Rau (2022) conducted a systematic review and found that, on average, school closures lasted for 15 weeks, resulting in a loss of 0.17 standard deviations in learning due to remote teaching. This loss is equivalent to six months' worth of an academic semester. It is important to note that remote teaching is not a perfect substitute for in-person teaching, and its impact is unequally distributed, with students from lower socioeconomic backgrounds being more adversely affected.

Contrary to the expectations of online learning software providers, results show an even greater need for support and/or supervision from parents and the educational institution since not all students perform the activities and/or engage with complementary education resources (Rouse & Krueger, 2004). Likewise, studies show that using technologies combined with classroom teaching and computer instructions promotes individualized learning, thus contributing to better academic performance (Barrow, Markman, & Rouse, 2009). Other evidence reinforces that teacher supervision is vital for optimizing classroom time and, consequently, improving performance (Angrist & Lavy, 2002).

Thus, even though the family-school relationship is important for school results and the development of children in general, it remains a challenge. A survey in Brazil showed that most state and municipal education departments believe that families play a critical role in education. However, only 58% of education departments have structured actions to improve this relationship. Most successful family-school relationships derive from actions fostered exclusively by the school manager and therefore depend on their leadership profile; these actions are hardly ever expanded to other schools (Itaú Social, 2018). In view of this, there is a dire need for a paradigm shift that prevents isolated actions and fosters integrated, structured actions that encompass the public education management agenda of education departments.

On the topic of the remote learning model imposed by the COVID-19 pandemic, according to Brom *et al.* (2020), families are not fully adapted. Lack of time and skills coupled with technology-related issues lead parents to demand more explanations and remote classes from teachers, as the learning load shifts mainly to activities posted on online platforms. Moreover, specifically for the later years of elementary school and for high school, parents find it more difficult to help children due to the wide variety of subjects and advanced educational content.

In general, the challenges posed by remote education in the pandemic reinforce the importance of strategies that strengthen the family's involvement in the children's school life.

Actions such as communication with parents and guardians might seem simple, but at the same time are capable of influencing the student's relationship with education and their engagement with remote activities.

3. Sample and database

Data used in this study come from the Remote Education in the Perspective of Students and Their Families (PENP) research. The PENP is a repeated cross-section study that gathers information from students' parents and guardians about different aspects of the educational experience amidst the COVID-19 pandemic. This survey had five editions and was conducted via telephone interview by the Datafolha Institute between May and December 2020. The survey gathers perceptions on the effects of closing schools, difficulties related to remote learning at home, students' feelings of anxiety and sadness as well as the ability of guardians to support school activities and their perception of the likelihood that students might dropout.

Each edition of the PENP includes questions regarding a fixed set of information on the guardian, including gender, age, color and/or ethnicity, occupation and household income. Student information reported by the guardians includes color and/or ethnicity, gender, age (between 6 and 18 years), disabilities, year, grade and type of public school (state or municipal).

The PENP was jointly commissioned by Itaú Social, the Lemann Foundation and Imaginable Futures as part of an endeavor to gather evidence on the context of public education during the COVID-19 pandemic and thereby contribute to the public debate on actions to mitigate its negative impacts. Respondents were drawn based on a list of cellphones generated by Datafolha. The sampling process was based on information from the 2019 Brazilian School Census, totaling 27,127,317 students. The sample is representative of public school students at national and regional levels, sorted by level of education (early years, late years and high school) and type of school (state and municipal). The PENP is weighted according to the type of city (if it is a capital city or not) and the student's gender and age. The sampling process assigns a certain weight to each observation, which is accounted for in estimated results.

It should be noted that, due to the availability of data for the variables that represent the family-school relationship, this study used waves 1 and 2 of the PENP. In total, there were 3,098 respondents (including waves 1 and 2). Among these respondents, 694 guardians provided only partial responses. Therefore, only 1,697 interviews were used, amounting to 2,236 students. The dependent variable and the variables of interest are described in the following sections.

