Spain

A successful experience of remote tutoring

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The preparation of this brochure was supported and reviewed by the following members of the Education Division of the Inter-American Development Bank: **Andrea Prieto, Carolina Hernández, Victoria Oubiña.**

Illustration and graphic design: **Juan Sebastián Fonseca**

Introduction

During the decade before the start of the pandemic, several rigorous studies showed that intensive, in-person tutoring in one-to-one and small group settings has substantial positive effects on learning at moderate cost (Nickow et al., 2020). The Covid-19 pandemic and associated lockdowns, which disrupted education in over 150 countries (World Bank, 2021), disproportionately affected children from disadvantaged backgrounds (Betthäuser et al., 2023). To close educational gaps that widened because of the pandemic, online tutoring programs took center stage as a cost-effective policy with high potential impact.

Given social distancing rules throughout the school year 2020/21 in Spain, alternatives to traditional in-person tutoring and other student support programs (like summer schools or extra-curricular activities) were necessary. Moreover, technologies and new habits adopted during the pandemic made online learning much more accessible to families from all backgrounds. Online tutoring further had the advantage that it could draw on a larger pool of potential tutors, not limited to local labor markets, and that it reduced time cost and commuting times for both tutors and students (Kraft et al, 2022).

In this chapter, we present evidence from a pilot program that offered online tutoring in mathematics to secondary school children in Spain. We provided free, 100-percent remote (online) after-school tutoring to pupils aged 12 to 15 from very disadvantaged backgrounds during eight weeks. The program, called Menttores, had four key features. First, the whole organization of the program (including selection and training of tutors) and the tutoring sessions were implemented online. Second, tutoring was carried out by paid-for, qualified math teachers. Third, the tutoring sessions were done in groups of two students per tutor. Fourth, the program focused on math and social-emotional support (motivation, well-being, and work routines).

We implemented the program in partnership with Empieza por Educar (ExE), the Spanish branch of Teach for All, an NGO specialized in training young teachers working in schools attended by vulnerable and low-income students. The recruitment of program participants was done in two steps. First, we identified several schools that showed interest in the program. Second, we asked head teachers in participating schools to identify students most in need for support in math and disseminate the program among them and their families.

We collected a rich array of child and family characteristics at the stage of online registration. We ran base- and endline surveys of pupils, which included a standardized math test and questions on socio-emotional well-being, aspirations, and past performance. At the end of the program, we conducted an endline survey of families to collect information on academic results at the end of the school year. We also collected very rich real-time data throughout the duration of the program capturing participation, connection time, and quality of the connection.

Our study contributes to the understanding of whether online tutoring can work as an effective tool for closing learning gaps for disadvantaged students. The closest to our research is the online tutoring program implemented in Italy in Spring 2020 by Carlana and La Ferrara (2021). They find large positive effects on student achievement (+0.26 SD) and positive effects on socio-emotional skills, aspirations, and psychological well-being. Kraft et al. (2022) also implement an online tutoring program for middle school students with college volunteers. They find positive but insignificant effects on math and reading.

Our program departs from these studies in three fundamental ways. First, they were delivered by volunteer university students, while Menttores used paid-for, qualified secondary school teachers. Second, our tutoring was implemented in groups of two students, instead of one-to-one. Third, and more importantly, these programs were implemented in exceptional circumstances. For the case of Carlana and La Ferrara (2021), during the harshest lockdown period in Italy from April to June 2020 (when all kids were at home and schools where closed).[1] In the case of Kraft et al. (2022), in early 2021 in the US, when schooling there was still highly disrupted. Ours, instead, was implemented one year after the onset of the pandemic, several months after schools were fully re-opened in Spain. In that sense, we believe our results show the effectiveness of online tutoring in normal times, when tutoring can be considered a complement rather than a substitute for in-class, regular teaching.

1. The Italian Statistical Institute estimates that around 3 million Italian students aged 6-17 may not have been reached by remote learning during the lockdown (INS, 2020).

