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Promoting in-person attendance for early childhood services after the COVID-19 pandemic using text messages[*]

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Abstract

This paper investigates whether text messages can encourage caregivers of young children to increase their intention to use in-person early childhood services and subsequently, actual attendance. We randomly assign 15,100 beneficiaries in 719 educational centers into one control and two treatment groups, the first in which caregivers receive four text messages designed to target risk and loss aversion for three weeks, while the second group receives the same number of messages reinforcing social norms that early childhood education is a civic duty. Results show greater reported intent from caregivers who receive text messages for their children to attend but no significant differences by the type of message. However, this increased willingness to attend does not translate into greater effective attendance. These findings suggest that while text messages may be useful to provide information to caregivers, these nudges require additional and complementary efforts to turn their reported intentions into actions.

Keywords: early childhood education, text messages, intention to attend, attendance, nudges.
JEL Classification: C93, D90, E70, I12, I20.

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Resumen

Este trabajo investiga si los mensajes de texto pueden motivar a los cuidadores de niños y niñas a aumentar su intención y uso efectivo de servicios de educación inicial brindados por el Instituto Colombiano de Bienestar Familiar (ICBF). Asignamos a 15,100 beneficiarios en 719 Unidades de Servicios en un grupo control y dos grupos tratamiento, el primero donde los cuidadores reciben cuatro mensajes de texto durante tres semanas que apelan a la aversión a la perdida y riesgo, mientras el segundo grupo tratado recibe la misma cantidad de mensajes reforzando la norma social que la educación temprana es un deber cívico. Los resultados muestran que los cuidadores reportan mayores intenciones de que los niños y niñas asistan a servicios presenciales, sin diferencias por el tipo de mensaje utilizado. Sin embargo, estas intenciones no se traducen en acciones, ya que no encontramos cambios significativos en la tasa de asistencia efectiva usando registros del ICBF. Estos resultados sugieren que, aunque los mensajes de texto pueden ser útiles para brindar información a los cuidadores de niños y niñas, estos empujoncitos requieren esfuerzos adicionales y complementarios que conviertan voluntad reportada por los adultos en acciones concretas.

Palabras clave: primera infancia, mensajes de texto, intenciones, asistencia escolar, *empujoncitos*.
Clasificación JEL: C93, D90, E70, I12, I20.

Contents

1. Introduction

Lockdown measures imposed during the COVID-19 pandemic disrupted the lives of many families. Previous pandemics have resulted in worse health, nutritional, and education outcomes for children (Peter *et al*., 2002; Lundemberg and Wuermli, 2012). Recent research suggests that the consequences of the COVID-19 pandemic are expected to yield similar losses (Hincapié *et al*., 2020; UN, 2020; Yoshikawa *et al*., 2020). In terms of education, nearly 1.5 billion children and young people around the world were affected by school closures and interruptions to in-person instruction (Seusan and Maradiegue, 2020; UNESCO, 2021). Estimates suggest that closures due to the COVID-19 pandemic could result in an average loss of at least 0.6 years of schooling, a drop in the quality of education, and lost earnings (Azevedo *et al*., 2020; Psacharopoulos *et al*., 2021).

Sudden disruptions to in-person schooling may affect some students more than others (Marcotte and Hemelt, 2008; Lloyd, 1978; Meyers and Thomasson, 2017). For instance, the potential effects of school closures and interruptions during early childhood (individuals aged six years or younger) may be greater than for older children, since early childhood is considered a crucial moment for human capital accumulation (Hincapié *et al*., 2020). Therefore, the potential negative consequences of school closures due to lockdown measures could be more pronounced for the youngest children. Lopez *et al*. (2020) suggest that millions of children under the age of six are likely to suffer considerable earning loses over their lifetime due to these unexpected disruptions in their education. Nevertheless, while there is some evidence on the effects of remote learning in early childhood during the pandemic (Atiles *et al*., 2021; Gayatri, 2020; Jalongo, 2021), fewer research has focused on attendance changes to early childhood services compared to primary and secondary (Chatterji and Li, 2021).

This study tests whether the caregivers of young children who receive text messages report greater intention for their children to attend in-person early childhood services and actual attendance to educational centers. Because of the COVID-19 pandemic, early childhood services provided by the Colombian Institute for Family Welfare (*Instituto Colombiano de Bienestar Familiar* or ICBF) were interrupted. Once lockdown mandates and social distancing restrictions began to relax in Colombia, the ICBF began to restore its in-person services. However, attendance has not returned to pre-pandemic levels. While the minimum attendance used to be 10 days per month to keep their place in the educational center (ICBF, 2021), the average number of days children attended ICBF's in-person services per month was nearly zero in March 2021 (0.044 days per month). By September 2021 this number was close to 4 days (3.85).

We conduct a cluster-randomized trial with a sample of 719 early childhood education centers that cover 15,100 beneficiaries, randomly assigning them into one control and two treatment groups. Caregivers in the first treatment group receive four text messages designed to target risk and loss aversion for three weeks, while the second treatment group receives the same number of messages reinforcing social norms that early childhood education is a civic duty. Using data from a telephone survey, we test whether these information treatments change caregivers' willingness for their children to attend (*intentions*) and estimate changes in actual attendance (*actions*) using ICBF administrative records to evaluate the effectiveness of text messages.

Our results reveal that while text messages were effective at increasing caregivers' reported willingness for their children to attend in-person early childhood educational services, this knowledge was insufficient to generate changes in effective attendance. While 61.8% of caregivers in the control group stated intent to return to ICBF's service centers, this share is 5.5 and 5.7 percentage points higher for the group that receives risk aversion and civic duty text messages,

respectively. We find that risk aversion and civic duty text messages have statistically identical effects, suggesting that the framing of messages is not relevant. Results for effective attendance are positive in sign but statistically insignificant and robust to specification choice and multiple hypothesis testing. We find some suggestive evidence of heterogeneous effects in intention to attend by gender and age, but no differential effects by child attributes in effective attendance.

This paper contributes to the growing literature estimating the consequences of the COVID-19 pandemic on early childhood education (Jalongo, 2021). Specifically, we provide new evidence on the disincentive effects of the sanitary emergency on attendance for young children in a developing country, and whether a low-cost behavioral intervention aimed at increasing parental trust is an effective tool to combat caregiver biases and can help overcome these disincentives to attend. While most available studies have focused on quantifying the learning effects of the pandemic (Azevedo *et al.*, 2020), less attention has been afforded to maintaining pre-crisis attendance rates, which are especially relevant in early childhood education since it is not mandatory in most countries. Together, this evidence allows documenting the current situation in early childhood education in Colombia and discussing a path forward to avoid negative long-term consequences.

2. Intervention and experimental setting

2.1. Context

Extended closures and interruptions forced educational centers to implement remote learning to maintain the continuity of education. However, limited internet access and low digital connectivity at home has become a barrier to educational access, especially for children in vulnerable contexts (ECLAC, 2021; Carvalho and Hares, 2020; Carvalho and Crawford, 2020; Timmons *et al.*, 2021). Unintentionally, the shift towards remote learning could have reinforced absenteeism and dropout

rates among students from the lowest income households, further exacerbating existing educational disparities (Azevedo *et al*., 2020; Neidhöfer et al., 2021). These potential effects on absenteeism are important to document for low-income children, who are generally those who gain more from attending school (Ehrlich *et al*., 2014; Susman-Stillman *et al*., 2018).[9] Children with frequent absences during early childhood tend to have lower skills and educational attainment later in life, resulting in poor performance in the labor market as adults (Berlinski *et al*., 2008; Ehrlich *et al*., 2014; Romero and Lee, 2007; Schady *et al.*, 2014; Taylor *et al*., 2000).

