

Building trust among caregivers through an SMS intervention to encourage attendance to early childhood services in Colombia

Pre-Analysis Plan

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Abstract

This intervention aims to determine whether SMS messages can encourage caregivers of young children (aged five or less) to increase their trust and use of in-person early childhood services provided by the Colombian Institute for Family Welfare (*Instituto Colombiano de Bienestar Familiar - ICBF*). Since the beginning of the pandemic, attendance for ICBF services fell substantially, with 78% of caregivers responding that the main barrier for attendance was fear of infection from COVID-19. For this trial, 719 ICBF service units nationwide were randomized into one control and two treatment groups, the first in which caregivers receive text messages designed to combat risk aversion and the second who receive messages that reinforce positive social norms that early childhood education is a civic duty. In total, 15,100 caregivers received 12 SMS messages during October and November 2021. This research will evaluate the impact of the intervention to reduce self-reported fear of COVID-19 infection among caregivers and the potential increase in attendance rates for ICBF's early childhood education services.

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1. Motivation

The restrictions and social distancing requirements imposed due to the COVID-19 pandemic, led to significant disruptions to the lives of children and their parents. Evidence regarding previous crises has shown that deteriorated economic conditions might deepen health, nutritional, and education risks for children and young people (Peter, Fallon, and Lucas, 2002; Lundemberg, and Wuermli, 2012). Recent estimations suggest that the social and economic crisis caused by COVID-19 pandemic will not be the exception (Hincapié, López-Boo, and Rubio-Codina, 2020; UN, 2020; Yoshikawa et al, 2020). For instance, in April 2020, nearly 1.5 billion children and young people around the world were affected by school closures, interruption to classes, and the postponement of assignments and examinations (Seusan and Maradiegue, 2020; UNESCO, 2020). Estimations suggest that 5-month school closures resulting from social distancing restrictions could result in a loss of 0.6 years of schooling adjusted for quality, and falling test scores on average (Azevedo et al., 2020).

School closures and interruptions caused by COVID-19 pandemic might have had a negative impact on the global stock of schooling and learning since not being able to attend to school has two main effects: i) it reduces children's learning opportunities and ii) it can contribute to children forgetting what they have learned (Alexander, Pitcock and Boulay, 2016; Azevedo et al., 2020; Harris et al., 1996). Moreover, evidence suggests that sudden disruptions to schooling potentially affect students' assistance, performance, and educational attainment, especially when they occur during critical stages in their development (Marcotte and Hemelt, 2008; Lloyd, 1978; Meyers and Thomasson, 2017). Given that early childhood is a critical life stage in which the brain develops and is more sensitive to de lack of responsive environments (Hincapié, López-Boo, and

Rubio-Codina, 2020), evidence indicates that the effects of the pandemic could be particularly strong for the youngest children.

This situation is concerning since children with frequent absences during early education tend to have lower incoming skills and academic achievements, and worst performance in the labor market later in life (Berlinski, Galiani, Manacorda, 2008; Ehrlich et al., 2014; Romero and Lee, 2007; Taylor, Gibbs, and Slate 2000). In the long term, Lopez, Behrman, and Vazquez (2020) show that millions of children of preprimary-program ages are likely to suffer considerable earning losses over their lifetime due to preprimary-program closures that resulted from the pandemic. Furthermore, evidence for Latin America suggests that children with poor levels of cognitive and socioemotional development in early childhood tend to have higher unemployment rates, lower wages, higher teenage pregnancy incidence and drug use (Schady et al., 2014). As a result, long-term effects of the pandemic in terms of educations seem to relate to increases in inequality.