Our contribution is relevant both in terms of policy and for further academic research. Governments are investing large amounts of money in tutoring programs (both in face-to-face and online formats). Our evidence suggests that this money is well spent. The intervention costs approximately 300 € per student and has a positive impact of 0.26 SD on learning outcomes (in math), translating into a 0.087 SD increase per 100 spent. This compares favorably with summer schools (Cooper et al, 2000) with a cost-effectiveness of 0.066 SD per 100 spent (based on an impact of 0.23 SD and a cost of 350 € per student). It also compares favorably with increasing instruction time one hour per day, which according to Higgins (2012) costs 1,020 € for an increase of 0.24 SD in test scores, resulting in a cost-effectiveness rate of 0.0235 SD per 100 € spent.

In terms of cost, programs with volunteers are always going to be cheaper than programs with paid professionals. However, at large scale, volunteers are likely to face more practical and political economy limitations than programs with paid professional teachers. First, availability of large amounts of volunteers is likely to be an important limitation in normal times. Second, large government-supported tutoring programs with unpaid workers are likely to encounter resistance from teacher unions, at least in advanced economies. Third, paid work is likely to generate higher engagement and lower teacher turnover. We show that our innovative two-to-one online design offers additional cost savings compared to in-person programs and one-to-one online programs, while achieving very similar results.

In the next section we will describe the context of the intervention in the aftermath of the Covid-19 pandemic and the challenges faced by the Spanish education system. Section 3 discusses the details of our intervention and the main results of the pilot. In Section 4 we discuss implications for the future and potential scaling up of the policy.

Problem

Like most education systems across the world, Spain faced unprecedented challenges in March 2020 due to the Covid-19 pandemic. Schools were closed on 11th March and did not reopen until September 2020, when the 2020/21 school year began. Using data from the Basque Country, a region in the north of Spain, Arenas and Gortazar (2022) estimate a learning loss of 0.075 SD for math and 0.05 SD for language one year into the pandemic. They also find that students with higher learning losses self-report significantly worse levels of socio-emotional well-being due to the pandemic. Thus, the demand for individualized learning and socio-emotional support was higher than normal.

The school year 2020/21 was close to a normal school year, with no coordinated school closure measures in any of the Spanish regions. On March 9th 2021, the latest date for which data is available (and closest to our intervention), only 0.5 percent of classes in Spain were quarantined at home. While most classes were open, the epidemiological constraints made the school year 2020/21 still complex in pedagogic and logistic terms. Many schools operated on morning shifts, avoiding lunch at school (a space where the risk of virus transmission was higher) and avoiding any sort of extracurricular activities, which usually happen at school after formal instruction time ends. This made it impossible to offer after-school in-person programs (such as tutoring) and online formats became the only viable option.

The fact that learning losses were larger in mathematics and that the deterioration of socio-emotional wellbeing was correlated with learning losses suggests that any remedial program should focus on both academic as well as socio-emotional aspects. Recent evidence from Turkey (Sule and Turkum, 2023) shows that although academic losses may seem to have recovered, no notable recovery were observed in socio-emotional skills. Furthermore, there is growing evidence on the importance of socio-emotional skills for educational attainment and future labor market outcomes.

Our program incorporated the above mentioned insights. The target was to design an online setting which could effectively address both academic and socio-emotional needs. The program was aimed at students from schools in highly disadvantaged neighborhoods with high shares of immigrants and lower average achievement. Engagement was a critical factor to overcome. First, from the side of students, the program design aimed at providing the necessary motivation and incentives to build engagement among tutors and students. Second, being aware of the generally lower level of engagement of parents in this context, the main challenges we faced were how to reach parents to sign their children up for the program and to ensure students stayed on.

Solutions

In this section we describe how we addressed the above-described challenges with the design of our program, highlight relevant implementation features and discuss our results.

