"EFFECTS OF ATTENDANCE AND TIME SPENT IN CENTER-BASED CHILD CARE ON CHILDREN'S OUTCOMES IN CHILE"

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EFFECTS OF ATTENDANCE AND TIME SPENT IN CENTER-BASED CHILD CARE ON CHILDREN'S OUTCOMES IN CHILE

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Abstract

Using data from a Chilean nationally representative longitudinal survey for early childhood, I study the effects of attendance and time spent in center-based care on children's outcomes. With a sample size of 1,758 children measured at three years of age, positive and significant effects of attending center-based care between two and three years of age are found by a value-added approach, using Ordinary Least Squares (OLS) and Instrumental Variables (IV) models. The magnitude of the effect is between 0.3 and 1.2 standard deviations in general development and language outcomes. Time spent in center-based care is positively associated with motor skills for boys, indicating that doubling time spent increases test scores by 0.17 standard deviations. All positive results are only significant for children whose mothers have a high-school education or lower. This evidence implies that policies aimed at increasing enrollment rates in center-based care are beneficial, as they might reduce development gaps between children from less and more-advantageous initial backgrounds.

JEL classification: J13, I2.

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1. Introduction

There is consensus about the influence that early investments have on children and their development later in life. The accumulation of human capital, measured in cognitive and non-cognitive skills, is associated with lower poverty and crime rates (Cunha et al., 2010). Interventions in early developmental stages are also a way to decrease socio-economic gaps (Cunha & Heckman, 2007). High-quality early childhood and primary education programs can permanently improve children's development, with cost-effective gains for society (Heckman & Kautz, 2014).

Empirical evidence shows that preschool programs significantly affect children's cognitive development. The stage previous to formal schooling is crucial, considering that gains at young ages are not likely to be substituted in later stages. Non-cognitive skills, on the other hand, are more likely to be developed even if there were no early-stage interventions (Cunha et al., 2010). These interventions can have an even greater impact on those from more vulnerable households, measured as lower-income or lower mothers' education (Burger, 2010). Early intervention preschool programs in the US aimed at improving the quality of centers have shown a positive and significant effect on cognitive and non-cognitive development (Weiland & Yoshikawa, 2013).

Structural differences between more and less-developed countries impose an issue. The findings for more-developed countries, where literature is more extensive than in non-developed, are not always applicable for the latter. In the Latin-American context, Berlinski et al. (2005) analyze how the expansion of preschool supply in Argentina positively affects children's enrollment and employment rates of mothers whose children were in preschool. In the case of Uruguay, preschool attendance predicts 0.8 more years of education and lower school dropout rates at 15 years of age (Berlinski et al., 2007).

In Chile, the provision of childhood care and preschool is for children five years old and younger. The first level, nursery care, accounts for children from three to 23 months old. Center-based care provides care for children between 24 and 47 months of age. Prekindergarten and kindergarten levels are for children aged four and five years, respectively (*Ministerio de Educación de Chile*, 2014). The focus of this paper is on the center-based care level.

Even though enrollment rates in all preschool levels have increased significantly since 2005, these rates are still under OECD averages. In 2015, the enrollment rates of two- and three-year-olds in center-based care were only 36% and 56%, and children from lower socio-economic status households have significantly lower rates (Narea et al., 2020).

Regarding previous evidence on the impact of childhood care centers and preschool attendance in Chile, Noboa-Hidalgo & Urzúa (2012) find positive and significant effects of attending public preschools on communicative expression skills. However, they find adverse effects on dimensions like reasoning, memory, and interaction with adults. They emphasize that, in Chile, between 2005 and 2007, enrollment in public preschools increased by around 55%. This increase was mainly driven by applying policies aimed at equipping pre-kindergarten and kindergarten rooms. They use

this potential exogenous source of variation in supply as an instrumental variable.

As for medium-term effects, Cortázar (2015) finds that attending public kindergartens generates an average increase of 0.2 standard deviations in a standardized language, math, and social sciences test for fourth graders (when children are approximately ten years old). This effect is more significant for children from a medium-low socio-economic status than high-income households.

Narea et al. (2020) address the effect on cognitive development of attending childcare centers at two years old, using a dichotomous variable of interest (attended or did not attend). They perform a difference-in-difference approach using standardized scores. Then, they estimate a propensity score matching for those who attended and did not. Both specifications (with and without PSM) find a positive and significant effect of approximately 0.2 standard deviations of attendance at two years old.

