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ABSTRACT

Developmental Losses in Young Children from Pre-primary Program Closures during the COVID-19 Pandemic*

The learning and developmental losses from pre-primary program closures due to COVID-19 may be unprecedented. These disruptions early in life can be long-lasting. Although there is evidence about the effects of school closures on older children, there is currently no evidence on such losses for children in their early years. This paper is among the first to quantify the actual impact of pandemic-related closures on child development, in this case for a sample of young children in Chile, where school and childcare closures lasted for about a year. We use a unique dataset collected face-to-face in December 2020, which includes child development indicators for general development, language development, social-emotional development, and executive function. We find adverse impacts on children in 2020 compared to children interviewed in 2017 in most development areas. In particular, nine months after the start of the pandemic, we find a loss in language development of 0.25 SDs.

JEL Classification: I25, J13, O15, Z13
Keywords: COVID-19, child development, Chile, childcare closures

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1. Introduction

In March 2020, the WHO declared the COVID-19 outbreak a pandemic. As a key way to limit virus transmission, most countries imposed social distancing. This led to lockdown strategies, including temporary closure of schools to contain the spread of the virus. The response to the pandemic caused the largest disruption of education in history, with a nearly universal impact on learners and teachers worldwide. By mid-April 2020, UNESCO (2020) reported that 94% of learners worldwide were affected, representing 1.58 billion children and youth, from pre-primary to higher education, in 200 countries. Estimations of the losses associated with the school closures are highly significant (Psacharopoulos et al., 2021).

Chile first closed childcare centers and schools on March 16, 2020, and they remained closed for almost the entire school year (which usually runs from early March to December). With educational centers closed, the country had to rapidly transition from in-person instruction to distance learning as a possible alternative. But a combination of limited resources and a significant gap in access to technology across the country made this process a complex challenge for schools and children.

The COVID-19 pandemic and these closures may have devastating impacts on young children's physical, and mental development, both in the short and in the long run. Studies tracking individuals conceived, in utero, infancy and early childhood during pandemics, natural disasters, and famines (e.g., the 1918/19 influenza pandemic, the 1959-61 Chinese famine) demonstrate that those exposed can suffer life-long negative consequences. (Majid and Behrman, 2020). Moreover,

in the early years, when children's developing brains are more sensitive to a lack of responsive environments (Nelson et al., 2007), the immediate negative impacts of closing programs that provide some early stimulations (such as childcare) are further amplified by diminished future learning (Cunha & Heckman, 2007), which also leads to more pronounced inequalities later on.

In this paper, we estimate a first difference models to capture the impact of pandemic-related school closures on children's developmental outcomes. Our empirical strategy is based on a natural experiment; we have face-to-face developmental outcomes data from the same instruments from before and after the pandemic lockdown to use to evaluate the impact of childcare closures on preschool children's development. We combine novel and unique data collected during the pandemic with Chile's nationally representative early childhood survey. Using a first difference strategy, we compare the children affected by the pandemic lockdown (2020 cohort) with a similar sample of children from a nationally representative study from 2017 (with robustness checks from the similar longitudinal study from 2010 and 2012).

Childcare closures occurred alongside many other shocks during the pandemic. We therefore cannot interpret the developmental losses as being causal effects of the closures, but this is the first paper to estimate the magnitude of preschool children's potential developmental losses due to pandemic-related closures of schools and childcare centers.

Our results suggest that compared to the 2017 cohort, the children of 2020 suffered developmental losses in general development, language, and social-emotional behavior. In particular, we find a language loss of 0.25 standard deviations on the Peabody Picture Vocabulary Test (PPVT). Not

surprisingly, we also found an increase in social-emotional problems in the 2020 cohort: the children affected by the pandemic scored 8.0 standardized points higher on the Child Behavior Checklist (CBCL) test than the children from the same region and age range evaluated in 2017. Children affected by the pandemic also did worse on the general development test (by 6.5 standardized points). For the executive function dimension, we did not find a difference between the cohort affected by the pandemic and previous cohorts; the difference is not statistically significant. All these results are robust to different specifications and samples.