Design

Our online tutoring program was an intensive intervention consisting of three 50-minute sessions per week over a period of eight weeks. The target population were students in Grades 7 and 8 (grades 1 and 2 of secondary school, aged 12 to 15), attending schools in highly disadvantaged neighborhoods. We chose this target for two reasons: First, disadvantaged students were disproportionately affected by learning loss and socio-emotional deterioration during the pandemic (Haelermans et al., 2021 and Blainey et al, 2021) and most likely to benefit from the intervention. The need to invest and experiment with remedial programs which could facilitate catch up for the learning loss of these students was and still is a priority in education policy in many countries (World Bank, 2021a,b). Second, evidence suggests that tutoring in mathematics tends to be more effective for students in higher grades (Nickow et al, 2020) and budget, logistical and time constraints meant that we could deliver tutoring only in one subject area and only in secondary schools.

Tutoring sessions were delivered online by qualified math teachers in groups of two students per tutor. We decided to hire qualified math teachers for several reasons: First, existing evidence on face-to-face tutoring shows that they are significantly more effective than non-professionals or volunteer tutors (Nickow et al, 2020). Second, while we had initially planned a treatment arm delivered by university student tutors as volunteers as in Carlana and la Ferrara (2021), we were neither able to recruit sufficient participating students nor sufficient volunteer tutors in the short timeframe we were operating in. The timing of our intervention (towards the end of the academic year, when university students tend to be busier because of final examinations) and the fact that life in Spain had largely gone back to normal by March 2021 (university students were no longer locked inside their homes as they had been between March 2020 to June 2020) are possible explanations for the low response to our call.

The group composition was fixed throughout the program, with the same students attending meetings with the same tutor in each session. The students in each tutoring group of two were from the same class or grade from the same school to guarantee that students knew each other and would find it easier to connect and accommodate. We decided to go for a two-to-one student-tutor ratio for three reasons. First, the pedagogic team in charge of implementation suggested that being in a group with another child had the potential to generate mutual motivation and peer pressure not to abandon the program, especially in an online setting. Second, existing evidence for face-to-face programs in Nickow et al (2020) shows that two-to-one tutoring is nearly as effective as one-to-one tutoring. Third, this design meant that we could deliver the tutoring to twice as many students as in a one-to-one setting, given our budget.

The first challenge we faced was related to recruiting students to participate in the program. To reach students, we proceeded in two steps. First, we identified several schools that showed interest in the program. Second, we asked schools who had agreed to participate to identify potential participants from their pool of students and disseminate the program among them.

For recruitment of participant schools, we leveraged ExE's large network of teachers working in schools in the regions of Catalonia and Madrid. School principals were initially contacted by ExE and informed about the program and its characteristics, its target population (disadvantaged students in the 1st and 2nd grade of secondary school lagging in mathematics), and the fact that the program was to be evaluated scientifically through a randomized controlled trial. There were no strict eligibility rules. Instead, we relied on the knowledge of teachers and principals to identify students most in need for math tutoring.[2]

In the second step, parents of children identified by the school as in need were directed to an online registration form, which included an information sheet for parents and children informing them of the fact that the program was to be evaluated and that not all students that registered would eventually be selected. A key element to successfully recruit the around 400 participants in the short timeframe we were operating in (two weeks) was the engagement of parents within the context of schools, with members of ExE going into the schools and actively helping parents to fill out the registration forms.

Another key element of the program was its online nature. The fact that face-to-face interactions were severely constrained by social distancing rules made this the only viable option. Additionally, the demand and interest in online tutoring has surged rapidly since 2020, while to date very limited evidence on its effectiveness exists.

2. Principals signed an agreement detailing the school's role in the study, including: (i) the identification of a group of students that would benefit most from the program; (ii) dissemination of the application material among these students and their families; (iii) ensuring the administration of baseline and endline surveys during school hours; and (iv) participating in a final survey themselves.