Parental trust in schools and biases about their children's education are key to determine attendance and academic performance (Bergman, 2015; Robinson *et al*., 2018). The COVID-19 pandemic may have undermined parents' trust in schools in terms of their safety, ultimately reinforcing student absenteeism and subsequently affecting learning. Meyers and Thomasson (2017) found that the polio pandemic affected parents' willingness to let their children attend school. A survey performed by the Colombian Institute for Family Welfare (ICBF, 2021), revealed that more than half of surveyed caregivers (55.5%), did not agree with sending their children to in-person early childhood services due to beliefs that educational centers were unsafe and did not have appropriate sanitary conditions, which could potentially increase contagion of COVID-19.

Previous studies have shown that behavioral interventions that provide better information can influence parental beliefs and increase school attendance (Bergman and Chan, 2019; Kalil, *et al*., 2018; Robinson *et al*., 2018; Smythe-Leistico and Page, 2018). Given this context, we co-designed and helped implement an intervention in partnership with the ICBF that aims to strengthen

[9] Students in low-income households also tend to be more exposed to difficult and unstable environments, which makes them more likely to be mentally and physically affected by being separated from the supportive environment educational institutions usually provide from conditions at home (Lopez *et al*., 2018; OECD, 2012).

caregiver trust for in-person early childhood services with the objective of increasing the intention for children to attend ICBF centers, as well as effective attendance.

2.2. Intervention

We employ text messages as a tool to provide information to caregivers given their velocity and cost-effectiveness (Damgaard and Nielsen, 2018; Boruchowicz *et al*., 2020). The ICBF keeps records of all mobile telephone numbers for the caregivers of enrolled children. 93% of all caregivers have a mobile phone with the capacity to receive text messages (ICBF, 2021).

The Early Childhood Development Division at ICBF co-created 12 text messages with two behavioral approaches. The first six aimed to target caregivers' risk and loss aversion, while the latter six meant to reinforce the social norm that early childhood education is a civic duty for all caregivers of young children. After the initial design of these messages, the ICBF held focus group discussions with caregivers and staff to validate the content and effectiveness of the text messages. This user-focused participatory design allowed constructing clear, concise, and effective text messages that communicate the relevant information in two different ways. All 12 text messages are shown in Table 1 (See Table A.1 in the Appendix for the original messages in Spanish).

The risk and loss aversion treatment sent text messages that communicated that not attending early childhood education had potential negative consequences on child development and well-being. For instance, one message reads: "*Join the reopening of ICBF pre-schools, where your child will increase their physical, cognitive, and emotional development. Don't be left behind!*" and "*ICBF pre-schools are prepared with all biosecurity measures. Don't let your child be left behind! Let's return to the classroom!*". The social norms treatment planned to influence caregivers' behavior using text messages that served as reminders about their social responsibility in guaranteeing their child's development (Hammer *et al*., 2007). This framing generates a feeling

of civic duty, reinforcing that guaranteeing early childhood education is a responsibility that should be carried out by all people in society. For instance, one message reads: "*ICBF pre-schools are prepared with all biosecurity measures for a safe return. Now it is parents' responsibility to return to the classroom.*" and another states: "*Over 460 thousand children have returned to safe pre-school spaces. Join all the other families in person!*".

Table 1. Text messages sent to caregivers

Number	Treatment 1: Risk & Loss aversion	Treatment 2: Social norms
1	Give your child the chance to enjoy and play in the ICBF pre-schools, their friends and teachers are waiting for them. Let's return to the classroom!	From monitoring to reopening, we found that families and teachers comply with biosecurity measures at home and in ICBF pre-schools. Let's return to the classroom!
2	ICBF pre-schools are prepared with all biosecurity measures. Don't let your child be left behind! Let's return to the classroom!	ICBF pre-schools are prepared with all biosecurity measures for a safe return. Now it is parents' responsibility to return to the classroom.
3	Studies ensure that reopening pre-schools does not represent a high COVID contagion risk. Only your child is missing in the classroom!	According to medical studies, COVID does not affect children more than adults. We are all responsible to inform ourselves and ensure all children's development.
4	According to medical studies, COVID does not affect children more than adults. We are waiting for your child in ICBF pre-schools!	All children returning to in-person classrooms are happy to reunite with their friends and teachers and enjoy their books and toys. Let's return to the classroom!
5	ICBF pre-schools are safe and secure spaces and increase the development of your child. Don't let your child be left behind! Let's return to the classroom!	All children who attend in-person lessons increase their physical, cognitive, and emotional skills. Let's return to the classroom!
6	Join the reopening of ICBF pre-schools, where your child will increase their physical, cognitive, and emotional development. Don't be left behind!	Over 460 thousand children have returned to safe pre-school spaces. Join all the other families in person!

Source: ICBF Direction of Early Childhood.
Notes: Text messages in their original Spanish form are shown in Table A.1.

Between August and September 2021, a baseline telephone survey was carried out for a sub-sample of the 15,100 caregivers, which we describe in more detail in the next section. This short survey asked caregivers whether they agreed or not with their children going back to in-person services and, it also inquired on the reasons for their favorable or unfavorable response. The text message intervention took place in October and November 2021. Caregivers in the treatment groups received four messages per week for three weeks. In December 2021, the ICBF

conducted a follow up telephone survey for the same individuals contacted in the baseline. 85.2% of caregivers in treatment groups reported receiving and reading text messages from ICBF.

We hypothesize that better information should increase 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 willingness for their children to attend early childhood services provided by the ICBF. We also expect that greater caregiver intentions for child attendance may translate into higher effective attendance.

2.3. Experimental design[10]

The ICBF currently operates 73,000 centers that provide early childhood services to young children in Colombia. We first selected 719 centers, which cover 15,100 beneficiaries. Then, we randomly assign these centers into three groups: 244 service units in a control group where no text messages were sent (4,028 beneficiaries); 235 were assigned to the risk and loss aversion treatment (4,892 beneficiaries); and 240 were assigned to the social norm treatment (6,180 beneficiaries). Random assignment was stratified by region, which guarantees that we have representativeness for the four regions in which the ICBF operates: Amazonía-Orinoquía, Centro-Oriente, Norte, and Pacífico-Occidente.

Table 2 shows descriptive statistics for our experimental sample and balance tests, with the results indicating that that all three groups are statistically identical in pre-intervention outcomes and observable attributes.

[10] An in-depth description of the details of our experimental design, including statistical power calculations may be found in our Pre-Analysis Plan (Ham *et al*., 2022).

Table 2. Descriptive statistics and balance tests before the intervention

Variable	Control	Treatment 1	Treatment 2	p-value
Days in Attendance	0.143	0.149	0.133	0.842
(March - October 2021)	(0.350)	(0.356)	(0.339)	
Female beneficiary	0.495	0.519	0.505	0.257
	(0.500)	(0.500)	(0.500)	
Age of beneficiary	3.661	3.723	3.911	0.316
	(3.734)	(4.074)	(4.523)	
Caregiver is family member	0.922	0.924	0.934	0.392
	(0.268)	(0.265)	(0.248)	
Age of caregiver	30.054	29.965	30.124	0.579
	(8.247)	(8.103)	(8.203)	
Observations	32,224	39,136	49,440	

Source: Own elaboration from anonymized administrative 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 (region) fixed-effects with clustered standard errors by educational center and correspond to the hypothesis that means for Control and both Treatment groups are equal.