3.1 *Dependent variable*

The dependent variable consists of a set of categories regarding the time Brazilian public school students spend performing activities at home as informed by their guardians during the research. Parents who participated in waves 1 and 2 of the PENP answered how many hours a day each student living in their residence spends on school activities. According to the guardians' responses and the number of hours spent on school activities, these students were classified as (1) at least one hour, (2) more than one but less than two hours, (3) more than two but less than three hours and (4) more than three hours.

Table 1 shows how students fall into these categories in each wave. Most of the students from the sample spend between one and three hours a day doing school activities at home, and their distribution in each category remains relatively stable between the two waves.

How many hours a day does the student spend doing the activities sent by the school at home	1	Wave 2	Total
Up to 1 hour	171	222	393
	16.46%	18.58%	17.58%
More than 1 and up to 2 hours	301	332	633
	28.91%	27.78%	28.31%
More than 2 and up to 3 hours	269	297	566
	25.84%	24.85%	25.31%
More than 3 hours	300	344	644
	28.82%	28.79%	28.80%
Total	1,041	1,195	2,236

Table 1.
Hours spent in school activities

Source(s): Prepared by the author's

3.2 Variables of interest and sample description

Based on the literature mentioned above, school actions that aim to inform, guide or increase communication between schools and parents, be they online or in-person, are considered the proxy of the family–school relationship (Bergman, 2016; Gallego, Malamud, & Pop-Eleches, 2020). This is the foundation that defines our main variables of interest.

The survey included two information pieces that are relevant to our study: (1) whether the student received guidance from the school to assist with activities to be performed at home and (2) whether the guardian is able to assist the student with the activities. These questions are essential measures to assess guardian–school and guardian–student relationships. Table 2 shows how this information is distributed according to the time each student spends on school activities. Regarding school guidance, students whose guardians received some guidance from the school spend more time in school activities. The lowest category (“Up to 1 hour”) is the only one in which most student guardians received no guidance from the school on how to support the students in their activities.

	How many hours a day does the student spend doing the activities sent by the school at home				
	Up to 1 hour	More than 1 and up to 2 hours	More than 2 and up to 3 hours	More than 3 hours	Total
<i>Did the guardian receive guidance from the school on how to help the students do the activities at home?</i>					
Did not receive guidance	232	276	244	268	1,020
	59.03%	43.60%	43.11%	41.61%	45.62%
Received guidance	161	357	322	376	1,216
	40.97%	56.40%	56.89%	58.39%	54.38%
<i>Guardian can help when the student has questions about the school tasks</i>					
Can never help	48	35	28	24	135
	12.21%	5.53%	4.95%	3.73%	6.04%
Sometimes can help	126	200	150	199	675
	32.06%	31.60%	26.50%	30.90%	30.19%
Can help most of the time	104	235	206	234	779
	26.46%	37.12%	36.40%	36.34%	34.84%
Can always help	115	163	182	187	647
	29.26%	25.75%	32.16%	29.04%	28.97%

Table 2.
Information on school–guardians interactions

Source(s): Prepared by the author's

Regarding the parents' availability to support students in performing school activities, it is important to note most students are in the categories in which the parent stated that "Sometimes they can help with school tasks" or "Most of the time they can help with school tasks." Students whose guardians declared they "can never help with school tasks" are relatively more frequent in the "Up to 1 hour" category.

Table 3 shows the characteristics of the sample of students in the PENP according to whether or not their guardians received guidance from the school on how to support students' school activities. We divided individuals into two groups: (1) those who received and (1) those who did not receive information from their families. The difference, (1)-(2), contains the statistical significance of the difference between the groups. For each group, we put each variable's mean (proportion).

Students whose guardians received guidance from the school are more likely to spend more than three hours studying (31%), whereas those whose guardians did not receive guidance are more likely to study only up to one hour per day (23%). Moreover, guardians who receive guidance are also able to help students more with their duties more often (97%).

The survey also provides data on the efficiency of the guidance the guardians received. Guardians who consider the guidance to be sufficient or barely sufficient represent 90% of the sample, whereas those who consider it not sufficient are only 11%. Because each respondent determines how this question is interpreted, answers that refer to "sufficient" information (whether too much or too little) were grouped into a single category. This division is used in the empirical model.