Extended closures and interruptions forced schools and early education services to implement remote learning to maintain the continuity of education. However, limited access to internet and digital devices at home became a barrier to access education especially for children in vulnerable contexts (ECLAC, 2021; Carvalho and Hares, 2020; Carvalho and Crawford, 2020). In consequence, remote learning could have unintendedly reinforced absenteeism and dropouts among students and children from low-income households, exacerbating educational disparities (Azevedo et al., 2020; Hincapié, López-Boo, and Rubio-Codina, 2020). These potential effects on absenteeism are extremely important, as evidence suggests absenteeism potentially increases inequality since children from lower-income households (who are generally the ones that potentially gain more from attending to school), tend to have lower levels of attendance to preschool (Ehrlich et al., 2014; Susman-Stillman et al., 2018). Moreover, children and students in

low-income households also tend to be more exposed to difficult and unstable environments, this makes them more likely to be mentally and physically affected by the separation the supportive environment educative institutions usually provide (Lopez et al., 2018; OECD, 2012).

Lastly, the COVID-19 pandemic could have also undermined parents trust in schools in terms of their safety, and ultimately reinforced students' absenteeism. Meyers and Thomasson (2017) found that the polio pandemic affected the parents' willingness to let their children attend school. Similarly, a survey performed by the Colombian Institute for Family Welfare (ICBF) to 632 parents and caregivers, revealed that 55,5% of them did not agree with sending their children to the in classroom early childhood services provided by the institute after the COVID-19 pandemic due to worries related to the conditions in the facilities and probability of contagion.

Given that, parents' trust and biases regarding their children's education are key to determine assistance and further down the line, children's academic results (Bergman, 2015; Robinson et al., 2018). Previous studies have shown that relatively simple behavioral interventions can influence parents' beliefs and increase school attendance (Bergman and Chan, 2019; Kalil, Mayer, Gallegos, 2018; Robinson et al., 2018; Smythe-Leistico and Page, 2018). In partnership with ICBF, we helped them design and implement an intervention that aims to strengthen parents' trust in the in ICBF early childhood services to promote and increase young children's assistance.

2. Intervention

This study focuses on Colombia and targets the caregivers of young children aged five or less in vulnerable socioeconomic conditions. Because of the COVID-19 pandemic, early childhood services provided by ICBF, a government agency with national coverage, had to be delivered online. It has been well documented that online learning is not a direct substitute for in-person

education, in fact, the evidence on the effectiveness of remote learning seems to be mixed and suggests that technology should supplement teaching, instead of replacing it (Allen et al., 2006; Bernard et al., 2004; Kearney and Levine, 2015; UN, 2020). Once the mobility and social distancing restrictions began to relax, the ICBF slowly began to restore its in-person services. However, children have not returned to the services as fast as it was expected, and absenteeism persists. By March 2021, the average number of days children in our sample attended ICBF's in-person services per month was nearly zero, in September this number was close to 3 days. However, ICBF facilities have capacity to receive more children following all COVID-19 protocols, but facilities remain empty. The situation is extremely concerning since in Colombia early childhood services do not only target education and development, but also provide food to the children that attend. These conditions suggest that the negative effects of the pandemic on development, vulnerabilities, and future outcomes could be stronger for this vulnerable group.

The first stage of the intervention focused on diagnosing why children were not returning to early childhood centers, 1,320 parents and caregivers were asked in a pilot telephone survey whether they agreed or not with their children going back to in-person early childhood services provided by the ICBF. Only 632 of them answered the question, and 55.5% of respondents informed that they did not agree with their children going to the in-presence services. These results are consistent with the body of literature that states parent's beliefs are a key factor in student attendance (Bergman, 2015; Bergman and Chan, 2019; Robinson et al., 2018).

The second stage of the intervention lasted about 3 months and was designed based on the knowledge gathered from the first stage. Its purpose was to address caregivers' trust and fears about their children going back to in-presence services. The intervention delivered information about the safety of the early childhood services provided by ICBF, the importance and benefits of

attending the services, and relative attendance of other students. The information was delivered via text messages or SMS, and each caregiver received two weekly SMS during six weeks. We expect that the new information would help to build trust among caregivers and reduce their cognitive biases regarding the importance of children's assistance to early childhood services. Stronger trust and less cognitive biases would possibly manifest in higher attendance rates to the early childhood services provided by ICBF. In the long-term, we expect that higher levels of attendance will help to guarantee better social and economic outcomes for young children.