ExE designed and implemented the selection and training for tutors based on their longstanding experience with teacher selection. A key criterion for selection was to hold a post-graduate (Master's) degree in Teacher Training in a scientific specialization (math, physics, chemistry, or biology), which is a formal requirement to teach mathematics in secondary education in Spain. Other skills, such as motivation for the program, having taught in low-income schools, and prior teaching experience, were also considered. Advertisement of the positions was done through various channels, including online hiring portals, ExE's own network of current teachers and alumni, and other teachers whom they work with. A total of 199 applicants which met the minimum pre-requisites were sent a formal application form and applied. Out of these, 110 candidates were sent a link for an online interview. Out of the 110 candidates interviewed we hired 46 tutors, which was the number required to provide tutoring to approximately 200 students (in the treatment group).

Implementation

Students and tutors were able to organize their own schedule and agree on weekly meeting times. Each student and mentor received personal and unique credentials for accessing a specifically created domain within an online platform from a large, US-based technology firm, consisting of a tool to organize emails, calendars, files and most importantly, hold online meetings. Tutors had to hold sessions through the platform and could only communicate with students through this channel.[3] Students who registered and stated they did not have access to a computer or tablet and/or internet were provided with a tablet with internet access for the duration of the program. In total, 13 students were given tablets, which were donated to their schools at the end of the program.

A key advantage of the online format was that student attendance could be monitored in real time. Throughout the program we collected data for each tutoring session via a management and monitoring dashboard that was fed with data from the technological platform where the virtual sessions were taking place. This data allowed us to immediately identify issues with the connection and quality of video calls and pupils who did not attend their sessions. With this information we could draw up plans of action with tutors, families, and schools to help get them back into the program. Only seven students (3.4 percent of the students assigned to the treatment group) dropped out of the program before it began. Among those that did start the program, the median number of minutes of tutoring received was 960, representing 80 percent of the maximum envisaged number of minutes (1200). The median number of sessions attended was 20, corresponding to 83 percent of the maximum envisaged number of sessions (24).

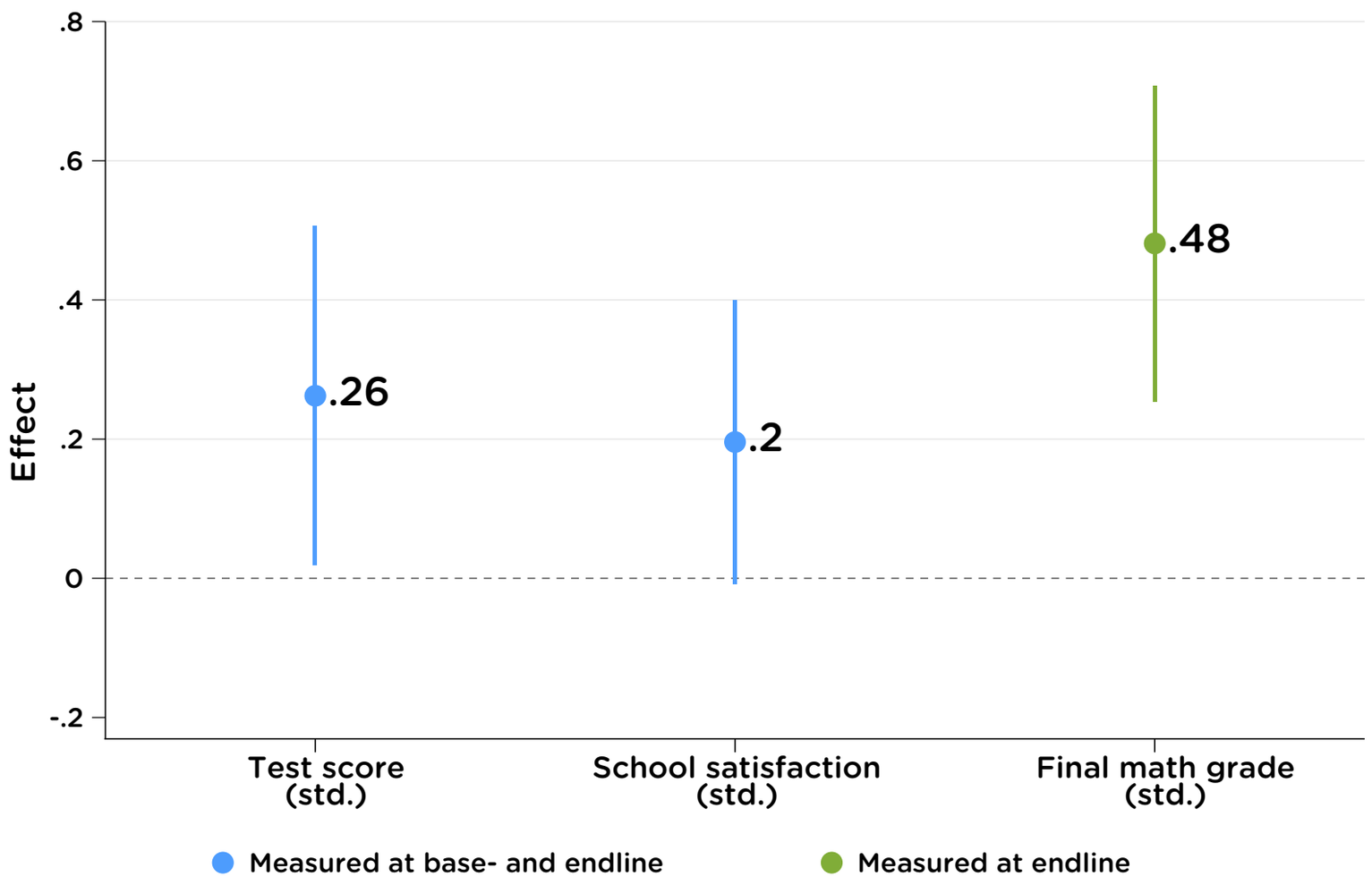
3. This was done both for organizational as well as for legal reasons of child protection: All communication through these channels could be monitored by us and the implementation team.