Reynolds (2022) studies the effect of time spent in center-based care on cognitive and non-cognitive outcomes. The variable of interest is the logarithm of months attended. The main conclusion is that time spent in childcare centers, measured as the dosage of attendance, has a positive and significant effect on children from low socio-economic status households. Effects for children with early development or both disadvantages (early development and socio-economic status) are not significant.

Both Narea et al. (2020) and Reynolds (2022) use data from the same study as this paper. That is the Longitudinal Survey of Early Childhood (*Encuesta Longitudinal de Primera Infancia*, ELPI). Building on these two papers, I explore the research question of whether attending childcare centers in Chile affects children's cognitive and non-cognitive outcomes, and if these effects also arise from time spent in these centers. The aim is to estimate these effects and see if there are heterogeneous patterns.

The main hypothesis is that attendance and time spent in childcare centers generate positive effects on cognitive and non-cognitive development. Effects may be heterogeneous, meaning that some part of the population benefits more from childcare centers than others.

In this paper, I extend evidence on a topic far from being definitive. The effect of attendance at childcare centers, especially in highly unequal countries like Chile, is limited. This paper contributes to previous literature because it uses an econometric approach of instrumental variables (IV) estimates to control for potential endogeneity and explores different heterogeneous effects. In particular, IV estimations allow expanding Narea et al. (2020) results, suggesting that OLS estimates are likely biased downwards.

Narea et al. (2020) restrict the sample to children who were one year old (12-24 months) in the first wave (2010) and three (36-48 months) years old in the second (2012). In addition, they restrict to children who did not attend center-based care before two years of age. I use the same sample restriction regarding attendance before two years of age but include children from a broader age range (8-23 months old in the first wave.) Thus, the sample size in this paper is 14% larger.

In terms of Reynolds (2022), I expand evidence by looking at different heterogeneous effects for time spent in center-based care. Instead of dividing the sample based on early development and socio-economic status, I explore heterogeneous patterns by child's gender and mother's educational level. In particular, I find positive and significant effects on motor abilities in boys whose mothers have high-school educational attainment or lower. Reynolds (2022) also suggests that more time in childcare centers is associated with enrolling earlier. This concern is one reason I restricted the sample in this paper to children who did not attend center-based care before turning two years old (as Narea et al., 2020). The other reason is that, as earlier enrollment is associated with being enrolled later, the instrumental variable approach is not valid for these children.

Another difference between this paper and Reynolds (2022) is that I estimate the logarithm of hours spent in center-based care between waves, using answers if the child attended part-time or full-time center-based care. Reynolds (2022) uses the logarithm of months as the variable of interest and part-time or full-time attendance as a control variable.

The remainder of this paper is as follows: Section 2 describes the data and descriptive statistics. Section 3 explains the methods. Section 4 shows and analyzes the results, and Section 5 discusses these results and gives the conclusions.

2. Data and descriptive statistics

2.1. Data

In this paper, I use data from the Longitudinal Survey of Early Childhood (*Encuesta Longitudinal de Primera Infancia*, ELPI). The ELPI is a Chilean nationwide representative survey used to study public policy on early childhood.[1] This panel survey gathers information in two stages. A socio-demographic survey is applied to the mothers (or main caregivers) during a first visit. Then, children and their mothers are evaluated on cognitive, socio-emotional, and anthropometric development in a second visit.

The ELPI has three waves. The sample was randomly selected from administrative birth records. The first wave, conducted in 2010, had a sample size of 15,175 children. It includes children born between January 2006 and August 2009. The second wave, conducted in 2012, in addition to the panel from the first wave, had a refresher sample of approximately 3,000 children born between September 2009 and December 2011. The third wave, carried out in 2017, had a refresher sample of approximately 5,000 children born between January 2012 and December 2016. Since the sample design differentiates by year of birth, it includes children from different cohorts (Behrman et al., 2010).

The analytical sample for this paper was built as follows. I restricted the sample to mothers and children who completed both visits in the first and second waves (11,064). I also restricted to

[1] See, for example, Contreras & González (2015), Narea et al. (2020), Reynolds (2022), Schady et al. (2015).

children who were less than two years old (8-23 months old) in 2010 and were three years old (36-48 months old) in 2012 (3,248). Within this group, I restricted the sample to children who did not attend center-based care prior to two years old (2,270) and had complete information about their attendance at centers in the period between waves (1,871).[2] Finally, due to missing data in some of the tests or control variables, the sample size was restricted to 1,758 observations.