3. Data and empirical strategy

3.1. Data

The experimental design requires measuring two effects: i) changes in caregivers' willingness to send their children back to in-person services and, ii) changes in effective attendance.

To study the first effect, we will use information from a telephone survey conducted by ICBF to a sub-sample of caregivers before and after the intervention (in August and December 2021, respectively). Due to logistical constraints, not all caregivers in the selected educational centers were interviewed. Of the 15,100 registered beneficiaries in the 719 centers in our sample, approximately 8,189 were contacted for the baseline survey and 7,522 were re-contacted for the follow up interview, for a survey sample of 50% of the entire population. Caregivers were contacted multiple times to ensure completion of the interview, with an average response rate of

70% for contacted individuals and 40% with respect to the experimental sample.[11] Given the inability to survey all caregivers, and that we have administrative records for the entire sample as described below, we compare attributes to determine whether the surveyed sample differs from the full sample in Table A.2 in the Appendix. There are few significant differences that are small in magnitude between surveyed and unsurveyed individuals in outcomes, attributes, or treatment group composition. We also explore whether response rates vary across randomly assigned groups, with the results in Table A.3 suggesting similar response rates for all groups.

These short surveys ask caregivers whether they agree or not with their children going back to in-person early childhood 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. These two questions were asked in both rounds, but we added an additional question in the follow up round: asking willing caregivers when they would be comfortable for their child to return to in-person services: in 2021, first semester of 2022, or second semester of 2022.

To assess the effects on the intervention on effective attendance, we employ administrative records from the ICBF, known as the Monthly Assistance Registry (RAM, for its acronym in Spanish). This is a census-style database compiled by the ICBF that records basic demographic information and days in attendance for all beneficiaries and collects information on caregivers, which allows constructing an individual-level panel data set from March to December 2021[12]. These data allow measuring the immediate effects of the intervention on actual attendance. Descriptive statistics for these administrative records are those shown in Table 1 above.

[11] 6,135 surveys were completed out of 8,189 contacted in the baseline (74.9%), while 5,267 surveys were completed out of 7,522 contacted in the follow up round (70%). Compared to the entire population of 15,100, we have 40.6% response in the baseline survey and 35% in the follow up. See Table A.2 in the Appendix for details.
[12] Unfortunately, the RAM was discontinued in January 2022, so available data exists until December 2021.

3.1. Empirical strategy

Given the experimental design, which confirms that groups are identical in observable attributes and outcomes before the intervention, we estimate the effect of text messages on caregivers' reported intention to attend and effective attendance using linear regressions following the strategy in our Pre-Analysis Plan (Ham *et al*., 2022). The regressions we estimate are:

$$y_{ist} = \alpha + \beta_1 T1 + \beta_2 T2 + \theta X_{is,t-1} + \lambda_r + u_{it} \quad (1)$$

where y_{ist} are the outcomes: intention for children to attend from the survey and effective attendance from administrative records. *T1* and *T2* are dummy variables that identify whether the individual belongs to the risk and loss aversion treatment or the social norms treatment. $X_{is,t-1}$ includes controls for sex and age of the child; a dummy variable if the caregiver is a family member, their age, and a dummy variable if age is unknown for the caregiver. In some specifications, we also control for the lagged outcome variable using an ANCOVA approach. We include region dummies to account for stratified random assignment in λ_r.

We estimate post regressions that compare treatment and control group means, ANCOVA regressions that control for lagged outcomes, and difference-in-difference specifications, determining the suitability of all three methods following the recommendations in McKenzie (2012). All effects are estimated using clustered standard errors by educational center since the intervention was randomly assigned at this level. To ensure robustness of our results, we apply multiple hypothesis corrections to avoid any misleading findings due to having multiple outcomes and two treatment groups, which leads to estimating several parameters using a single source of variation. We present *q*-values in addition to *p*-values, calculated using the method proposed by Benjamini and Hochberg (1995) that controls for the false discovery rate (FDR).

4. Results

We begin by presenting the results of receiving text messages on the intention for beneficiaries to attend in-person services in Table 3. The regressions from survey data are cross-sectional and show three specifications: no controls, controlling for demographic attributes of the beneficiary and their caregivers, and including the lagged outcome variable in an ANCOVA specification. We estimate regressions for each treatment separately in Panel A and pool them together in Panel B.

Our findings indicate that receiving text messages increases caregivers' willingness for their children to attend in-person early childhood services. While 61.8% of caregivers in the control group state intention to return to ICBF's service centers, this share is 5.5 and 5.7 percentage points higher for the group that receives risk aversion and civic duty text messages, respectively. In relative terms this suggests an increase of about 9% for both treatment groups compared to the control group. These estimates are unchanged when including controls in column 2 and controlling for the lagged dependent variable in column 3, since the 95% confidence intervals overlap. For all specifications, we accept that risk aversion and civic duty messages have statistically identical effects. Given this last result, we present results for each treatment separately but also pool them together to maximize statistical power in our ensuing estimates. The pooled results show an increase between 4.5-5.6 percentage points in caregivers' intentions for their children to return to in-person early childhood services, an increase ranging from 7.3-9 percent in relative terms.

Table 3. The effects of text messages on caregiver's intention for children to attend early childhood services

	(1)	(2)	(3)
Panel A. Multiple treatments			
Treatment 1: Risk aversion	0.055	0.054	0.038
	(0.026)**	(0.026)**	(0.023)*
	[0.046]	[0.046]	[0.096]
Treatment 2: Social norms	0.057	0.057	0.051
	(0.027)**	(0.026)**	(0.024)**
	[0.046]	[0.046]	[0.046]
Baseline mean	0.618	0.618	0.618
p-value T1=T2	0.888	0.892	0.446
Adjusted R^2	0.018	0.018	0.136
Observations	5,267	5,267	3,512
Panel B. Pooled treatments			
Received SMS	0.056	0.055	0.045
	(0.025)**	(0.024)**	(0.022)**
	[0.046]	[0.046]	[0.046]
Baseline mean	0.618	0.618	0.618
Adjusted R^2	0.018	0.018	0.136
Observations	5,267	5,267	3,512
Lagged outcome	No	No	Yes
Controls	No	Yes	Yes

Source: Authors' elaboration from anonymized survey data provided by ICBF.

Notes: The table reports cross-section estimates of the effects of text messages on caregivers' willingness for their children to return to in-person instruction at ICBF educational centers (see Section 3 for details). Each column presents results from a separate regression considering multiple treatments (Panel A) and pooling treatments (Panel B). Clustered standard errors by educational center are shown in parentheses. Column 1 estimates Equation (1) with no controls, Column 2 includes controls for sex and age of the child; a dummy variable if the caregiver is a family member, their age, and a dummy variable if age is unknown for the caregiver. All specifications include region indicators to account for stratified random assignment. Given that we estimate results for two outcomes and three specifications using the same source of exogenous variation, we present q-values that adjust for multiple hypothesis testing in brackets, calculated using the method by Benjamini and Hochberg (1995) that controls for the false discovery rate (FDR) described in Anderson (2008). Full regressions, including all covariates, are shown in Appendix Table A.4 (Panel A) and Table A.5 (Panel B).

Significance levels: $^{***}p<0.01$; $^{**}p<0.05$; $^{*}p<0.10$.