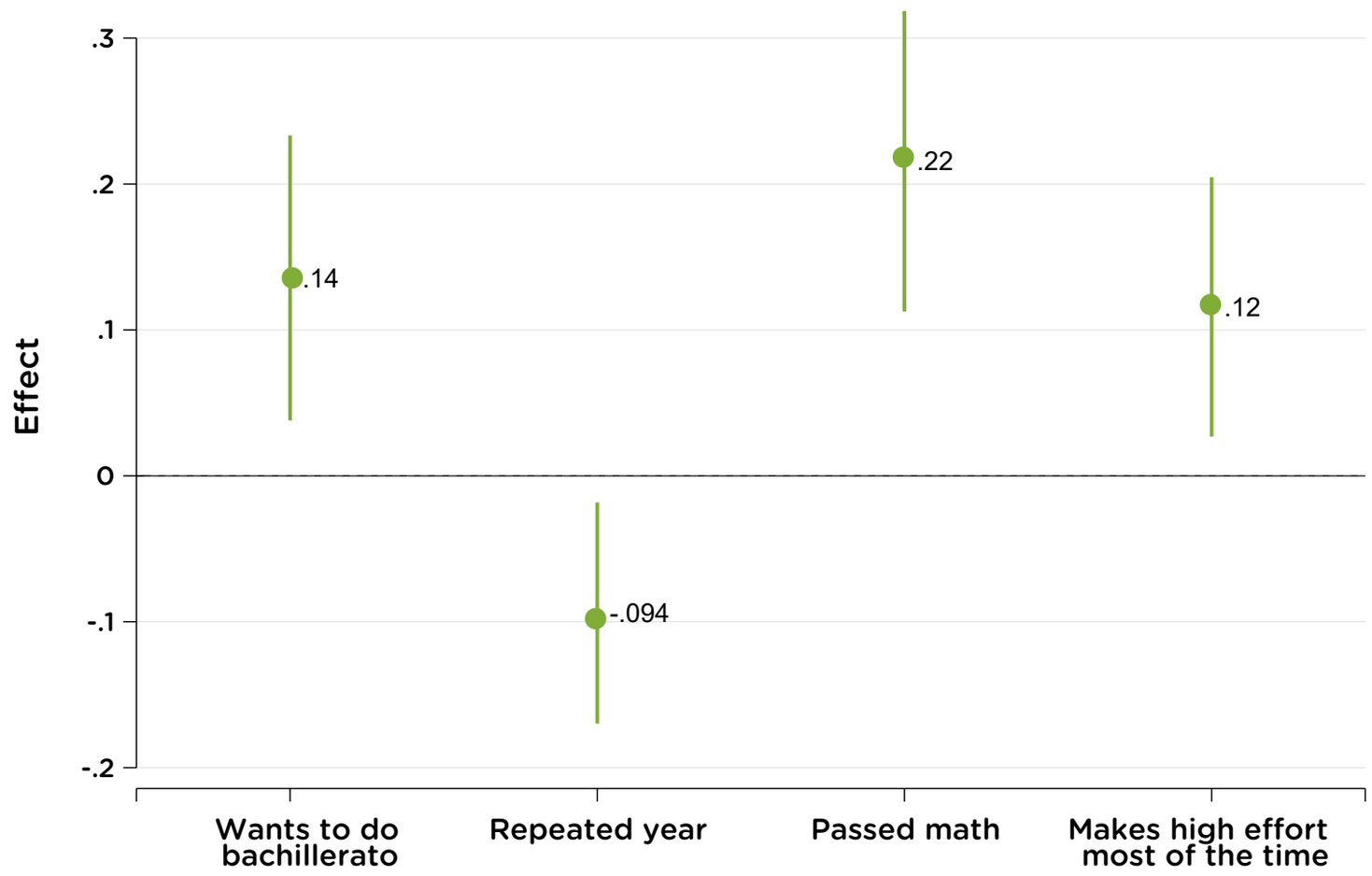
Results

Figure 1 summarizes our main findings. We find a positive and significant effect of program assignment on end-of-year math grades (+0.48 SD), equivalent to about six months of learning. Further, we find a significant 22 percentage point increase in the likelihood of passing math, equivalent to a 32 percent increase with respect to the control group mean. Using our standardized math test, we find an increase in the test score by 0.26 SD, which is significant at the 10 percent level. To put these numbers into context, Nickow et al's (2020) meta-analysis of the effectiveness of in-person tutoring finds an overall pooled effect size of 0.37 SD. Further, we find a large and significant effect on grade retention: the program decreased the likelihood of repeating the school year by 9.4 percentage points, equivalent to a 78 percent decrease with respect to the control group, which had a repetition rate of 12 percent. We also provide suggestive evidence that the positive effects of the program are persistent one year after the end of the program.

In terms of non-cognitive outcomes, we find that the program raised students' aspirations: Students in the treatment group were 14 percentage points more likely to state that they would like to go onto the academic track after compulsory schooling (i.e., Bachillerato), equivalent to a 33.2 percent increase compared to the control group mean. Students assigned to treatment were also 12 percentage points more likely to state that they exerted high effort always or most of the time at school, which corresponds to an increase by 21.5 percent when compared to the control group mean. We do not find an impact on student's self-perceived math competencies or the likelihood of stating they like mathematics. We neither find an effect on locus of control, grit, or on overall well-being.

Figure 1: Summary of results





Notes: The figure shows intention-to-treat effects for being assigned to program participation.