To measure general development, I used the Child Learning and Development Test (*Test de Aprendizaje y Desarrollo Integral*, TADI) and the Peabody Picture Vocabulary Test (PPVT). TADI is a Chilean developed test that evaluates child development in four dimensions: cognitive, language, motor, and socio-emotional (Edwards & Pardo, 2013). The PPVT assesses receptive vocabulary, acquisition of vocabulary, and the child's verbal intelligence. To measure non-cognitive outcomes, I used the Child Behavior Checklist (CBCL). This instrument evaluates behavioral and emotional problems in children using a questionnaire that is applied to the mother.[3]

These tests have been used to measure child development in early childhood. TADI is a test built and validated for Chile and used in the national context (Albagli & Rau, 2017; Reynolds, 2022). PPVT has been used internationally to measure language development (Cunha et al., 2010; Schady et al., 2015), and CBCL has been widely used to measure non-cognitive development (Snow Jones et al., 1999; Reynolds et al., 2018).

I also include a wide range of baseline controls, including child's, mother's, and household characteristics. For child's characteristics, I include sex at birth, age in months in 2010 and 2012 (with their respective squares), premature condition, and if the child is from indigenous heritage. I use the Battelle Development Inventory test results in the first wave to control for baseline development. This test measures the skills of children in five dimensions: adaptive, communication, cognitive, motor, and socio-personal (*Ministerio de Desarrollo Social y Familia de Chile*, 2018). Following the methodology of Reynolds (2022), I use the scores of the communication, cognitive and socio-personal dimensions as baseline development in 2010.[4]

For mother's characteristics, I include years of schooling, WAIS (Weschler Adults Intelligence Scale) test scores in numeric and vocabulary dimensions, age in years, and working condition at childbirth. WAIS is a test that measures the mother's numerical and vocabulary skills (Apfelbeck & Hermosilla, 2000). Besides that, I include variables for postpartum depression, alcohol consumption, and cigarette consumption within the first six months since the child was born.

Regarding household characteristics, I control for the father's presence in the household, income per capita, whether the household receives a government subsidy called Unique Family Subsidy

[2] Since the survey and evaluations are carried out in separate visits, a child might have been less than three years old at the moment of the survey in 2012. Then, there is no information about center-based care at three years old, even if they were evaluated in that age range.

[3] CBCL scores were multiplied by -1, meaning that a higher score reflects better behavior, so it is in line with the other tests.

[4] I chose TADI instead of Battelle to analyze results in the second wave because the Battelle applied in 2012 is a short version (Battelle Development Inventory Screening), which does not allow evaluating each dimension.

(*Subsidio Único Familiar*, SUF), municipality of residence, and urban (or rural) status.

2.2. Descriptive statistics

Table 1 shows the descriptive statistics for the analytical sample, divided by attendance to center-based care between waves. 743 out of 1,758 children in the sample did not attend care centers (42.26%), as opposed to 1,015 that attended between waves (57.74%).

Test scores show that those who attended care centers scored significantly higher in all tests in 2012, except for CBCL. In this case, the difference is negative but not significant at the 5% level. The difference in baseline tests (in the first wave) between groups are not statistically significant.

Regarding child characteristics, it is shown that girls have a significantly higher presence in the not-attended group: 53.6% of the children that did not attend between waves were girls, as opposed to only 48.3% of girls in the group that attended. Differences are also significant regarding children's age. The group that attended was older by approximately one month in both waves, suggesting that age is an important factor in predicting care center attendance even within the restricted age range. Therefore, it enhances the importance of controlling for these variables. There are no significant differences between groups in the percentage of indigenous descent and premature children.

For mother's characteristics, differences are significant between groups in age, years of education, and WAIS vocabulary skills. Children who attended care centers between waves had younger, more educated mothers, with higher vocabulary skills. Cognitive differences were not significant for the WAIS numeric dimension. These differences may be explained by a higher correlation between years of schooling and the WAIS vocabulary dimension ($\rho = 0.44$) than with the numeric dimension ($\rho = 0.32$). There are no significant differences in the working condition of the mothers at childbirth. This also holds for depression condition, alcohol, and cigarette consumption after pregnancy.