To initially assess the consequences of childcare centers closures for children's development, we drew parallels between the current situation and other instances in which students missed school, like summer vacation, weather- or disaster-related school closures (e.g., the 2010 Chilean earthquake), and prolonged absenteeism due to illness (Kuhfeld et al., 2020). The most robust evidence from these events suggests a developmental loss of between 0.06 and 0.10 standard deviations, roughly equivalent to the difference between being taught by a highly effective teacher and being taught by an ineffective teacher (The DELVE Initiative, 2020).

Until now, research assessing the impact of COVID-19 school closures on young children's development has been limited by the lack of detailed, individual-level data. Engzell et al. (2020) is one exception, but it focuses on elementary-aged children. This research uses information from the Netherlands' national exams from before and after the lockdowns. Using an estimation strategy similar to ours, the authors compared students' progress during the pandemic to the same period in the previous three years. The results reveal a developmental loss of about 0.08 standard deviations— equivalent to a fifth of a school year—which was the amount of time schools

remained closed (8 weeks). Losses are up to 60% greater among students from less-educated homes. The findings imply that students made little or no progress while learning from home and suggest even more extensive losses in countries with weaker infrastructure or more prolonged school closures.

Evidence on test scores in England and the US also points to significant losses from missed school and deepening inequalities (Amplify study, 2020; Rose et al., 2020; The DELVE Initiative, 2020) among primary school children. To the best of our knowledge, no evidence is available yet on losses for younger children, with the exception of Author et al. (2020) and Mc Coy et al. (2021), which use simulations rather than actual data and find that large, lifetime losses in children's education, health, income, and productivity may occur. This study is one of the first to directly quantify such impacts with real data on vulnerable young children during the pandemic.

Young children's learning

Research from neurobiology and developmental psychology show that the first years of life offer an opportunity to alter neural circuits just before they mature and become more difficult to modify (Fox et al., 2010). Critical aspects of the brain architecture begin to be shaped by experience before and soon after birth. More importantly, many fundamental aspects of that architecture are established well before a child enters school (National Scientific Council on the Developing Child, 2007).

Research from many disciplines has shown evidence of the impact that early experiences have on child development, including cognitive and socio-emotional skills, and also educational outcomes,

employment, mental health, and risk conditions in adulthood (Cawley et al., 2001; Bakermans-Kranenburg et al., 2003; Gertler et al, 2014).

Early childhood education in Chile

Early childhood education in Chile is the educational level that attends children from birth until the start into mandatory education, which starts at first grade for primary school. According to the Chilean national curriculum, early childhood education aims to promote comprehensive development and develop relevant and significant skills in children (Law 20.370, Chilean Educational Ministry, 2009). Private and public childcare programs provide early childhood services. There is infant, toddler, and preschool services within the public programs administrated by the Chilean Nacional Union of Child Care (Junta Nacional de Jardines Infantiles JUNJI) and by the Chilean Educational Foundation Integra. Private services are composed of private schools that have the certification to work with children (Undersecretary of Early Childhood Educational, 2019).

In 2006, the Chilean government stated the early childhood development policy as a priority, intending to give free childcare for the poorest children (40% of the most vulnerable households) until four years old. After that policy, the early childhood education participation increased to double during the last 10 years in Chile (OECD, 2015); however, the assistance rate is lower compared with other OECD countries. For instance, since the assistance rate for children between 0 to 2 years old is 18% in Chile, the other OCDE countries reach 33% overall. For three years old children, the difference is similar (Narea et al., 2018).

Although Chile has significantly expanded early education coverage for children from low-income backgrounds; there has been little research to assess these programs' effects in improving academic outcomes. Cortazar (2015) showed that after controlling for socio-demographic factors potentially associated with choosing to participate in an early childhood education program or not, early childhood education is positively associated with academic gains in a standardized test score in school years.

Early childhood education in Chile during the COVID-19 Pandemic

The emergency state in Chile was declared by March 16th, 2020. That included the closure of all educational institutions, which remained closed practically during the whole year. The same situation happened with early childhood institutions that started opening with voluntary assistance by October 2020. Thus, during 2020, the early childhood system was closed by over seven months, with partial opening by the end of the school year (October to December 2020; Valenzuela et al., 2021).