Looking ahead: implications

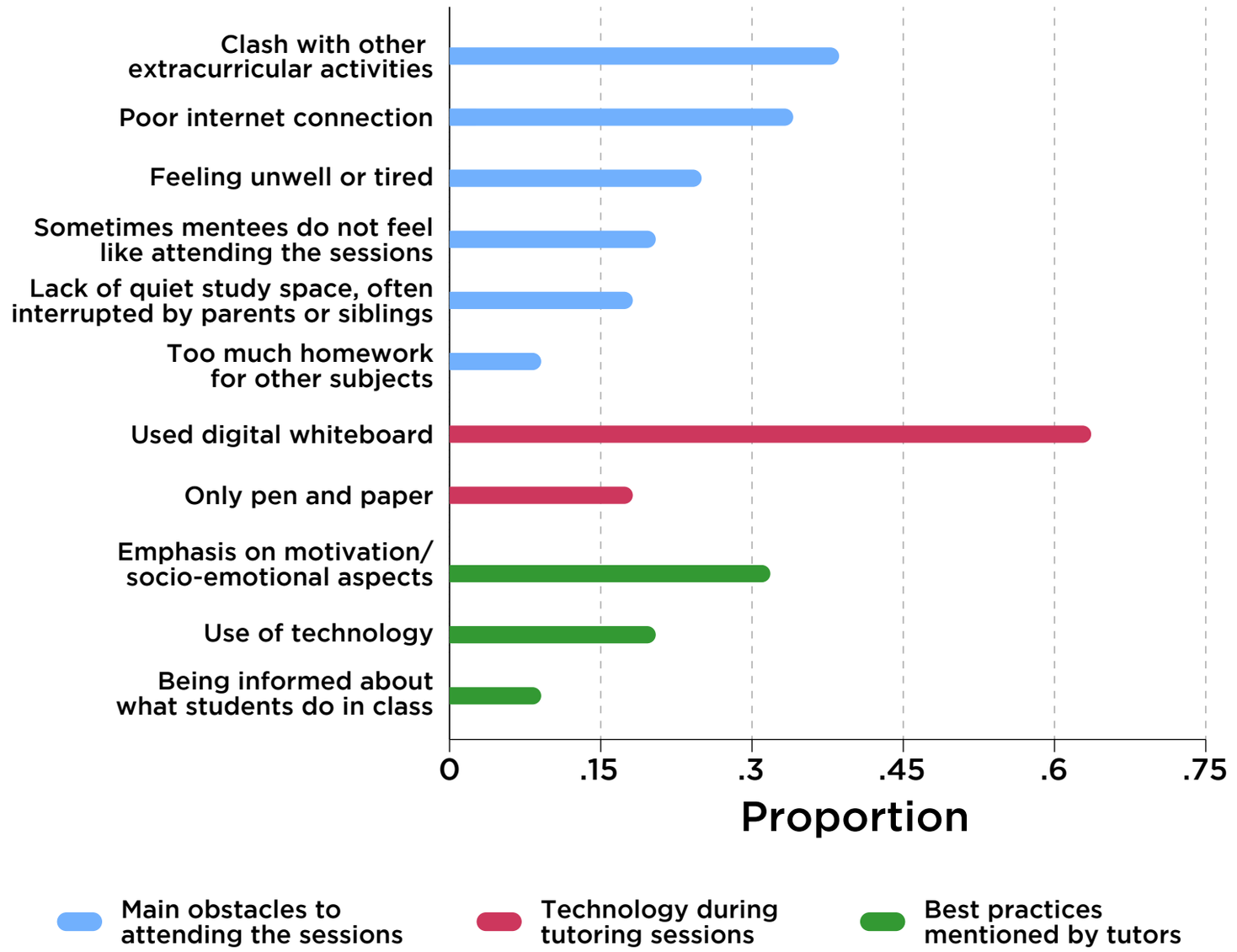
Our results have immediate policy relevance to inform on how to design effective policy responses to reduce educational inequalities. Online tutoring programs have the advantage of reaching children at a lower cost and can be provided to any child with an internet connection, including those in remote places where traditional tutoring programs are harder to deliver. Moreover, our two-students-per-tutor format has the benefit of being more cost-effective than other alternatives with professional teachers, such as face-to-face small groups or one-to-one online programs. Beyond this, global private tutoring is growing rapidly after the pandemic and is projected to grow at an annual rate of 8.95 percent per year between 2022 and 2027, mostly due to the larger growth of its online segment. A policy strategy of publicly funded tutoring could contain and respond to this growing demand for more personalized services among middle-classes (Report Linker, 2022) and may be especially relevant for lower-income or lagging students to contain widening educational gaps.