Fathers were present in the household significantly more in the group that did not attend, suggesting that alternative parental care may affect the decision of childcare center attendance. In this case, mothers might be more able to provide full-time care at home.

Children that attended care centers between waves are from households of higher baseline per capita income (approximately 20% higher). However, the difference is not significant for the dummy variable that accounts for households receiving the SUF government subsidy. Given that the focus of the ELPI is not on income, I control for both variables, so concerns about the measurement error on the income variables used to generate the per capita income variable decrease.

There is also a significant difference in the households' urban status. 89.2% of children who attended were from urban zones. However, only 82.8% of those who did not attend were. This difference may be explained by a lower supply of centers in rural areas and longer distances between households and childcare centers.

Table 1: Descriptive statistics - Childcare center attendance between waves

	Not attended		Attended		T-test
Variable	Mean	SD	Mean	SD	p-value
Test scores					
TADI total 2012 (z-score)	-0.134	0.999	0.098	0.990	0.000
PPVT 2012 (z-score)	-0.090	0.985	0.066	1.006	0.001
CBCL 2012 (z-score)	0.054	0.987	-0.039	1.008	0.054
TADI cognitive 2012 (z-score)	-0.134	1.026	0.098	0.970	0.000
TADI language 2012 (z-score)	-0.074	0.967	0.054	1.020	0.008
TADI socio-emotional 2012 (z-score)	-0.116	0.995	0.085	0.996	0.000
TADI motor 2012 (z-score)	-0.110	1.009	0.080	0.986	0.000
Battelle communication (z-score)	0.044	1.026	-0.033	0.980	0.111
Battelle cognitive (z-score)	-0.019	1.008	0.014	0.994	0.498
Battelle socio-personal (z-score)	0.040	1.026	-0.029	0.980	0.151
Child's characteristics					
Child's sex (1 = female)	0.536	0.499	0.483	0.500	0.028
Child's age 2010 (months)	16.040	3.542	17.195	3.418	0.000
Child's age 2012 (months)	42.058	3.378	43.135	3.179	0.000
Indigenous descent (1 = yes)	0.113	0.317	0.096	0.294	0.234
Premature child (1 = yes)	0.073	0.260	0.068	0.252	0.703
Mother's characteristics					
Mother's age (years)	28.801	7.131	27.643	6.906	0.001
Mother's schooling (years)	10.828	3.079	11.541	2.738	0.000
WAIS Numeric	6.813	2.612	6.932	2.621	0.346
WAIS Vocabulary	7.752	3.564	8.106	3.413	0.035
Working at childbirth (1 = yes)	0.330	0.470	0.328	0.470	0.942
Depression post pregnancy (1 = yes)	0.148	0.355	0.155	0.362	0.702
Cigarettes consumption post pregnancy (1 = yes)	0.110	0.314	0.116	0.321	0.701
Alcohol consumption post pregnancy (1 = yes)	0.069	0.253	0.062	0.241	0.581
Household's characteristics					
Father's presence in the household (1 = yes)	0.752	0.432	0.707	0.455	0.037
Income per capita ($CLP Thousands 2010)	172,709	240,621	207,208	215,392	0.002
Receives SUF government subsidy (1 = yes)	0.343	0.475	0.335	0.472	0.719
Area (1 = urban)	0.828	0.378	0.892	0.311	0.000
Observations	743		1,015		

Author's own elaboration based on ELPI 2010 and 2012. All variables are measured in 2010 unless stated otherwise. The sample is restricted to children that did not attend childcare centers before turning two years old.

The differences mentioned above suggest a selection bias in attendance to center-based care. Boys with more educated mothers, from urban zones, and higher-income households are more likely to have attended a care center. Thus, the methodology to apply has to take this bias into account.

3. Methods

3.1. Attendance to childcare centers

The aim is to identify the effect of attendance and time spent on center-based care on cognitive and non-cognitive tests. It is plausible that there are extensive and intensive margin effects. Extensive margin effects arise from whether a child attended a childcare center between 2010 and 2012. The intensive margin effects are those attributable to time spent in center-based care. Therefore, it is sensible to have different approaches for each effect.