3. Data

To assess the intervention, we intend to identify two main effects: i) changes in parent's or caregivers' willingness to send their children back to the in-person services provided by the ICBF and, ii) changes in the probability of a beneficiary child returning to in-person services. To study the first effect, we will use information from a telephone survey conducted by ICBF to parents and caregivers before and after the intervention (August and December 2021). The survey asks caregivers whether they agree with their children going back to in-person services and, it also inquires on the reasons for their favorable or unfavorable response, such as fear of the pandemic and other potential reasons for their children not to attend. To assess the effects on the intervention on the probability of a beneficiary returning to in-person services, we will use administrative records from the ICBF, known as the *Registro de Asistencia Mensual* (RAM for its acronym in Spanish). This is a database compiled monthly by the ICBF that records the assistance of all enrolled beneficiaries to their services across the entire country and is updated each month, which allows for the creation of an individual-level panel data set starting in March 2021 and (expected) to cover at least the first quarter of 2022 to measure both the immediate and longer-lasting potential effects of the intervention on household attendance decisions.

3.1 Experimental design

ICBF currently has 73,000 service units (SU) through which it provides early childhood services to children and pregnant women. We randomly selected 719 SUs and assigned them into three groups: control, treatment 1, and treatment 2. 244 service units were assigned to the control group, 235 were assigned to treatment 1, and 240 were assigned to treatment 2. These groups were stratified by macro regions, which guarantees that we have representative samples for all 4 regions in which ICBF operates: Amazonía-Orinoquía, Centro-Oriente, Norte, Pacífico-Occidente. We then tested whether there were any statistically significant differences between the observable attributes of beneficiaries in each group from RAM administrative records, with our results indicating there are no significant differences between individuals allocated to the three groups.

Table 1. Balance tests for randomization

	Control	Treatment 1	Treatment 2	p-value
<i>Attendance (Aug. 2021)</i>				
Mean	0.19	0.16	0.15	0.798
SD	(0.39)	(0.37)	(0.36)	
<i>Female beneficiary</i>				
Mean	0.10	0.09	0.08	0.796
SD	(0.29)	(0.28)	(0.28)	
<i>Age of beneficiary</i>				
Mean	3.66	3.72	3.91	0.315
SD	(3.73)	(4.07)	(4.52)	
<i>Caregiver is family</i>				
Mean	0.92	0.92	0.93	0.384
SD	(0.27)	(0.27)	(0.25)	
<i>Age of caregiver</i>				
Mean	30.05	29.96	30.13	0.561
SD	(8.25)	(8.10)	(8.20)	

Source: Own elaboration from anonymized administrative and survey data provided by ICBF.

Notes: The table presents means for each variable and standard deviations in parentheses. The p-values in the final column are obtained by regressing each variable on treatment group dummy variables and strata fixed-effects with clustered standard errors by educational service unit and correspond to the hypothesis that means for Control and both treated groups are equal.

Given behavioral literature suggests pandemics and unexpected shocks may undermine caregiver's trust on educational services (Meyers and Thomasson, 2017), the first treatment of the intervention sent text messages that aimed to target their risk and loss aversion. For instance, one message reads "Boys and girls that do not attend early childhood education have LESS POSSIBILITIES that a learning disability is diagnosed. LET'S RETURN TO THE CLASSROOM" and "From the ICBF, we guarantee a gradual and safe return, don't miss the opportunity to guarantee your child's welfare".

Meanwhile, the second treatment intended to influence parents' and caregivers' behavior using text messages that focused on reminding them about their responsibility towards their children's development (Hammer, Rodriguez, Lawrence, Miccio, 2007). This framing of the messages aims to remind the parents about their role in their child's education and increase the feeling of civic duty; that education is a responsibility to aid in the development of young children. For instance, a few messages read: "ICBF has reopened its in-person services, now IT IS YOUR DUTY to join us. We are all responsible for the success of early childhood education" and "Over 140 thousand children have returned to ICBF educational institutions, don't let your child miss out".