Given that we have two rounds of survey data, we also estimate treatment effects using a difference-in-difference approach, with results shown in Table A.6 in the Appendix. The estimates have a positive sign and are similar in magnitude to the estimates in Table 3 but are insignificant at conventional levels. However, difference-in-difference results have been shown to have lower

statistical power when autocorrelation in the outcome variable over time is below 0.5 (McKenzie, 2012).[13] In our case the estimated autocorrelations in Tables A.4 and A.5 suggest a statistically significant coefficient of 0.26 (standard error of 0.019), below the stated threshold. In this case with one baseline and follow-up survey, the gains in statistical power from using an ANCOVA specification outweigh using a difference-in-differences approach with two-way fixed effects.

Do greater caregiver intentions for child attendance translate into effective attendance? Table 4 shows results from cross-section and ANCOVA regressions of treatment effects on the actual number of days in attendance per month to measure whether actions are in line with reported intentions. All specifications include beneficiary and caregiver controls, as well as strata fixed effects. They vary in the number of lagged outcomes included. The first column does not control for past attendance, the second column controls for attendance in the month prior to the intervention (October 2021), and the last column controls for all available months in our panel (from March to October 2021).

Results indicate positive but statistically insignificant effects when separating both treatments (Panel A) and pooling them into a single treatment (Panel B). In this case, effective attendance has an autocorrelation coefficient between 0.786-0.859, so ANCOVA and difference-in-differences have almost identical statistical power.[14] Regressions using a difference-in-difference specification yield similar results, positive but insignificant effects (See Table A.9).

[13] Intuitively, the difference in two random variables has a higher variance than just one of these variables unless they are sufficiently highly correlated. Formally, the ratio of the difference-in-differences variance to the ANCOVA variance is $2/(1+\rho)$, where ρ is the autocorrelation coefficient. When $\rho \approx 0.25$, which is the case in this paper, the sample size so that difference-in-differences has the same statistical power as ANCOVA would be 60% larger.

[14] See Figure A.1 in the Appendix for trends in effective attendance by multiple and pooled treatments. Formal tests of parallel trends support this hypothesis in the administrative data, which are available upon request.

Table 4. The effects of text messages on effective attendance in early childhood services

	(1)	(2)	(3)
Panel A. Multiple treatments			
Treatment 1: Risk aversion	0.350	0.654	0.637
	(0.906)	(0.423)	(0.419)
	[0.822]	[0.294]	[0.294]
Treatment 2: Social norms	0.231	0.554	0.533
	(1.025)	(0.418)	(0.412)
	[0.822]	[0.294]	[0.294]
Mean in October 2021	4.048	4.048	0.044
p-value T1=T2	0.905	0.762	0.745
Adjusted R^2	0.045	0.674	0.677
Observations	15,100	15,100	15,100
Panel B. Pooled treatments			
Received SMS	0.284	0.598	0.579
	(0.839)	(0.388)	(0.384)
	[0.822]	[0.294]	[0.294]
Baseline mean	4.048	4.048	0.044
Adjusted R^2	0.045	0.674	0.677
Observations	15,100	15,100	15,100
Lagged outcome	No	October	March-October
Controls	Yes	Yes	Yes

Source: Authors' elaboration from anonymized administrative records provided by ICBF.

Notes: The table reports cross-section estimates of the effects of text messages on effective attendance (in days) at ICBF educational centers (see Section 3 for details). Each column presents results from a separate regression considering multiple treatments (Panel A) and pooling treatments (Panel B). Clustered standard errors by educational center are shown in parentheses. Column 1 estimates Equation (1) with no lagged outcome, Column 2 controls for the lagged outcome in the month prior to the intervention (October 2021); and Column 3 controls for the lagged outcome for all pre-intervention months (from March to October 2021). All specifications include controls for sex and age of the child; a dummy variable if the caregiver is a family member, their age, a dummy variable if age is unknown for the caregiver; and region indicators to account for stratified random assignment. Given that we estimate results for three specifications using the same source of exogenous variation, we present q-values that adjust for multiple hypothesis testing in brackets, calculated using the method by Benjamini & Hochberg (1995) that controls for the false discovery rate (FDR) described in Anderson (2008). Full regressions, including all covariates, are shown in Appendix Table A.7 (Panel A) and Table A.8 (Panel B).

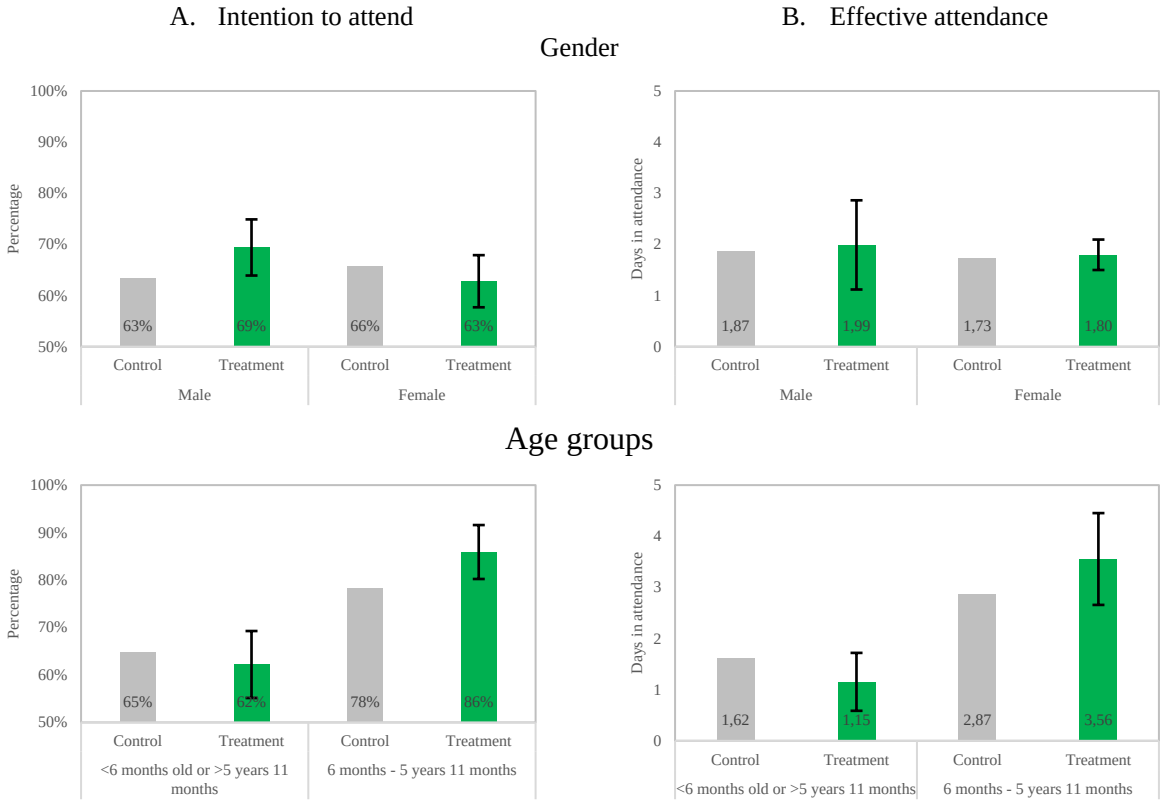
Significance levels: $^{***}p<0.01$; $^{**}p<0.05$; $^{*}p<0.10$.