Guardians who received information are more likely to completely agree that students are progressing in their studies than guardians who received no guidance (33 and 20%, respectively). Conversely, guardians who did not receive guidance are more likely to completely disagree that the students' learning is improving (36%).

Students in the sample are statistically equal in terms of gender and color and/or ethnicity. Among guardians, there is no statistically relevant correlation between having received guidance (or not) and their level of education, occupation and income. About 48% of the guardians have declared to be female and 40% have declared to be white. Approximately 75% of guardians have a monthly income of up to two minimum wages, 21% between two and five, 4% between five and ten and 1% receive more than ten minimum wages per month.

Differences in age, school type and student's level of education are more prominent between the two groups. The majority of students whose guardians received information were attending municipal schools (56%), which represent a large share of public elementary education (years one to nine). Therefore, guardians of students in the early years and/or grades received more guidance from the school.

The majority of students whose parents did not receive guidance from the school are 11 years old or older. This may be related to the student's level of education since 71% of students whose guardians received guidance from the school were attending the later years of elementary school or high school.

Parents who receive guidance from the school are also more likely to have access to broadband Internet (63%) and computers and TVs connected to the Internet (64 and 69%, respectively). Regarding household characteristics, guardians living in capital cities, the metropolitan area, the Southeast and the Midwest receive less information from the school. Finally, guardians in households with older students receive more information from the school. The following section presents the empirical strategy used to verify how these characteristics are associated with the number of hours students spend on school activities.

4. Empirical strategy

An ordered logit model was used to analyze the time students spent on school activities at home when schools were closed and its associated factors. The goal is to estimate the odds

	Received information from the school		
	No (1)	Yes (2)	Difference (1)-(2)
<i>Dependent variable: hours spent performing school activities</i>			
Up to 1 hour	0.227	0.132	0.095***
More than 1 and up to 2 hours	0.271	0.294	-0.023
More than 2 and up to 3 hours	0.239	0.265	-0.026
More than 3 hours	0.263	0.309	-0.046**
<i>Independent variables</i>			
<i>Student's gender</i>			
Male students	0.536	0.527	0.009
Female students	0.464	0.473	-0.009
<i>Student's age</i>			
Younger than or 10 years old	0.247	0.498	-0.251***
Between 11 and 15 years old	0.488	0.385	0.103***
Older than or 16 years old	0.265	0.117	0.148***
<i>Student's ethnicity</i>			
White or Asian	0.406	0.428	-0.022
Black, Brown, Indigenous or other	0.594	0.572	0.022
<i>Type of school</i>			
Municipal school	0.415	0.561	-0.146***
State school	0.585	0.439	0.146***
<i>Student's level of education</i>			
Early years of elementary school	0.286	0.541	-0.255***
Late years of elementary school	0.423	0.324	0.099***
High school	0.291	0.135	0.156***
<i>Guardian's gender</i>			
Male guardian	0.295	0.271	0.024
Female guardian	0.705	0.729	-0.024
Guardian's age	39.89	37.61	2.281***
<i>Guardian's ethnicity</i>			
White or Asian	0.340	0.341	-0.001
Black, Brown, Indigenous or other	0.660	0.659	0.001
<i>Guardian's level of education</i>			
Illiterate or some primary	0.045	0.045	-0.000
Primary or incomplete elementary	0.193	0.162	0.031*
Complete elementary education	0.109	0.110	-0.001
Incomplete secondary	0.118	0.144	-0.026*
Complete upper secondary	0.354	0.363	-0.009
Incomplete college	0.073	0.063	0.010
College	0.083	0.085	-0.001
Post-graduate	0.025	0.029	-0.003
<i>Guardian's occupation</i>			
Unemployed	0.167	0.151	0.015
Employed	0.274	0.258	0.015
Public servant	0.067	0.086	-0.019*
Autonomous or independent professional, freelancer and odd jobs	0.225	0.221	0.003