We have three primary outcomes in this research, two related to attendance and another with caregiver willingness to send children to in-person services. Using the administrative data from the RAM for attendance in August and baseline telephone survey data, both before the start of the intervention, we calculated the relevant parameters to approximate the statistical power of the experiment with a rejection rate of 0.05 and 80% power. The results are shown in Table 2.

Table 2. Power calculations (alpha=0.05, power=80%)

	Mean	SD	ICC	MDE
Days in attendance	2.39	(5.57)	0.65	1.17
Attendance (=1 if attends for >2 days)	0.17	(0.37)	0.72	0.08
Willingness to return children to classrooms	0.62	(0.49)	0.22	0.06

Assuming 50% response rate to endline survey

Source: Own elaboration from anonymized administrative and survey data provided by ICBF.

Notes: The table presents means for each variable and standard deviations in parentheses. ICC represents the intra-cluster correlation of the outcome within educational service units and the last column presents the minimum detectable effect with a rejection rate of 5% and 80% power using clustersampsi command in Stata.

In general, the design allows estimating a minimum detectable effect of 1.17 days for the first outcome variable, days attended; 0.08 percentage points for the second outcome, a dummy variable for attendance which considers 2 or more days as attending; and 0.06 percentage points for the third outcome, the percentage of caregivers that report willingness to send their children to ICBF service units. We note that these estimates assume an R^2 coefficient of 0, so that any additional covariates or explanatory power from fixed effects will reduce the MDEs reported in Table 2. We also highlight that the intra-cluster correlation coefficients are quite high for many outcomes, which affects our ex-ante power calculations but also requires less units in each cluster.

4. Hypotheses and empirical strategy

Given the design of the experiment, we will first analyze whether the receipt of text messages affects caregivers' attitudes to attend in-person early childhood education services and then proceed to study whether any changes in attitudes translate into changes in observed attendance.

- **H1:** the receipt of SMS affects the willingness of parents and caregivers to return their children to ICBF early childhood educational services.
- **H2:** The receipt of SMS affects attendance rates for children.

- **H3:** the different types of SMS have a differential effect on both the willingness to return to in-person services and observed attendance.
- **H4:** There may be heterogeneous effects by age and sex of the child, and by other attributes of the caregiver.

Given the available data and our experimental design, we will estimate results using post regressions, ANCOVA (post-regressions controlling for the initial outcome), and difference-in-difference with fixed effects, determining the suitability of all three methods following McKenzie (2012). All regressions will include strata fixed effects and clustered standard errors by education service unit. In the difference in difference regressions, we will use different types of fixed effects as the data permits (strata, educational service units, and beneficiary), also following the latest best practices in the difference-in-difference literature (Roth et al, 2022). We will conduct placebo experiments on pre-treatment data and other robustness tests on the full results to ensure any results are due to the SMS intervention. Finally, we will also apply multiple hypothesis corrections to avoid any misleading results due to having more than one outcome and two treatment groups, which leads to estimating many parameters and conducting multiple hypothesis tests.

5. Threats to inference

The threats to inference depend mostly on the strength of the treatment. While SMS messages will be sent to all registered caregivers in all treated service units (475 SUs of the 719), receipt of the text message does not guarantee that individuals read it and more importantly, internalize the message. Additionally, other issues with respect to text messaging interventions apply, such as problems with network coverage, the word limit, and other issues that may dilute the treatment. If take-up of the behavioral intervention is diluted for any reason, the experiment would lose

statistical power since the treatment would be less intensive, which is a result in and of itself. Additionally, any knowledge on how best to provide information would also be useful for ICBF moving forward, to establish better and more effective communication with caregivers.

6. Ethics and IRB approval

Given that the experiment was carried out by the Colombian Institute for Family Welfare (Instituto Colombiano de Bienestar Familiar – ICBF) and that the researchers at Universidad de los Andes do not have access to identifying information in any of the databases, this study was not deemed to require Institutional Review Board approval from the university since it analyzes secondary data to carry out the evaluation of the program and we did not deal with the participants directly. The ICBF did obtain informed consent from all eligible caregivers in the selected service units.

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