We also estimate an event study specification since text messages were staggered over time, with caregivers in some educational centers receiving messages a few weeks before others. The findings indicate no effect of the treatment on effective attendance when considering this staggered structure (see Figures A.2 for both treatments and A.3 for the pooled treatment).[15]

Following our pre-analysis plan (Ham *et al*., 2022), we test for heterogeneous effects. We evaluate whether intention to attend and effective attendance have differential effects depending on gender (male and female) and by age groups (children younger than 6 months or older than 5 years and 11 months compared to children between 6 months and 5 years 11 months). The results from this analysis are summarized in Figure 1. We find differential effects on intention to attend for boys and children aged between 6 months and 5 years and 11 months, but not for girls, infants, or older children. This suggests that text messages were more effective in changing attitudes for caregivers of male children between the ages of six months and just below six years of age. However, there is no conclusive evidence of that these differential effects carry over when we observe effective attendance, confirming evidence of disconnection between intention and action.

[15] We also estimate results using a different dependent variable: a binary indicator equal to unity if the child attended at least 2 days per month and zero otherwise. While not reported here due to space restrictions, we find no evidence of any effect of the separate or pooled treatment using different specifications and correcting for multiple hypotheses.

Figure 1. Heterogeneous effects of text messages on caregiver's intention for children to attend and effective attendance to early childhood services



Source: Authors' elaboration from anonymized survey data and administrative records provided by ICBF.
Notes: The figure reports the percentage of caregivers who report intent to send their children to ICBF educational centers (left) and the number of days in attendance from administrative records (right). The grey bars correspond to the control group means and the green bars report the sum of control group means and the estimated coefficient from ANCOVA regressions that control for sex and age of the child; sex, age, a dummy variable if age is unknown for the caregiver; region indicators to account for stratified random assignment; and lagged outcomes. 95% confidence intervals shown for bars that show outcomes for pooled treatment group.

5. Discussion

This paper estimates whether text messages can encourage the caregivers of young children to increase their intention to attend in-person early childhood services and subsequently, actual attendance. We conduct a cluster-randomized trial in 719 educational centers which cover 15,100 beneficiaries, assigning centers into one control group that receives no messages and two treatment groups, the first in which caregivers receive text messages designed to target risk and loss aversion, while the second receive messages which reinforce social norms that early childhood education is a civic duty. Results indicate that while text messages were effective at increasing caregiver

willingness for their children to attend in-person early childhood educational services, this knowledge was insufficient to generate changes in effective attendance.

Most caregivers who do not want their children to attend in-person services stated fear of COVID contagion as their main concern for not returning. The data suggest that this fraction fell from 77.2 to 58.7% after the text message intervention for those with no intention of attending. While this result is encouraging, it highlights that moving from intention to action requires more than a nudge. Additionally, while 49.2% of caregivers reported intentions to return immediately, 44% reported their willingness to return in early 2022 and another 6.8% later in that same year. Given the inability to measure attendance starting in 2022 due to an institutional decision by ICBF to discontinue attendance records, we cannot ascertain if these intentions became actions in 2022. Future research should attempt to gauge the medium- and longer-term effects of similar interventions that aim to return attendance rates to pre-pandemic levels.

While text messages are a rapid and cost-effective approach to engage parents in their child's education by providing relevant information (Kraft and Rogers, 2015), other evidence has shown that shaping beliefs does not always lead to changes in behavior (Sunstein, 2017). In the case of the pandemic, certain myths about the appropriateness of schools to deal with contagion rates seem to be cemented in Colombia. The evidence in this paper suggests that while text messages may be useful in some circumstances, there are beliefs that are harder to influence through this type of nudge, especially those that may have consequences on the health of children and their families. Nudges by themselves have been shown to be insufficient in several contexts to change behavior (Hummel and Maedche, 2019). Complementary efforts should also be carried out to increase the effectiveness of these policy tools to bridge gaps between intentions and actions, especially in an educational context with high long-term costs (Damgaard and Nielsen, 2018).

The benefits of in-person schooling over remote learning have been well-documented since the beginning of the pandemic for short and long-term child development (Kaffenberger, 2021). Our results suggests that health concerns may outweigh the benefits of human capital investment in emergency contexts. While we have much to learn on what motivates parents and children to attend school in times of crisis, we hope this evidence contributes to the ongoing discussion of potential solutions to circumvent any negative consequences of the pandemic for young children, not only in terms of learning outcomes but also attendance and retaining students at all levels.

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Online Appendix – Not for publication

Table A.1. Text messages sent to caregivers (in original Spanish)

Number	Treatment 1: Risk & Loss aversion	Treatment 2: Social norms
1	Dale la oportunidad a tu niñ@ de disfrutar y jugar en el jardín del ICBF, sus amigos y profes lo están esperando en la presencialidad. Anímate al regreso seguro.	Del monitoreo a la reapertura encontramos que las familias y profes cumplen con las medidas de bioseguridad en sus casas y jardines del ICBF. ¡Anímate a volver!
2	Los jardines del ICBF están preparados con todas las medidas de bioseguridad ¡Que tu niña o niño no se quede atrás! Anímate al regreso seguro.	Los jardines del ICBF están preparados con todas las medidas de bioseguridad para el regreso seguro. Ahora es responsabilidad de los padres animarse a volver.
3	Estudios afirman que la reapertura de los jardines no representa un riesgo alto de contagio de COVID. ¡Solo falta tu niña o niño en la presencialidad!	Según investigaciones, el COVID no afecta más a los pequeños. Todos somos responsables de informarnos y asegurar el desarrollo de tu niñ@ en la presencialidad.
4	Según estudios, el COVID no afecta más a los niñ@s. Te esperamos en el jardín del ICBF con tu niñ@s para vivir experiencias de juego y creación.	Todos los niñ@s que vuelven a la presencialidad son felices al reencontrarse con sus amigos y profes, y al disfrutar de los juguetes y libros. ¡Anímate a volver!
5	Los jardines del ICBF son espacios bioseguros y potencian el desarrollo de tu niña o niño. ¡No dejes que se quede atrás! Anímate a volver presencialmente.	Todos las niñ@s que van presencialmente a los jardines potencian su desarrollo físico, cognitivo y emocional. ¡Anímate con nosotros a la presencialidad!
6	Únete a la reapertura de los jardines de ICBF, donde tu niña o niño puede potenciar su desarrollo físico, cognitivo y emocional. ¡No te quedes atrás!	Más de 460mil niñ@s ya volvieron a los espacios adecuados para que las niñas y niños estén seguros. ¡Únete a estas familias en la reapertura!

Source: ICBF Direction of Early Childhood

Table A.2. Comparison of surveyed and unsurveyed individuals

	Baseline survey			Follow up survey		
	Unsurveyed	Surveyed	p-value	Unsurveyed	Surveyed	p-value
Treatment 1: Risk aversion	0.315	0.337	0.305	0.316	0.338	0.065
	(0.465)	(0.473)		(0.465)	(0.473)	
Treatment 2: Social norms	0.416	0.400	0.688	0.404	0.419	0.500
	(0.493)	(0.490)		(0.491)	(0.493)	
Female beneficiary	0.511	0.500	0.180	0.512	0.497	0.099
	(0.500)	(0.500)		(0.500)	(0.500)	
Age of beneficiary	4.136	3.881	0.009	4.138	3.836	0.001
	(4.497)	(3.667)		(4.274)	(3.995)	
Caregiver is family member	0.917	0.929	0.021	0.918	0.927	0.078
	(0.277)	(0.258)		(0.274)	(0.259)	
Age of caregiver	30.079	30.632	0.000	30.180	30.533	0.080
	(8.283)	(8.022)		(8.264)	(8.024)	
Observations	8,965	6,135		9,833	5,267	

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

Notes: The table presents means for each variable and standard deviations in parentheses. The p-values in the third and final column are obtained by regressing each variable on a dummy variables that identifies surveyed individuals with clustered standard errors by educational center and correspond to the hypothesis that means for unsurveyed and surveyed individuals are equal.