First, I analyze the effect of attending a care center or not by estimating a value-added model. Using a linear regression model by Ordinary Least Squares (OLS), the following equation can be estimated

$$y_{i,t} = \beta_0 + \beta_1 x_{i,t_0} + \beta_2 y_{i,t-1} + \beta_3 c_{i,t-1} + \beta_4 m_{i,t-1} + \beta_5 h_{i,t-1} + \epsilon_{i,t} \tag{1}$$

where i is the subindex for each child, t corresponds to 2012, $t-1$ to 2010, and t_0 to the period between waves. $y_{i,t}$ is the standardized score of a child on a test in 2012. All test scores are standardized. Thus, they have null mean and unit variance. As explained in Section 2, the analyzed tests are TADI, PPVT, and CBCL. TADI measures general development, PPVT receptive language, and CBCL behavioral development. An advantage of TADI is that it allows accounting for effects on each of its dimensions: cognitive, language, motor, and socio-emotional development.

x_{i,t_0} is a dichotomous variable that indicates whether the child attended a care center between waves. Then, β_1 is the coefficient of interest. $y_{i,t-1}$ is a vector of baseline controls of scores attained in 2010. Following the methodology of Reynolds (2022), I include the standardized scores of the cognitive, communication, and socio-personal dimensions of the Battelle test in 2010.

The term $c_{i,t-1}$ is a vector of controls for child's characteristics that includes: sex at birth, age in months in 2010 and 2012 (and their squares), premature condition, if the child is from indigenous heritage, and month of evaluation in 2012.[5] $m_{i,t-1}$ is a vector of controls for mother's characteristics. It includes age in years, years of schooling, vocabulary and numeric WAIS test scores, employment condition at childbirth, depression post-pregnancy, alcohol, and cigarettes consumption during the first six months after the child's birth.

[5] Since the timing of the survey varies both in 2010 and 2012, children of a certain age in the first wave could be evaluated in the second at different ages. To decrease concerns about multicollinearity arising from including age in months in both waves, I estimated all models using age either in 2010 or 2012. Results from the preferred specification are robust to these alternatives. The month of evaluation in 2012 was also included, as Reynolds (2022) argues that there is a negative association between being evaluated later in the year and test scores.

$h_{i,t-1}$ is a vector of controls of household characteristics that includes a dichotomous variable to control for the father's presence in the household, household income per capita, whether the household receives the SUF government subsidy, whether the household is located in an urban or rural area, and municipality of residence. $\epsilon_{i,t}$ is the error term.

Even though this is a useful approach, there is an endogeneity problem. The assumption that there is no selection bias on attendance does not hold. Besides differences in observable characteristics, attendance to a care center may depend on unobservable factors. Mothers (and families) with higher levels of ability, motivation, effort, and involvement in their child's life may see attendance to care centers as a way to foster development. Then, children that attend care centers may also have better conditions regarding maternal care. So there may be endogeneity arising from an omitted variable bias.

If attending a care center has a positive effect, it is arguable that children from more vulnerable households may benefit more, thus implying a downward bias. On the other hand, if children with better care outside centers are those who attended, the effects may be driven by these characteristics and not by the center-based care. Thus, implying an upward bias. Then, determining the direction of the bias is not straightforward.

A systematic approach to solving endogeneity problems is to use instrumental variables. The conditions to fulfill are relevance and exogeneity. The relevance condition means that the instrument significantly affects the endogenous variable (in this case, attendance to care centers). The exogeneity condition means that the instrument only affects the outcome of interest through the endogenous variable (uncorrelated to other potential channels). Therefore, the instrument should be correlated with attendance to care centers but not affect cognitive and non-cognitive development.

An instrument that may fulfill these conditions is the available capacity of care centers in the municipality of residence during the period in which the child was the respective age to attend. The instrument would be exogenous because attendance may be positively correlated with living in a municipality that has a higher capacity.

Arguably, the decision to live in a certain municipality is not correlated with the supply of center-based care and the availability at a specific period. If this assumption is correct, the instrument will fulfill the exogeneity condition. Given that an expansion of supply took place in the period right before the relevant cohort enrolled in center-based care, it is unlikely that the uneven distribution and availability of care centers were forecast by families. It is even more unlikely considering the expansion was carried out by refurnishing old classrooms and building new facilities in the same period (Noboa-Hidalgo & Urzúa, 2012).

In the sample, 78.6% of the mothers whose children attended a care center between waves answered that they had a care center that received children of the child's age in the relevant period. This suggests that the instrument is valid. Some studies have used similar instruments, exploiting exogenous variations of schools or center-based supply (Berlinski et al., 2007; McEwan, 2001; Noboa-Hidalgo & Urzúa, 2012).