For 2020, childhood enrolment in Chile was 783.000 children, which was a reduction of 4.5% concerning 2019, due primarily to the COVID pandemic. The enrolment percentage increases as children grow. Therefore, the total of children enrolled in the minor infant for 2020 was 1,75%, from the total of children enrolled in early childhood, and for kinder, represented 31% from the total (Subsecretaría de Educación Parvularia, 2020). With respect to the total of Chilean children at the age of assist to childcare, the enrollment reached over 50%, which means that over a half of children in Chile were enrolled in any type of Childcare Center (Subsecretaría de Educación Parvularia, 2020).

Meanwhile, the early childhood centers were closed; one of the first critical issues was the communicational strategies between the families and the centers, which allowed the interchange of educational material that helped maintain the attachment and the contact with the children. Within the difficulties for the continuity of the children learning at a distance was the lack of equipment and internet connection, and the lack of competencies and time of the parents to do the activities at home. That was even more accentuated for the low socioeconomic status families (Valenzuela et al., 2021).

2. Data and Measures

Data

This study uses a cross-sectional sample of children from 7 childcare centers in the Metropolitan Región, Chile. In December 2020, a team from the Universidad Catolica de Chile evaluated 240 children between 3 and 4 years old, measuring general development, language, social-emotional development, and executive function. The childcare centers are located in low-income municipalities in the Metropolitan Region.

The main comparison group was taken from the third wave of the Chilean Longitudinal Early Childhood Survey (ELPI), a nationally representative survey conducted in 2017. This face-to-face survey gathers two types of information: a socio-demographic survey applied to all mothers; and a battery of tests for evaluating cognitive, social-emotional, and anthropometric development in children and their mothers. The sample for the 2010 wave was randomly drawn from official

administrative birth records of children born between January 2006 and August 2009. The sample size was approximately 15,000 children between 6 months and 5 years old. The second wave was conducted in 2012. The target population for 2012 was the same sample interviewed in 2010 and an additional (refresher) sample of 3,000 children born between September 2009 and December 2011 (children between 6 months and 7 years old). The third wave was carried out in 2017. The target population for 2017 was the sample interviewed in previous waves and a refresher sample of approximately 5,000 children born between January 2012 and December 2016 (between 6 months and 12 years old). The sample includes different cohorts of children, differentiated by year of birth. In each wave, a trained psychologist administered the battery of instruments to evaluate the child's cognitive, language, motor, social-emotional, and physical development. The 2020 sample's evaluations were done with the same team and with standards identical to those of the ELPI.

Measures

The instruments used for both samples are children's general development, vocabulary, social-behavioral skills, and executive function. For general development, children were assessed using the Spanish version of the Battelle® Developmental Inventory, Second Edition (Newborg, J., Stock, J. R., Wnek, L., Guinubaldi, J. y Svinicki, J., 1998). Battelle is a screening test appropriate for all children from birth through age 7 years, 11 months. It evaluates children's development toward progressive learning milestones through 100 questions or observational items in five areas: motor, adaptive, cognitive, personal-social, and communication. Each item is scored with 2 points (child's response meets the specified criteria), 1 point (the child may have emerging skills), or 0 points (the child did not attempt the task). The test's starting point depends on the child's age, and

test administration concludes after three consecutive failures. Raw scores are calculated by adding the number of successful answers and items after the starting point (maximum of 2 points each).

Children's receptive vocabulary was measured using the Spanish version of the Peabody Picture Vocabulary Test (PPVT) (Dunn, Lugo, Padilla, & Dunn, 1986). The PPVT is appropriate for children 30 months or older and consists of 125 items ordered by increasing difficulty. Children are shown four pictures for each item and asked to select one related to a single-word stimulus (e.g., swing). Items are continually administered until the child fails six items within a range of eight items. Each response is scored as 1 point (success) or 0 points (failure). Raw scores are calculated by adding up the number of successful answers and then standardized using the Latin norms reported in the examiner's manual. Standard scores are presented on a scale of 20 to 160 points.

Children's social-emotional skills were assessed using the Child Behavior Checklist 1 (Achenbach & Rescorla, 2001), a parent-reported form appropriate for children 18 months or older, used as a screener to identify potential behavioral and emotional problems among children. The CBCL contains a list of 99 items, and the primary caregiver is asked to rate the extent to which the behavior described in the item statement ("e.g., cries a lot") characterizes their children's behavior on a three-point scale: 0 points (not true), 1 point (somewhat or sometimes true) and 2 points (often true). Item responses are added up to create raw scores, which can then be converted to standard scores. Higher scores on the CBCL indicate more behavioral problems and lower social-behavioral skills. The standard score scale ranges from 28 to 100.