(continued)

Table 3.
Descriptive student
statistics for waves 1
and 2 of the PENP

	Received information from the school		Difference (1)-(2)
	No (1)	Yes (2)	
Businessperson	0.020	0.026	-0.007
Stay-at-home parent	0.166	0.199	-0.033**
Retired	0.029	0.023	0.006
Student, intern or apprentice	0.013	0.008	0.005
Living off income	0.018	0.004	0.014***
Other	0.024	0.023	0.001
<i>Household income</i>			
Household income of up to BRL 1,045.00	0.398	0.431	-0.033
Household income from BRL 1,046.00 to BRL 2,090.00	0.325	0.303	0.022
Household income from BRL 2,091.00 to BRL 3,135.00	0.149	0.136	0.013
Household income from BRL 3,136.00 to BRL 5,225.00	0.077	0.082	-0.005
Household income of BRL 5,226 or more	0.050	0.048	0.002
<i>Broadband Internet availability in the household</i>			
Broadband Internet is available in the household	0.573	0.627	-0.055***
Broadband Internet is not available in the household	0.427	0.373	0.055***
There are computers or laptops with Internet access available in the household	0.576	0.641	-0.064*
There are TVs with Internet access available in the household	0.579	0.686	-0.106***
There are cell phones with Internet access available in the household	2.646	2.642	0.004
<i>Guardian's assessment of student learning with activities in the household</i>			
Guardian completely agrees that "The student is progressing in their learning"	0.203	0.334	-0.131***
Guardian agrees that "The student is progressing in their learning"	0.200	0.271	-0.071***
Guardian neither agrees nor disagrees that "The student is progressing in their learning."	0.012	0.013	-0.001
Guardian disagrees that "The student is progressing in their learning"	0.214	0.192	0.021
Guardian completely disagrees that "The student is progressing in their learning"	0.366	0.183	0.182***
Guardian does not know whether "The student is progressing in their learning."	0.006	0.007	-0.001
Number of children or teenagers in the household (aged 6-18)	1,850	1,910	-0.060
<i>Other older children in the household</i>			
There are no children older than the student in the household	0.726	0.641	0.085***
There are children older than the student in the household	0.274	0.359	-0.085***
<i>Household location</i>			
Capital city	0.283	0.228	0.056***
Metropolitan area	0.183	0.154	0.030*
Inland (not the capital)	0.533	0.618	-0.085***
Southeast	0.425	0.370	0.055***
South	0.154	0.175	-0.021
Northeast	0.231	0.227	0.004
Midwest	0.085	0.113	-0.027**
North	0.104	0.115	-0.011
<i>Wave in which the interview was performed</i>			
Wave 1	0.486	0.448	0.038*
Wave 2	0.514	0.552	-0.038*

Table 3.

(continued)

	Received information from the school		Difference (1)-(2)
	No (1)	Yes (2)	
<i>Did the guardian receive guidance from the school about the activities in the household</i>			
Guardian did not receive guidance from school	1.000	0.000	1.000
Guardian received sufficient or barely sufficient information (enough)	0.000	0.897	-0.897***
Guardian did not receive sufficient information	0.000	0.103	-0.103***
<i>Guardian can help with school tasks</i>			
Guardian cannot help with school tasks	0.102	0.025	0.076***
Guardian can help with school tasks (always, most of the times, sometimes)	0.898	0.975	-0.076***

Note(s): 1. The column difference concerns the *t*-test. 2. *, ** and *** represent a confidence of 90, 95 and 99% respectively

Source(s): Prepared by the author's

Table 3.