Table A.3. Response rates for telephone surveys by randomized group

	Control	Treatment 1	Treatment 2	p-value
Baseline				
Contacted	0.526	0.539	0.555	0.608
	(0.499)	(0.498)	(0.497)	
Completed surveys	0.400	0.423	0.397	0.485
	(0.490)	(0.494)	(0.489)	
Follow-up				
Contacted	0.476	0.509	0.504	0.478
	(0.499)	(0.500)	(0.500)	
Completed surveys	0.318	0.364	0.357	0.425
	(0.466)	(0.481)	(0.479)	

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

Notes: The table presents means response rates 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 (region) fixed-effects with clustered standard errors by educational center and correspond to the hypothesis that means for Control and both Treatment groups are equal.

Table A.4. The effects of text messages on caregiver's intention for children to attend early childhood services (full regressions with multiple treatments)

	(1)	(2)	(3)
Treatment 1: Risk aversion	0.055	0.054	0.038
	(0.026)**	(0.026)**	(0.023)*
	[0.046]	[0.046]	[0.096]
Treatment 2: Social norms	0.057	0.057	0.051
	(0.027)**	(0.026)**	(0.024)**
	[0.046]	[0.046]	[0.046]
Lagged outcome			0.260
			(0.019)***
Female beneficiary		-0.010	0.002
		(0.010)	(0.011)
Age of beneficiary		0.000	0.000
		(0.001)	(0.002)
Caregiver is family member		0.029	0.009
		(0.025)	(0.029)
Age of caregiver		-0.000	0.001
		(0.001)	(0.001)
Age of caregiver missing		0.199	-0.552
		(0.733)	(0.878)
Baseline mean	0.618	0.618	0.618
p-value T1=T2	0.888	0.883	0.445
Adjusted R^2	0.018	0.018	0.137
Observations	5,267	5,267	3,512

Source: Authors' elaboration from anonymized survey data provided by ICBF.

Notes: The table reports cross-section estimates of the effects of text messages on caregivers' willingness for their children to return to in-person instruction at ICBF educational centers (see Section 3 for details). Each column presents results from a separate regression considering multiple treatments (Panel A) and pooling treatments (Panel B). Clustered standard errors by educational center are shown in parentheses. Column 1 estimates Equation (1) with no controls, Column 2 includes controls for sex and age of the child; a dummy variable if the caregiver is a family member, their age, and a dummy variable if age is unknown for the caregiver. All specifications include region indicators to account for stratified random assignment. Given that we estimate results for two outcomes and three specifications using the same source of exogenous variation, we present q-values that adjust for multiple hypothesis testing in brackets, calculated using the method by Benjamini and Hochberg (1995) that controls for the false discovery rate (FDR) described in Anderson (2008).

Significance levels: $^{***}p<0.01$; $^{**}p<0.05$; $^{*}p<0.10$.

Table A.5. The effects of text messages on caregiver's intention for children to attend early childhood services (full regressions with pooled treatment)

	(1)	(2)	(3)
Received SMS	0.056	0.055	0.045
	(0.025)**	(0.024)**	(0.022)**
	[0.046]	[0.046]	[0.046]
Lagged outcome			0.261
			(0.019)***
Female beneficiary		-0.010	0.002
		(0.010)	(0.011)
Age of beneficiary		0.000	0.000
		(0.001)	(0.002)
Caregiver is family member		0.029	0.009
		(0.025)	(0.029)
Age of caregiver		-0.000	0.001
		(0.001)	(0.001)
Age of caregiver missing		0.199	-0.549
		(0.733)	(0.878)
Baseline mean	0.618	0.618	0.618
Adjusted R^2	0.018	0.018	0.136
Observations	5,267	5,267	3,512

Source: Authors' elaboration from anonymized survey data provided by ICBF.

Notes: The table reports cross-section estimates of the effects of text messages on caregivers' willingness for their children to return to in-person instruction at ICBF educational centers (see Section 3 for details). Each column presents results from a separate regression considering multiple treatments (Panel A) and pooling treatments (Panel B). Clustered standard errors by educational center are shown in parentheses. Column 1 estimates Equation (1) with no controls, Column 2 includes controls for sex and age of the child; a dummy variable if the caregiver is a family member, their age, and a dummy variable if age is unknown for the caregiver. All specifications include region indicators to account for stratified random assignment. Given that we estimate results for two outcomes and three specifications using the same source of exogenous variation, we present q-values that adjust for multiple hypothesis testing in brackets, calculated using the method by Benjamini and Hochberg (1995) that controls for the false discovery rate (FDR) described in Anderson (2008).

Significance levels: $^{***}p<0.01$; $^{**}p<0.05$; $^{*}p<0.10$.

Table A.6. The effects of text messages on caregiver's intention for children to attend early childhood services (difference-in-difference regressions)

	(1)	(2)	(3)
Panel A. Multiple treatments			
Treatment 1 x Post	0.019	0.019	0.007
	(0.029)	(0.030)	(0.034)
	[0.581]	[0.581]	[0.833]
Treatment 2 x Post	0.045	0.054	0.032
	(0.031)	(0.030)*	(0.032)
	[0.366]	[0.366]	[0.565]
Baseline mean	0.618	0.618	0.618
p-value T1=T2	0.467	0.341	0.516
Adjusted R^2	0.112	0.214	0.391
Observations	11,399	11,367	7,024
Panel B. Pooled treatments			
Received SMS x Post	0.034	0.038	0.020
	(0.024)	(0.024)	(0.027)
	[0.366]	[0.366]	[0.581]
Baseline mean	0.618	0.618	0.618
Adjusted R^2	0.112	0.214	0.391
Observations	11,399	11,367	7,024
Fixed effects	Region	Center	Beneficiary

Source: Authors' elaboration from anonymized survey data provided by ICBF.

Notes: The table reports difference-in-difference estimates of the effects of text messages on caregivers' willingness for their children to return to in-person instruction at ICBF educational centers (see Section 3 for details). Each column presents results from a separate regression considering multiple treatments (Panel A) and pooling treatments (Panel B). Clustered standard errors by educational center are shown in parentheses. Column 1 includes region (strata) fixed effects, Column 3 includes educational center fixed effects, Column 3 includes individual fixed effects. Given that we estimate results for two outcomes and three specifications using the same source of exogenous variation, we present q-values that adjust for multiple hypothesis testing in brackets, calculated using the method by Benjamini and Hochberg (1995) that controls for the false discovery rate (FDR) described in Anderson (2008). Significance levels: $^{***}p<0.01$; $^{**}p<0.05$; $^{*}p<0.10$.