Executive function was assessed using the Hearts and Flowers Dimensional Stroop Task (Wright, A. and Diamond, A., 2014), a computer test in which one of two target pictures (heart or flower) appears on either the left or right side of a screen. Children are told that when a heart appears on the screen, they should press the button on the same side as the heart, and when a flower appears on the screen, they should press the button on the opposite side of the flower. Hearts and Flowers is appropriate for children over three years old. It consists of three different tasks: the first 12 trials are only hearts trials, the following 12 trials are only flowers trials, and the subsequent 33 trials are mixed hearts and flowers. Each response is scored as 1 point (success) or 0 point (failure or out of time). Raw scores are obtained by adding up the number of successful answers and calculating the percentage of correct answers.

The covariates include the child's sex and age, in months. A dummy indicates whether the child's primary caregiver is the mother or father; the reference category is no (another member of the household is the primary caregiver). There are dummy variables for maternal education, in categories (primary incomplete, primary complete, secondary incomplete and complete, technical higher education, and university education) and for whether the mother works. There are dummies indicating whether the father lives in the household, whether the child has other siblings, and whether the child has school-age siblings. Finally, we added a dummy indicating whether the child was enrolled in a childcare center.

3. Analytical Strategy

Our empirical strategy is based on a natural experiment, since we have face-to-face developmental outcomes data from the same instruments from before and after the pandemic lockdown to use to evaluate the impact of childcare closures on preschool children's development. We estimate first difference models, comparing each developmental dimension of the 2020 sample with a similar sample of children from the 2017 nationally representative ELPI survey. Throughout this process, we only consider children from the metropolitan region and in the same age range. Thus, we estimate the equation:

$$Y_i = \alpha_0 + \beta Sample_i + \delta X_i + \varepsilon_i \quad (1)$$

Where the dependent variable Y_i is the standardized scores obtained on the general development (BDI), language (PPVT), social-emotional behavior (CBCL), and executive function (Hearts and Flowers) tests for child *I*; the main independent variable is a dummy identifying the 2020 sample relative to the pre-COVID ELPI sample, X_i represents controls, and the error term is ε_i.

Given that the 2020 sample is children from low-income municipalities, we make the comparison groups as similar as possible to help ensure a proper comparison. To do this, we use information about municipalities and run three additional models: i) only selecting municipalities from the ELPI that are similar[1], in socioeconomic terms, to those of the 2020 sample; ii) selecting similar municipalities from the ELPI, but also adding a municipality fixed effect; and iii) the same municipalities, with fixed effects, but also selecting only children from the ELPI who were enrolled in a childcare center (in Chile, enrollment is not mandatory for that age range). All regressions are estimated using robust standard errors.

[1] We could not consider only the same municipalities because of a sample size matter.

4. Results

Table 1 shows the means and standard deviations for the developmental measures—BDI, PPVT, CBCL, and Hearts and Flowers—and for each of the covariates, differentiating between the 2020 cohort and the ELPI sample with only children from the Metropolitan Region and between 3 and 4 years of age. The children in the 2017 ELPI cohort achieved higher mean scores on the general development, language, and executive function tests than the 2020 cohort. For the CBCL, the 2020 cohort's mean is higher than that of the 2017 ELPI cohort, but on this social-emotional test, more points mean more behavioral problems. The samples have similar socio-demographic characteristics. The children in the 2020 cohort are slightly older, and its households have a higher percentage of caregivers who are not mothers or fathers (but more paternal presence at home). In terms of maternal education, the samples are very similar (38% of mothers have post-secondary education in both samples). However, the 2017 cohort has a higher percentage of working mothers, which is to be expected given the complicated labor market situation in 2020. Also, there is a statistically significant difference in enrollment in childcare centers between the two samples.

Table 2 shows the estimated losses of the 2020 cohort as compared to the 2017 one. Childcare closures correlate to lower general development, language, and social-emotional skills in children. Children affected by the pandemic scored worse than the pre-pandemic cohort in three out of four developmental areas. When comparing the general development test scores of the children evaluated at the end of 2020 with those of children from the same region and same age range assessed in 2017, the discrepancy is 6.5 standardized points. We also see a 3.8 standardized point reduction in language development. The CBCL scores rose, signifying an increase in social-

emotional problems: children affected by the pandemic scored 8.0 standardized points higher on the CBCL test than the children from the same region and age range evaluated in 2017. For the executive function dimension, the 2020 cohort results cannot be said to differ from those of the 2017 cohort; the difference is not statistically significant.