Only 3.34% of the children who attended care centers between waves (34 observations) attended at two years old but did not at three years old. Thus, prior attendance is a determinant for future attendance. This was a determining factor for restricting the sample to children that did not attend previous to two years of age. This restriction is also in line with the methodology of Narea et al. (2020).

Children in the sample were born between May 2008 and August 2009. Then, the instrumental variable used is the ratio of three-year-olds attending care centers in 2012 divided by the total population of that age in the municipality of residence. To that extent, I use administrative data from the Chilean Ministry of Education (*Ministerio de Educación de Chile*), which has a complete register of individual enrollment, including age and municipality. For the denominator, I use population estimations of the National Statistics Office of Chile (*Instituto Nacional de Estadísticas de Chile*) for 2012, based on information gathered in the 2017 Census. Then, the instrument for a child i in municipality j in t, 2012, is defined as[6]

$$z_{i,j,t} = \frac{E_{j,t}}{P_{j,t}} \tag{2}$$

where $E_{t,j}$ and $P_{t,j}$ are the total enrollment and the population of three-year-olds, respectively. With this instrument, the effect of care center attendance can be estimated using Two-Stage Least Squares (2SLS). The first stage is estimated by the equation

$$x_{i,t_0} = \alpha_0 + \alpha_1 z_{i,t} + \alpha_2 y_{i,t-1} + \alpha_3 c_{i,t-1} + \alpha_4 m_{i,t-1} + \alpha_5 h_{i,t-1} + v_{i,t} \tag{3}$$

where $z_{i,t}$ is the instrument.[7] $v_{i,t}$ is the error term. The other terms are the same as in Equation 1. The second stage is estimated by

$$y_{i,t} = \beta_0 + \beta_1 \hat{x}_{i,t_0} + \beta_2 y_{i,t-1} + \beta_3 c_{i,t-1} + \beta_4 m_{i,t-1} + \beta_5 h_{i,t-1} + \mu_{i,t} \tag{4}$$

where $\hat{x}_{i,t_0}$ is the estimate of the first stage, and $\mu_{i,t}$ is the error term. As the instrument does not vary within municipalities, $h_{i,t-1}$ in the 2SLS estimations does not include municipality of residence.

In Section 4, I compare the results of both models: OLS, and IV by 2SLS.

[6] Although the municipality of residence is defined with the 2010 survey information, only 0.29% of the mothers in the sample declared that they had to change care centers due to a change of residence in 2012.

[7] Since the municipality of residence is assumed to be fixed, the j subindex is disregarded.

3.2. Time spent in childcare centers

The ELPI questionnaire, besides asking for attendance at childcare centers, includes a battery of questions about the amount of time that the child spent in center-based care. For each period, two and three years of age, mothers were asked how many months and weeks the child attended, how many days a week, and if they attended full-time or part-time care.

Using all these variables, I defined time spent in center-based care as the number of hours a child attended between waves (full-time as eight hours and part-time as four hours of attendance per day). I use the logarithm of the number of hours in child care centers between waves, as stated in the relevant literature that center-based care has decreasing marginal returns (Noboa-Hidalgo & Urzúa, 2012; Reynolds, 2022).

As a higher supply of childcare may influence the decision to enroll a child, it is less likely to influence the decision to maintain attendance. Therefore, I only use the OLS model defined in Equation 1, with a minor variation. As explained in Section 4, attendance at care centers has heterogeneous effects. For that reason, and following the methodology of Reynolds (2022), I divided the sample by child's gender and mother's educational level (completed high school or lower, and more than high school). Then, the following equation was estimated

$$y_{i,t} = \beta_0 + \beta_1 x_{i,t_0} + \beta_2 y_{i,t-1} + \beta_3 c_{i,t-1} + \beta_4 m_{i,t-1} + \beta_5 h_{i,t-1} + \beta_6 w_{i,t-1} + \beta_7 w_{i,t-1} \times x_{i,t_0} + \epsilon_{i,t} \quad (5)$$

where x_{i,t_0} is the logarithm of hours spent in care centers between waves, $w_{i,t-1}$ is a categorical variable that divides the sample into four groups: boys with high-educated mothers (omitted category), boys with low-educated mothers, girls with high-educated mothers and girls with low-educated mothers. Then, the coefficients of interest are β_1 and β_7.