ratio of a particular characteristic associated with an increase or decrease in hours spent on remote activities. More specifically, the goal is to identify the influence of school-guardian communication and the guardian's support of students performing their activities. Be y an ordered dependent variable that takes values $\{0, 1, 2, \dots, M\}$ for the m categories. Thus, the lowest value $\{0\}$ represents the lowest result (up to one hour spent on school activities) and M is the highest result (more than three hours spent on school activities). The ordered logit model can be derived from a regression model with latent variables:

$$y_i^* = \beta x_i + \varepsilon_i \quad (1)$$

where y_i^* is a continuous latent variable, x_i is a vector of independent variables (e.g. age, sex and income), β is a set of estimated parameters and ε_i is the error term. Using the ordered logit model, the residual ε_i assumes a logistic distribution. y_i^* suffers a censoring mechanism:

$$y_i = m \text{ if } \mu_{m-1} < y_i^* \leq \mu_m \quad (2)$$

where y_i is the observed part of the variable y_i^* , m is an ordered category and μ is a set of parameters that represent the different cutoff points estimated with β . The probability of observing a given result can be written as follows:

$$Prob(y_i = m | x_i) = g(\mu_m - x_i \beta) - g(\mu_{m-1} - x_i \beta) \quad (3)$$

where g has an accumulated logistical distribution, a positive coefficient for β represents that the variable is more likely to have higher values. Alternatively, a negative coefficient for β indicates that the variable is more likely to have smaller values.

5. Results and discussion

Results show a positive correlation between the number of study hours and the proxy for the family-school relationship, represented by variables that define whether the guardian received guidance from the school and provided support during the activities. In addition to the category that describes whether the guardian received guidance or not (omitted for comparisons), the guardian's perception of the quality of this information is accounted for and serves as the foundation for the remaining analytical categories. Results suggest that receiving information from the school, regardless of whether it is considered sufficient or

insufficient, is associated with a statistically significant difference in study hours compared with students whose guardians received no information. This contributes the hypothesis that families who have a close relationship with the school and supportive guardians are also the ones with students who are more engaged in the activities (Table 4).

Before interpreting the coefficients, it should be noted that the results are presented as odds ratios. Conditional probabilities are considered. In column (1), values higher/lower than one indicate a higher and/or lower probability of the student having more study hours than the dummy variable category, as long as these values are statistically significant. Column (2) shows the percentage [2] at which the independent variable represents an increase and/or decrease compared to the reference category, i.e. whether it increases and/or decreases the odds that the student will spend more hours studying. Thus, when the information is considered to be sufficient or barely sufficient, the odds that the student will spend more hours on school activities increase by 27.2%. Among students whose guardians received information from the school and consider it to be insufficient (which may represent guardians who are more demanding when it comes to their student's learning), the odds of spending more hours studying increase by 36%, i.e. when parents or guardians are more involved in the school, students also become more involved. A potential reason for this is the influence of this communication on how engaged parents are in their children's school life.

Alongside the family-school relationship, when guardians can help students with school activities, the odds of the learner spending more hours studying increase by 178.5%. In terms of odds ratio, this relationship is the one that has the most influence over study hours. This merits further investigation about potential causal links between parenting and students' outcomes in the context of remote learning (Pajarianto *et al.*, 2020; Yarrow, Masood, & Afkar, 2020). In this sense, guardians may represent a strategic link between the school and the students amidst the pandemic.

Likewise, there is a positive relationship with the guardians' perception that the student is progressing. For guardians who agree that the student is progressing, the number of hours spent on school activities is also higher. It is worth noting that this relationship might be endogenous since a higher number of hours spent studying may also influence the guardians' perception that the students are progressing. Empirical studies show that study time positively affects student performance (Lavy, 2015; Rivkin & Schiman, 2015). While measuring the effects of changing the school schedule to full time, Aquino (2011) reported that this relationship (albeit of a small magnitude) is also valid for Brazil. In the context of remote learning imposed by the COVID-19 pandemic, Sintema (2020) showed that the number of study hours and guardian monitoring are related to student learning. However, it is common for this relationship to be more effective when students have a better study environment, receive better instructions and have better interactions with their teacher (Rivkin & Schiman, 2015). For remote classes (where students do not have the benefits of peers and the school environment), the relationships between school, parents and students become even more important. Students from the lowest socioeconomic levels were the most affected during the pandemic, regardless of the country's income level. Engzell, Frey, and Verhagen (2021) point out that Dutch students, whose country has high access to broadband and where schools remained closed for a short time, progressed due to remote teaching. Furthermore, students whose parents had the lowest levels of education experienced the greatest learning losses. Contini, Di Tommaso, Muratori, Piazzalunga, and Schiavon (2021) find high learning losses for Italian students of lower socioeconomic status and whose parents have a low level of education. Other variables that showed statistically significant correlation with the number of hours students spend on school activities were the student's gender, level of education, school type, guardian's age, the number of computers with Internet access, the number of students in the household, guardian's occupation (if the occupation is businessperson or retired) and location.