Table 1: Descriptive Statistics for 2020 Cohort and ELPI 2017 sample

	2020 Cohort			ELPI 2017 Cohort			Dif.
	Obs.	**Mean**	**St. Dev**	**Obs.**	**Mean**	**St. Dev**	
BDI	240	147.1	15.9	545	150.8	29.0	*
PPVT	236	100.5	17.6	621	104.8	18.5	**
CBCL	240	57.6	8.9	681	50.3	10.6	***
H&F	240	18.5	13.7	669	15.7	17.4	*
Sex [ref. boy]	240	49.6%	0.5	702	46.4%	0.5	
Age in months	240	50.9	3.8	702	48.6	5.4	***
Main caregiver mother or father	240	93.3%	0.2	702	98.4%	0.1	***
Maternal education: Primary incomplete	236	3.8%	0.2	685	2.2%	0.1	
Maternal education: Primary complete	236	3.8%	0.2	685	5.4%	0.2	
Maternal education: Secondary incomplete	236	10.6%	0.3	685	14.2%	0.3	
Maternal education: Secondary complete	236	43.2%	0.5	685	38.8%	0.5	
Maternal education: Technical Higher Education	236	23.3%	0.4	685	17.8%	0.4	
Maternal education: University	236	15.3%	0.4	685	21.6%	0.4	
Father present in home	240	80.4%	0.4	702	61.3%	0.5	***
Working mother	233	45.5%	0.5	686	62.0%	0.5	***
Siblings	239	64.4%	0.5	702	66.2%	0.5	
School-age siblings	209	61.2%	0.5	702	57.4%	0.5	
Enrolled in childcare center	240	70.0%	0.5	702	83.3%	0.4	***

Table 2: Estimated losses in the 2020 cohort for 4 developmental outcomes

	General development (BDI)	Language (PPVT)	Social-emotional behavior (CBCL)	Executive Function (H&F)
2020 Cohort [ref- ELPI]	**-6.578*** **	**-3.811** **	**8.026*** **	**0.729**
	(2.096)	(1.586)	(0.860)	(1.329)
Sex [ref. boy]	6.059***	3.315***	-0.930	-0.319
	(1.710)	(1.254)	(0.666)	(1.034)
Age in months	2.139***	-0.063	-0.195***	1.369***
	(0.173)	(0.126)	(0.067)	(0.104)
Main caregiver mother/father	-1.940	-1.240	2.396	0.230
	(6.937)	(5.325)	(2.930)	(4.514)
Maternal Education. [ref. Prim. Incom.]				
Primary complete	-6.160	3.089	-7.644***	-1.492
	(6.247)	(4.599)	(2.516)	(3.820)
Secondary incomplete	2.055	3.456	-6.537***	1.317
	(5.466)	(4.019)	(2.240)	(3.390)
Secondary complete	5.281	9.553**	-7.516***	0.768
	(5.133)	(3.767)	(2.114)	(3.189)
Technical Higher Education	6.554	10.329***	-9.717***	0.172
	(5.324)	(3.910)	(2.185)	(3.305)
University	9.526*	15.122***	-12.390***	-1.343
	(5.306)	(3.915)	(2.184)	(3.305)
Father present in home [ref. No]	-0.082	0.371	-3.136***	-1.449
	(1.964)	(1.419)	(0.751)	(1.169)
Working mother [ref. No]	2.145	-1.484	-0.867	1.980*
	(1.771)	(1.303)	(0.690)	(1.072)
Siblings [ref. No]	-8.856***	-0.482	0.015	1.367
	(3.210)	(2.397)	(1.247)	(1.935)
School-aged siblings [ref. No]	3.649	-2.273	0.051	-1.289
	(3.005)	(2.258)	(1.171)	(1.816)
Enrolled in childcare [ref. No]	2.363	1.055	0.709	1.403
	(2.216)	(1.666)	(0.868)	(1.359)
Constant	40.273***	99.564***	68.348***	-52.799***
	(11.968)	(8.854)	(4.793)	(7.393)
Observations	747	821	883	871
R-squared	0.234	0.075	0.172	0.206