Table A.7. The effects of text messages on effective attendance in early childhood services (full regressions with multiple treatments)

	(1)	(2)	(3)
Treatment 1: Risk aversion	0.350	0.654	0.637
	(0.906)	(0.423)	(0.419)
Treatment 2: Social norms	0.231	0.554	0.533
	(1.025)	(0.418)	(0.412)
Female beneficiary	-0.149	-0.024	-0.016
	(0.118)	(0.068)	(0.068)
Age of beneficiary	-0.038	-0.032	-0.034
	(0.019)**	(0.011)***	(0.011)***
Caregiver is family member	0.595	0.168	0.191
	(0.346)*	(0.151)	(0.149)
Age of caregiver	0.028	0.006	0.006
	(0.010)***	(0.005)	(0.005)
Age of caregiver missing	-26.977	-5.775	-5.662
	(9.197)***	(4.452)	(4.578)
Lagged outcome (October)		0.859	0.786
		(0.030)***	(0.032)***
Lagged outcome (September)			0.073
			(0.043)*
Lagged outcome (August)			0.007
			(0.045)
Lagged outcome (July)			0.025
			(0.053)
Lagged outcome (June)			0.076
			(0.073)
Lagged outcome (May)			-0.099
			(0.085)
Lagged outcome (April)			0.140
			(0.059)**
Lagged outcome (March)			0.087
			(0.066)
Baseline mean	4.048	4.048	0.044
p-value T1=T2	0.905	0.762	0.745
Adjusted R^2	0.045	0.674	0.677
Observations	15,100	15,100	15,100

Source: Authors' elaboration from anonymized survey data provided by ICBF.

Notes: The table reports cross-section estimates of the effects of text messages on effective attendance (in days) at ICBF educational centers (see Section 3 for details). Each column presents results from a separate regression considering multiple treatments (Panel A) and pooling treatments (Panel B). Clustered standard errors by educational center are shown in parentheses. Column 1 estimates Equation (1) with no lagged outcome, Column 2 controls for the lagged outcome in the month prior to the intervention (October 2021); and Column 3 controls for the lagged outcome for all pre-intervention months (from March to October 2021). All specifications include controls for sex and age of the child; a dummy variable if the caregiver is a family member, their age, a dummy variable if age is unknown for the caregiver; and region indicators to account for stratified random assignment. Significance levels: $^{***}p<0.01$; $^{**}p<0.05$; $^{*}p<0.10$.

Table A.8. The effects of text messages on effective attendance in early childhood services (full regressions with pooled treatment)

	(1)	(2)	(3)
Received SMS	0.284	0.598	0.579
	(0.839)	(0.388)	(0.384)
Female beneficiary	-0.147	-0.022	-0.015
	(0.115)	(0.067)	(0.067)
Age of beneficiary	-0.038	-0.033	-0.034
	(0.020)*	(0.011)***	(0.011)***
Caregiver is family member	0.590	0.164	0.187
	(0.354)*	(0.149)	(0.147)
Age of caregiver	0.028	0.006	0.006
	(0.010)***	(0.005)	(0.005)
Age of caregiver missing	-26.904	-5.713	-5.596
	(9.185)***	(4.449)	(4.577)
Lagged outcome (October)		0.859	0.786
		(0.030)***	(0.032)***
Lagged outcome (September)			0.073
			(0.043)*
Lagged outcome (August)			0.007
			(0.045)
Lagged outcome (July)			0.023
			(0.054)
Lagged outcome (June)			0.077
			(0.074)
Lagged outcome (May)			-0.100
			(0.086)
Lagged outcome (April)			0.139
			(0.059)**
Lagged outcome (March)			0.088
			(0.067)
Baseline mean	4.048	4.048	0.044
Adjusted R^2	0.045	0.674	0.677
Observations	15,100	15,100	15,100

Source: Authors' elaboration from anonymized survey data provided by ICBF.

Notes: The table reports cross-section estimates of the effects of text messages on effective attendance (in days) at ICBF educational centers (see Section 3 for details). Each column presents results from a separate regression considering multiple treatments (Panel A) and pooling treatments (Panel B). Clustered standard errors by educational center are shown in parentheses. Column 1 estimates Equation (1) with no lagged outcome, Column 2 controls for the lagged outcome in the month prior to the intervention (October 2021); and Column 3 controls for the lagged outcome for all pre-intervention months (from March to October 2021). All specifications include controls for sex and age of the child; a dummy variable if the caregiver is a family member, their age, a dummy variable if age is unknown for the caregiver; and region indicators to account for stratified random assignment. Significance levels: $^{***}p<0.01$; $^{**}p<0.05$; $^{*}p<0.10$.

Table A.9. The effects of text messages on effective attendance in early childhood services (difference-in-difference regressions)

	(1)	(2)	(3)	(4)
Panel A. Multiple treatments				
Treatment 1: Risk aversion	0.180	0.180	0.234	0.234
	(0.491)	(0.491)	(0.482)	(0.482)
	[0.963]	[0.963]	[0.963]	[0.963]
Treatment 2: Social norms	0.024	0.024	0.087	0.087
	(0.512)	(0.512)	(0.522)	(0.522)
	[0.963]	[0.963]	[0.963]	[0.963]
Baseline mean	1.474	1.474	1.474	1.474
p-value T1=T2	0.737	0.737	0.765	0.765
Adjusted R^2	0.152	0.368	0.462	0.462
Observations	151,000	151,000	151,000	151,000
Panel B. Pooled treatments				
Received SMS	0.093	0.093	0.093	0.152
	(0.448)	(0.448)	(0.448)	(0.444)
	[0.963]	[0.963]	[0.963]	[0.963]
Baseline mean	1.474	1.474	1.474	1.474
Adjusted R^2	0.152	0.368	0.433	0.462
Observations	151,000	151,000	151,000	151,000
Fixed effects	Region	Center	Beneficiary	Beneficiary x Region

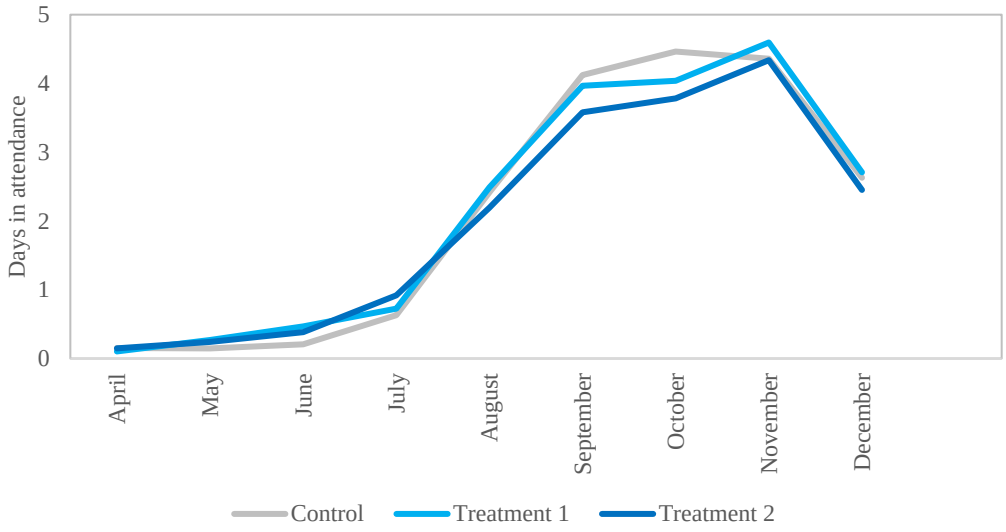
Source: Authors' elaboration from anonymized survey data provided by ICBF.

Notes: The table reports difference-in-difference estimates of the effects of text messages on effective attendance (in days) at ICBF educational centers (see Section 3 for details). Each column presents results from a separate regression considering multiple treatments (Panel A) and pooling treatments (Panel B). Clustered standard errors by educational center are shown in parentheses. Column 1 includes region (strata) fixed effects, Column 3 includes educational center fixed effects, Column 3 includes individual fixed effects, and Column 4 includes beneficiary fixed effects and strata specific time trends. Given that we estimate results for two outcomes and three specifications using the same source of exogenous variation, we present q-values that adjust for multiple hypothesis testing in brackets, calculated using the method by Benjamini and Hochberg (1995) that controls for the false discovery rate (FDR) described in Anderson (2008).