Variables	Study hours	
	(1)	(2)
<i>Received information from the school</i> (dummy = not received)		
A lot or a little (enough)	1.281*** (0.117)	28.1%
Not enough	1.334 (0.251)	33.4%
<i>Guardian can help with school tasks</i> (cannot help)		
Can help (always, most of the time, sometimes)	2.785*** (0.544)	178.5%
<i>The student is progressing in their learning</i> (dummy = completely agree)		
Partially agrees	0.774** (0.089)	-22.6%
Neither agrees nor disagrees	0.664 (0.274)	-
Partially disagrees	0.581*** (0.067)	-41.9%
Completely disagrees	0.414*** (0.051)	-58.6%
Does not know	0.575 (0.288)	-
<i>Student's gender</i> (female = 1)	1.223** (0.099)	22.3%
<i>Student's age</i>		
Between 11 and 15 years old	1.002 (0.187)	-
Older than or 16 years old	0.771 (0.172)	-22.9%
<i>Color/ethnicity</i> (POC = 1)	1.074 (0.106)	-
<i>Type of school</i> (state = 1)	1.486*** (0.149)	48.6%
<i>Level of education</i>		
Late years of elementary school	1.803*** (0.333)	80.3%
High school	2.059*** (0.450)	105.9%
<i>Guardian's gender</i> (female = 1)	0.969 (0.096)	-
<i>Guardian's age</i>	0.989** (0.005)	-1.1%
<i>Guardian's color/ethnicity</i> (POC = 1)	0.939 (0.100)	-
<i>Level of education</i>		
Primary/incomplete elementary	0.876 (0.210)	-
Complete elementary	1.243 (0.321)	-
Incomplete lower secondary	0.860 (0.212)	-
Complete upper secondary	0.956 (0.226)	-

(continued)

Table 4.
Factors associated
with the number of
hours Brazilian
students spend on
school activities during
remote learning
(ordered logit model in
the odds ratio format)

ECON

Variables	Study hours	
	(1)	(2)
Incomplete college	0.931 (0.270)	–
College	0.816 (0.234)	–
Post-graduate	0.813 (0.303)	–
<i>Guardian's occupation</i> (dummy = unemployed)		
Employed	1.121 (0.155)	–
Public servant	1.054 (0.243)	–
Autonomous or independent professional, freelancer, odd jobs	1.196 (0.165)	–
Businessperson	1.594* (0.403)	59.4%
Stay-at-home parent	1.279 (0.194)	–
Retired	1.741* (0.541)	74.1%
Student, intern or apprentice	0.990 (0.398)	–
Living off income	1.314 (0.462)	–
More	0.759 (0.201)	–
<i>Household income</i> (dummy <BRL 1,046.00)		
From BRL 1,046.00 to BRL 2,090.00	1.082 (0.115)	–
From BRL 2,091.00 to BRL 3,135.00	0.906 (0.141)	–
From BRL 3,136.00 to BRL 5,225.00	0.764 (0.142)	–
BRL 5,226.00 or more	1.008 (0.247)	–
<i>Household with broadband Internet</i> (1 = no)	0.912 (0.0881)	–
<i>How many computers or laptops with Internet access are available in the household</i>	1.066 (0.063)	–
<i>How many TVs with Internet access are available in the household</i>	1.049 (0.0671)	–
<i>How many cell phones with Internet access are available in the household</i>	1.054 (0.0404)	–
<i>Are there children and teenagers (6 to 18 years old) in the household? How many?</i>	0.869*** (0.0472)	–13.1%
<i>Are there children older than the student in the household?</i>	1.005 (0.111)	–
<i>Type of city</i> (dummy = capital city)		
Other cities in the metropolitan area	1.292** (0.165)	–
Inland (not the capital city)	1.393*** (0.137)	39.3%

Table 4.