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

The second analysis shows the comparisons using the 2017 ELPI cohort but refining the comparison group. The results in Table 3 show point estimates for the developmental losses of the 2020 cohort as compared to three different comparison groups: i) including only municipalities similar to those of the 2020 cohort; ii) including similar municipalities but also adding municipality fixed effects; and iii) including similar municipalities, with fixed effects, but also restricting the

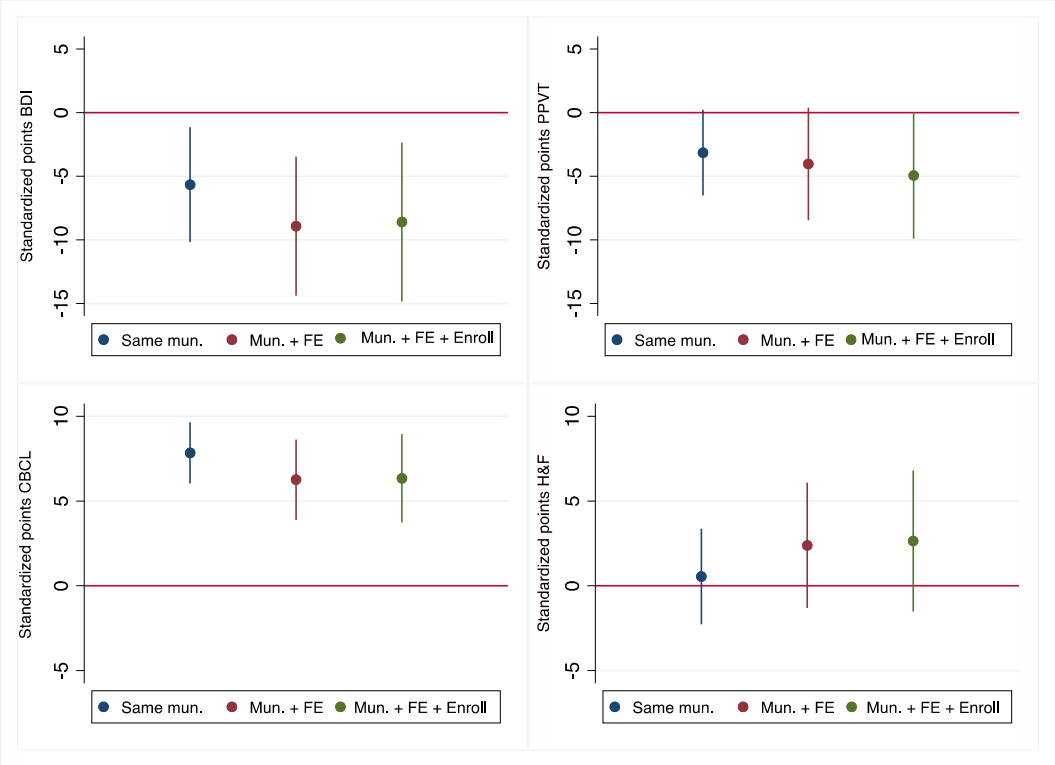
sample to children enrolled in childcare centers. The developmental loss for the 2020 cohort ranges from 5.6 to 8.9 standardized points for the general development measure, depending on the comparison group. For language, developmental losses range from 3.1 in the comparison group of children from the same municipalities to almost 5 points when incorporating municipality fixed effects and only children enrolled in childcare. For the social-emotional dimension, more points mean more behavioral problems; therefore, the 2020 cohort is at least 6.3 standardized points worse off than the 2017 comparison group. We do not find statistically significant coefficients for the executive function test, so it cannot be said that the 2020 cohort is worse off in that dimension. Figure 1 summarizes these developmental losses.