In terms of implementation, a key advantage of the online format is that attendance can be tracked in real time and one can react with action plans immediately when students are starting to lag or be absent. In our experiment, this ability might have been one of the reasons explaining the high attendance rate of the program, despite the intensity (three sessions per week) and the fact that most participants came from highly disadvantaged backgrounds. When thinking about implementing such a program at bigger scale, these considerations are important, as data driven monitoring is a key advantage of online programs. In future research it will also be important to get a deeper understanding of the importance of digital technology for learning. Figure 2 below shows that nearly 70 percent of tutors used digital whiteboards, but nearly 20 percent used only traditional tools such as pen and paper. The use of additional digital resources (such as online quizzes and games) was mentioned by more than 20 percent as important for the design of the tutoring sessions.

First, in order to launch a national program addressing education needs of millions of students requires the selection of a new tutor workforce not yet identified, which will subsequently create a new labor market. The secular shortage of qualified math and science teachers (Santiago, 2002), which seems to have deepened in the last years, may operate as a big challenge. The number of tutors needed for a large-scale program should be at least on a maximum ratio of one tutor per 10 students: afternoon time slots are limited to three to four hours per day, hence, the number of students a tutor can handle in total (in groups of two) could not be larger than eight or 10 (4 or 5 groups). To what extent it is possible to select and train a large workforce of potentially medium to high-quality tutors? Although the online nature may help bridge the gaps between supply and demand at local labor markets, this policy will imply creating professional pathways for tutors, assuming that tutoring will usually be a part-time job, that it will not be a lifetime career, and that it will require a social commitment towards vulnerable students in the system. The most likely candidates could be undergraduate and graduate students with interest in education and social change, recent graduates aiming for job opportunities or retired teachers aiming at contributing to their communities.

The second array of limitations stems from students themselves. Various conditions will be necessary, such as guaranteeing technological equipment at home or at school, internet connection and basic digital skills. Another limitation is that students may have been more willing to engage in online after-school tutoring program because they were coming out the of the pandemic, and this effect may fade away in the coming years. Figure 2 shows the main obstacles stated by tutors for why students sometimes failed to attend sessions. About 40 percent of tutors mentioned that scheduling issues, such as tutoring sessions coinciding with other extra-curricular activities, were an issue. Poor internet connections, feeling unwell or tired and a lack of a quiet place to attend the sessions were other obstacles for attendance.

Figure 2: Obstacles to attendance, use of technology and best practices



Finally, to activate demand at a large scale, the participation of schools and principals will be necessary. Schools are the natural candidate to channel free tutoring programs, no matter whether these are implemented while students are at school or at home. Such programs should not imply additional administrative and management costs for principals in order to match supply and demand. They should acknowledge that school teachers will benefit from an additional personalized support for their students, but also some time for better coordination with tutors.

For future research, it will be relevant to explore in more detail the mechanisms driving our results, such as tutor characteristics and their interactions with students, the type of training tutors receive, the number of students per tutor or the type of devices used. Due to the relatively small sample size in our study, we cannot detect small effect size differences between groups, hence large sample evaluations should be part of the pipeline of actions.

It will also be important to explore whether the positive results of online tutoring shown here hold in different contexts: with primary school students, with variations in socio-emotional support or teacher training or focusing on other subjects, such as reading. Also, it would be interesting to explore in more detail the potential benefits of small-group positive peer dynamics in online teaching. The remarkable academic effect of the program as well as the success in attendance and completion rates indicate that our two-to-one design might have helped to mitigate some of the shortcomings found in the literature in online education, such as a lack of perseverance and motivation (Escueta et al., 2020).

Finally, it would be interesting to explore the effect introducing complementary technologies such as adaptive software with high quality content, asynchronous interactions with tutors through chats or even more advanced AI bots to support math learning.

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