(continued)

Variables	Study hours	
	(1)	(2)
<i>Region</i> (dummy = Southeast)		
South	1.222 (0.149)	–
Northeast	1.069 (0.122)	–
Midwest	1.523*** (0.229)	52.3%
North	0.850 (0.115)	–
<i>Wave 2</i>	1.020 (0.085)	–
<i>Observations</i>	2,236	

Note(s): 1. The robust standard error is between parentheses. 2. *, ** and *** represent a confidence of 90, 95 and 99% respectively

Source(s): Prepared by the authors

Table 4.

Gender is relevant to understand the number of hours spent on school activities. Female students have increased odds (22.3%) of spending more hours on activities than male students. These findings go against the results of other studies since it was observed that girls were the most affected during the remote learning period. This could be because girls generally spend more time on unpaid activities such as domestic work when compared to boys (Burzynska & Contreras, 2020). This increases the opportunity cost for them to dedicate more time to studying. Additionally, according to a study in rural areas of western Kenya by Zulaika *et al.* (2022), girls are at a higher risk of teenage pregnancy, school dropout and school transfer. Dessy, Gninafon, Tiberti, and Tiberti (2021) highlight an increase in rates of teenage pregnancy in regions of Nigeria. In Italy, Contini *et al.* (2021) found that girls whose parents have low levels of education performed poorly on standardized mathematics tests. Conversely, for girls whose parents have a high level of education, no statistical difference was observed when compared to boys. According to Lichand *et al.* (2022), girls were the most affected. The literature on learning and gender differences shows that girls perform better in Portuguese and boys in mathematics (Contini, Tommaso, & Mendolia, 2017; Gevrek, Gevrek, & Neumeier, 2020). For Legewieae Diprete (2012), boys are more sensitive to the study environment and more influenced by their peers. Because remote learning is more demanding and is not affected by peers, students must be more resilient, so boys may be more prone to engaging in activities that are not school-related (including entering the job market).

Students aged 16 and over are 22.9% less likely to spend more hours studying. Because this is the legal age for entering the job market, this might be related to the number of hours spent studying and might hinder motivation. Dessy *et al.* (2021) note that the pandemic affected individuals aged between 15 and 18 years in Nigeria, as they were not of compulsory school age. Consequently, they were more prone to school dropouts. These aspects are not investigated in this article but might have an influence. For Brom *et al.* (2020), the transition from the early and late elementary school years is coupled with a change in how subjects are structured, demanding more time and effort from students. The increased odds of students from state schools (primarily responsible for high school and the later years of elementary education) spending more hours studying corroborate this idea (48.6%). This may be related to the fact that students are preparing to take the college entrance exams (*vestibular* and ENEM (national high school exam)), since the odds of spending more hours studying are 80.3% for students in the early years of elementary school and 105.9% for high school students.

On the other hand, the results show that the resources available for performing the activities are positively correlated with time spent studying. Sabates, Carter, and Stern (2021) found that the negative impact of school closures in Ghana could be mitigated by parental support and the availability of school resources. Lichand *et al.* (2022) note that students who had no prior experience with remote classes were the most affected. Also, when there are more children in the household, the odds of spending more hours studying decrease by 13.1%, possibly due to the need to share devices to have access to remote education. The results are concerning because students with less access to infrastructure and lower socioeconomic status are more prone to drop out of school since they are more likely to enter the job market (Yarrow, Masood, & Afkar, 2020).

Furthermore, there are disparities between regions. Students living in the Midwest are 52.3% more likely to spend more hours studying per day compared to those in other Brazilian regions. Compared to students living in capital cities, students from inland cities have 39.3% higher odds of spending more time studying. Students from other cities in the metropolitan area have 29.2% higher odds.