Table 3: Estimated losses comparing the 2020 cohort with three ELPI 2017 samples

	(1) ELPI - Same municipalities	(2) ELPI - Same municipalities + Municipality FE	(3) ELPI - Same municipalities + Municipality FE + Enrolled
BDI			
2020 Cohort [ref- ELPI]	-5.665**	-8.923***	-8.594***
	(2.297)	(2.781)	(3.180)
Observations	564	564	445
PPVT			
2020 Cohort [ref- ELPI]	-3.145*	-4.029*	-4.937*
	(1.713)	(2.256)	(2.531)
Observations	617	617	492
CBCL			
2020 Cohort [ref- ELPI]	7.838***	6.261***	6.336***
	(0.920)	(1.207)	(1.325)
Observations	658	658	521
Hearts & Flowers			
2020 Cohort [ref- ELPI]	0.548	2.387	2.642
	(1.434)	(1.882)	(2.114)
Observations	655	655	521

Notes: Controls not shown: child's sex and age, main caregiver mother or father, maternal education, father present, mother working, siblings, enrolled. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Full tables in Appendix: Tables A1 to A4.

Figure 1: Developmental losses (2020 cohort compared to ELPI 2017 cohort)



5. Robustness checks

We examined the assumptions of the identification strategy in two different ways. To discard the hypothesis that the 2017 cohort could have had better developmental scores for whatever reason, we compared the 2020 cohort with two other similar cohorts of children from the 2010 and 2012 waves of the ELPI in the same age range and residing in Chile's Metropolitan Region. We re-estimate the same models using these new comparison groups. For the 2010 wave, the only similar instruments to compare with the 2020 cohort were the language and the socioemotional measures. For 2012, we had the general development, language, and socioemotional measures. These robustness checks confirm our results. The cohort affected by the pandemic-related closures shows worse general development, losses in language development, and more behavioral problems. Even

compared to cohorts from a decade before, the results for children affected by the pandemic's preprimary program closures are worse. Results are shown in Appendix Table A5.

The second robustness check confirmed that our specification is not prone to false negatives. We performed a placebo treatment analysis on all the samples, using the same unequal distribution of treatment and control groups. We re-estimate all four models, and in each case the 95% confidence intervals of our main effect span zero. Results are shown in Appendix Table A6.

6. Discussion

As a way to cope with the COVID-19 pandemic in 2020 and 2021, most educational systems, in Chile and around the world, closed schools and childcare centers and moved to distance or virtual learning models. Implementing these models came with multiple challenges in both developed and developing countries, as most educational centers did not have the capacity or resources to adjust. Implementing distance learning for preschool-aged children was particularly complex, as children in this age group are not able to learn and develop from a screen and need real interactions with adults. Children may suffer lifelong negative consequences as a result of these educational shocks.

Our findings provide initial estimates of the short-term effects. More specifically, we report developmental losses in children assessed at the end of 2020 relative to children assessed with the same instruments and identical procedures in 2017. The areas of child development evaluated include general development, language, social-emotional behavior, and executive function. The

results indicate that the boys and girls assessed in 2020 earned lower average scores than their 2017 counterparts in three of these areas.

This paper has two limitations. First, we do not have data on the same children before and after COVID-19, so we cannot control for unobservables (nor can we argue causality). Therefore, we built the most similar comparison group possible, and the estimated models stand up to multiple robustness checks. Second, the closure of childcare centers was just one of many shocks that occurred during the pandemic lockdown in Chile in 2020, so we cannot with certainty disentangle the developmental losses from childcare closures from other effects of the pandemic. However, this is the first attempt to measure developmental losses for preschool children.

The strength of this study is its unique, face-to-face data set. No other country in the developing world has such data. Also, the same child development instruments were administered by the same team before and after the pandemic-related closures, providing an opportunity to measure the exact same constructs and compare them to a valid baseline.

Moreover, to illustrate the magnitude of these losses, we provide an equivalence exercise. The language losses found are equivalent to 0.25 SD in language development. Empirical evidence from Ecuador (Schady, 2011) shows that with each additional year the mother attended school, the child scores an average of 0.053 SD more on language development. Therefore, the reported developmental losses due to the preprimary closures are equivalent to lopping 5 years off the education of a child's mother (equivalent to "losing" a college degree). We can thus anticipate long-standing impacts on these children, their families, and the country as a whole. Quantifying

these losses should be a priority in order to design public policies to alleviate and mitigate the associated impact

Finally, Chile is relevant as a "best-possible" scenario in the developing world, with high levels of educated mothers and high rates of broadband access. Despite relatively favorable conditions in relation to other parts of the world, we find that children's development suffers when pre-primary programs are shut down. We urgently need take action to address these developmental losses, especially for children currently living in vulnerable situations.

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