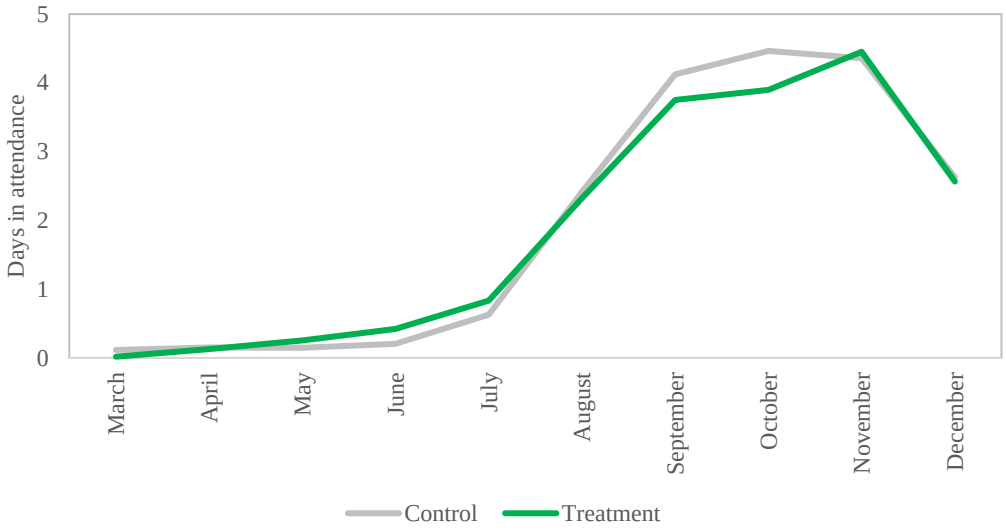
Significance levels: $^{***}p<0.01$; $^{**}p<0.05$; $^{*}p<0.10$.

Figure A.1. Trends in effective attendance by treatment groups

Multiple treatments

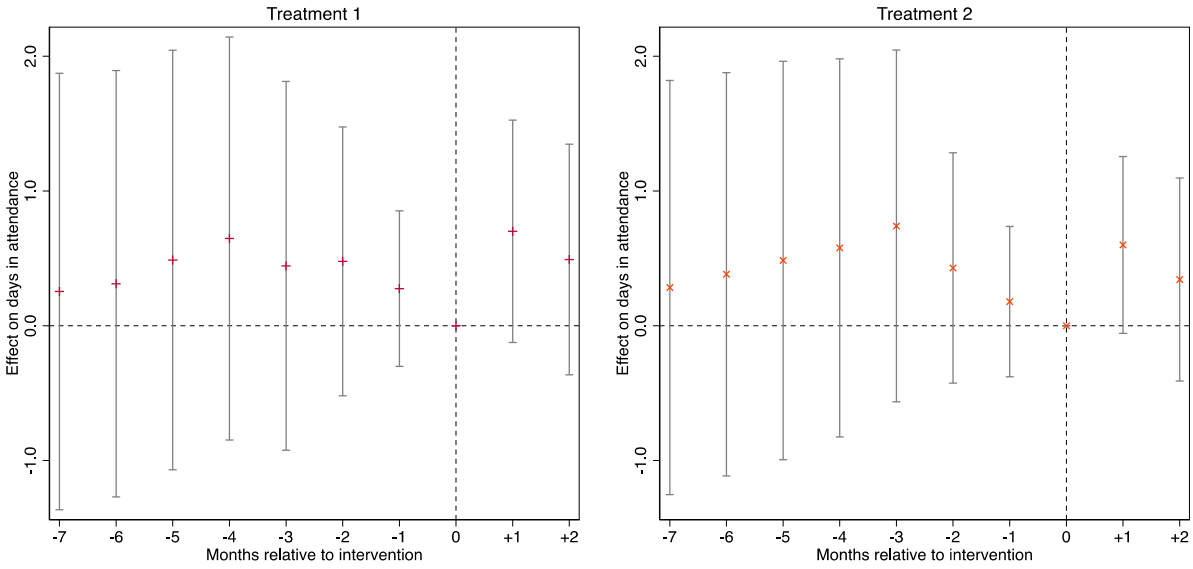


Pooled treatment



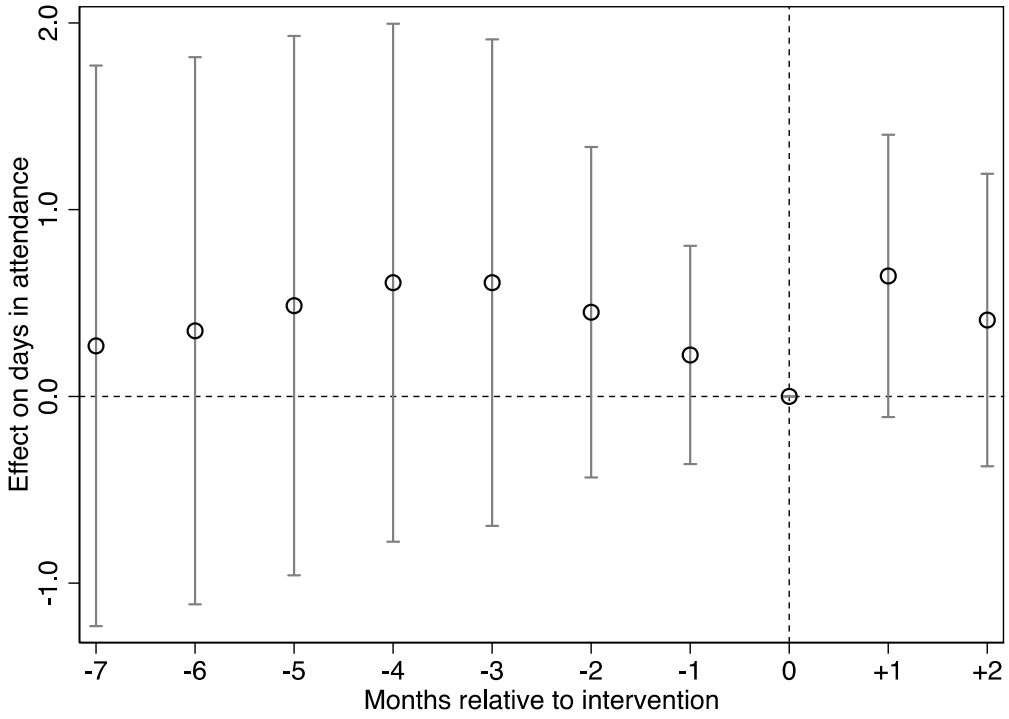
Source: Authors' elaboration from anonymized administrative records provided by ICBF.

Figure A.2. Event study effects of on effective attendance in early childhood education
Multiple treatments



Source: Authors' elaboration from anonymized administrative records provided by ICBF.
Notes: Estimated coefficients shown as "+" and "x". 95 percent confidence intervals shown around the point estimates.

Figure A.3. Event study effects of on effective attendance in early childhood education
Pooled treatment



Source: Authors' elaboration from anonymized administrative records provided by ICBF.
Notes: Estimated coefficients shown as "O". 95 percent confidence intervals shown around the point estimates.

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