The remaining terms are the same as in Equation 1, except for $c_{i,t-1}$, since child's sex is now contained in $w_{i,t-1}$. $m_{i,t-1}$ still contains mother's years of schooling, to control for possible heterogeneity within groups.

Since the sample was restricted to children who did not attend center-based care previous to two years of age, and a wide variety of controls are included, I aim to mitigate the possible concerns of endogeneity problems. Besides the former restrictions, 34 observations that declared attendance at two years of age but not at three were excluded to lessen concerns about bias regarding exiting center-based care. Seven observations did not have answers about time spent in care centers. In addition to the 34 mentioned observations, they were not considered for this analysis, keeping 974 observations with complete information.

4. Results

4.1. Effects of attendance to childcare centers

Table 2 shows the results for OLS and IV models for TADI, PPVT and CBCL. The results are positive and significant for general development (TADI) and receptive language (PPVT) in both specifications, but not for behavioral development (CBCL). The effect of attendance between waves is 0.24 standard deviations in the OLS model for general development and 0.12 for language. The coefficients are 7.46 and 11.68 times higher for the IV models (1.75 and 1.4 standard deviations).

A child's baseline development measured in the Battelle communication dimension in 2010 is positive and significant for general development and language. For behavioral development, the socio-personal dimension in 2010 has a positive effect (consistent with Reynolds, 2022).[8]

Child's sex at birth is also significant for all tests. These results show that girls perform significantly higher than boys. Mother's schooling also has a positive effect on all specifications, but they are not significant in the IV models for general development and language. Development differences in favor of girls and children with high-educated mothers have been previously stated in Chilean relevant literature (Noboa-Hidalgo & Urzúa, 2012; Contreras & González, 2015).

The results suggest that the mother's schooling may be a driving factor in the high differences between OLS and IV estimates for the variable of interest.

The IV model fulfills the general condition to test for weak instruments, with an F-statistic larger than 10 (15.63). The Durbin-Wu-Hausman (DWH) test *p-value* is lower than 0.05 for the general development and language tests, suggesting that attendance is indeed an endogenous variable. However, in addition to the much higher coefficients, the low partial R^2 of the first stage (0.009) gives intuition that the instrument may not be valid, as previously stated in the literature (Bound et al., 1995).

These results motivated an exploratory analysis, concluding that the instrument may be valid for only a part of the sample. The main dividing factor, as previously indicated, is the mother's years of schooling.

[8] The scores of the cognitive dimension are not significant, suggesting that it may be confounded with the communication dimension.