The variables representing the families' socioeconomic status, e.g. income, occupation and level of education, were not statistically relevant to determine the number of hours students spent studying when conditioned on other relevant factors included in the estimation. Although these are significant predictors of performance in standardized tests, some hypotheses can be raised. Because many non-essential activities started to be performed remotely, parents started spending more time at home and were thus closer to students. The idea that certain professionals that had to work outside the home did not have sufficient control over the learners' study hours was called into question (Gallego, Malamud, & Pop-Eleches, 2020). Another critical issue is that, although there is a positive correlation between the number of study hours and the parents' perception of learning, it is impossible to know the quality of the tasks students are doing. Therefore, even though socioeconomic factors are linked to educational performance, the results about the time spent studying do not reflect educational quality.

6. Final considerations

Schools closing as a result of the COVID-19 pandemic led to various challenges for parents and students. The home environment had to be adapted and include the technological assets, students needed to have access to classes and parents needed to take on a more active role in school activities.

Information from waves 1 and 2 of the PENP showed how involved parents and students are with the school. Using an ordered logit methodology, results showed that student, family and regional characteristics have a different relationship with students' engagement with remote activities.

Parents' or guardians' support during activities is the most prominent odds associated with longer study hours, with an odds ratio of 144%, followed by guidance from schools, with an odds ratio of 36%. We documented an association between students' characteristics and time use. These correlations inform hypotheses that need to be further investigated by research that takes advantage of exogenous sources of variation to document causal relationships between these constructs. Moreover, there are also differences in the characteristics or resources available in the household, such as the number of students living therein and access to computers, including differences regarding the region where the household is located.

These estimates show the need to reflect on the demand for strategic actions amidst the pandemic, when students are challenged to keep studying despite the changing conditions, e.g. low connectivity, limited device availability, different levels of contact with teachers and even challenges related to the family environment, both in terms of school resources

available at the household and in terms of parent and guardian support in remote activities. This is further intensified by the emotional exhaustion and social distancing that may increase the odds of losing interest in school and, later on, lead to school dropout.

As the results of this article show, the role of the family is important to minimize the negative impacts of the pandemic on the learning process and school engagement. This was one of the most important factors for predicting longer time spent on school activities. Therefore, it is essential to develop strategies that help families become more engaged with the learning process and the school. This may also help parents feel better prepared to help with school tasks, especially when there are more children at home and parents have less time to spend with each child. The findings suggest that students from families with the lowest socioeconomic statuses were the most impacted by the period of remote classes. The lower educational outcomes can be attributed to the lack of proper Internet infrastructure to watch classes and limited parental support, as parents have a lower socioeconomic status. It is also important to note that the absence of interaction with peers has also compromised the mental health of students, which has further affected their educational achievements. The results also reinforce empirical studies from other countries that have pointed out the importance of strategies that improve the family-school relationship. More specifically, such strategies were creating structured actions led by the education departments, including actions aimed at the political-pedagogical project; implementing systemic strategies adapted to the realities of families and their territories and creating spaces to talk to families inside schools. Finally, improvements in the urban infrastructure, which includes providing computers and broadband access for students, may minimize the lack of resources and facilitate access to classes.

Although this study provides unprecedented evidence regarding the family-school relationship in the context of the COVID-19 pandemic in Brazil, the potential of endogenous coefficients is not dismissed. The three main limitations are (1) the number of hours spent studying may be related to the parents' perception that students are progressing and vice-versa; (2) there is a chance that parents report their children spend more time studying when they are more involved in the children's school life, which causes an error in the measure, and (3) the availability of hours to study or parents' engagement with school may have a correlation with household wealth. More robust empirical strategies are necessary to clarify both points, such as an instrumental variable model, which is beyond the scope of this study. Therefore, more studies are necessary to address these limitations.

Notes

1. Information available at: <https://en.unesco.org/covid19/educationresponse/consequences>
2. If z is the odds ratio value, the calculation is as follows: $((z-1)*100)$.

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