Table 2: Effects of childcare center attendance - Total sample

	TADI		PPVT		CBCL	
	(1) OLS	(2) IV	(3) OLS	(4) IV	(5) OLS	(6) IV
Variable of interest						
Attendance between waves (1 = yes)	0.235***	1.754***	0.120**	1.402**	-0.063	-0.438
	(0.049)	(0.609)	(0.050)	(0.597)	(0.049)	(0.483)
Child's characteristics						
Battelle communication 2010 (z-score)	0.135***	0.193***	0.087***	0.142***	-0.026	-0.037
	(0.029)	(0.041)	(0.030)	(0.039)	(0.029)	(0.032)
Battelle cognitive 2010 (z-score)	0.010	-0.031	0.012	-0.012	0.015	0.012
	(0.029)	(0.036)	(0.029)	(0.033)	(0.028)	(0.028)
Battelle socio-personal 2010 (z-score)	0.013	0.043	0.005	0.015	0.093***	0.073**
	(0.029)	(0.035)	(0.029)	(0.032)	(0.031)	(0.030)
Child's sex (1 = female)	0.168***	0.236***	0.147***	0.213***	0.123***	0.091*
	(0.046)	(0.066)	(0.047)	(0.064)	(0.046)	(0.055)
Indigenous descent (1 = yes)	-0.204**	-0.268***	-0.138*	-0.107	-0.064	0.092
	(0.080)	(0.089)	(0.081)	(0.082)	(0.087)	(0.089)
Premature child (1 = yes)	0.014	0.032	-0.029	-0.046	0.065	0.090
	(0.094)	(0.119)	(0.092)	(0.106)	(0.088)	(0.097)
Mother's characteristics						
Mother's age (years)	0.003	0.010*	0.012***	0.018***	0.010***	0.008*
	(0.004)	(0.005)	(0.004)	(0.005)	(0.004)	(0.004)
Mother's schooling (years)	0.038***	0.008	0.055***	0.029*	0.023**	0.027**
	(0.010)	(0.017)	(0.010)	(0.016)	(0.011)	(0.014)
WAIS Numeric	0.022**	0.034***	0.011	0.030**	-0.005	-0.008
	(0.010)	(0.013)	(0.010)	(0.012)	(0.010)	(0.010)
WAIS Vocabulary	0.017**	0.016	0.016*	0.007	0.036***	0.033***
	(0.008)	(0.010)	(0.009)	(0.009)	(0.008)	(0.008)
Working at childbirth (1 = yes)	-0.019	0.041	-0.053	-0.022	0.061	0.045
	(0.051)	(0.063)	(0.053)	(0.061)	(0.051)	(0.052)
Depression post pregnancy (1 = yes)	-0.017	0.023	0.018	0.043	-0.257***	-0.225***
	(0.065)	(0.080)	(0.067)	(0.079)	(0.065)	(0.066)
Cigarettes consumption post pregnancy (1 = yes)	-0.022	-0.014	0.011	-0.005	-0.091	-0.151**
	(0.071)	(0.094)	(0.076)	(0.086)	(0.075)	(0.073)
Alcohol consumption post pregnancy (1 = yes)	0.055	0.118	0.077	0.105	-0.167**	-0.152*
	(0.094)	(0.117)	(0.100)	(0.112)	(0.079)	(0.081)
Household's characteristics						
Father's presence in the household (1 = yes)	-0.036	-0.013	0.015	0.024	-0.042	-0.030
	(0.055)	(0.071)	(0.057)	(0.066)	(0.057)	(0.058)
Income per capita ($CLP Thousands 2010)	0.000**	0.000	0.000	0.000	0.000	0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Receives SUF government subsidy (1 = yes)	-0.121**	-0.138**	-0.218***	-0.255***	-0.018	0.059
	(0.054)	(0.067)	(0.056)	(0.064)	(0.059)	(0.059)
Area (1 = urban)	0.039	-0.071	0.085	0.010	-0.024	-0.062
	(0.092)	(0.112)	(0.088)	(0.109)	(0.088)	(0.097)
Constant	-6.677	-0.016	-1.699	2.525	-6.099	-6.410
	(5.003)	(6.429)	(5.093)	(6.176)	(4.974)	(5.323)
Observations	1,758	1,758	1,758	1,758	1,758	1,758
R^2	0.263		0.222		0.242	
Partial R^2 (first stage)		0.009		0.009		0.009
F-statistic (first stage)		15.632		15.632		15.632
DWH endogeneity test p-value		0.001		0.010		0.480

Author's own elaboration based on ELPI 2010 and 2012. Robust standard errors in parentheses. Control variables also include child's age in months in 2010 and 2012, their respective squares, and dummy variables for month of evaluation in 2012. OLS controls also include municipality of residence in 2010. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

4.1.1. Heterogeneous effects

School is mandatory in Chile until completion of high-school. That is, after completing 12 years of formal education. Therefore, the percentage of mothers with exactly 12 years of education in the sample is high, 41.2%. Mothers with less than high-school account for 38.4% of the sample, and the remaining 20.4% has at least one year of tertiary education.

I decided to divide the sample between mothers that have high-school attainment or lower, and those who have tertiary education. These groups will be further referred to as low-educated and high-educated mothers. The division was made based on the differences in attendance to center-based care.[9]

Table 3 shows the results restricting the sample to low-educated mothers. The variable of interest is still significant at the 5% level for both specifications (OLS and IV) in general development and language. However, the OLS estimates are higher than for the whole sample, and the IV estimates are lower. In this subsample, the effects on general development are 0.27 standard deviations, and 0.15 standard deviations for language (as opposed to 0.24 and 0.12 standard deviations for the whole sample). The IV coefficients decrease from 1.75 to 1.25 standard deviations for general development, and from 1.40 to 1.03 standard deviations for language.[10]

The F-statistic is higher than for the whole sample (17.41 instead of 15.63), suggesting that center-based care supply has a stronger influence on attendance for children with low-educated mothers. The partial R^2 is also higher than for the whole sample but still low (0.012). If children with low-educated mothers are those with lower attendance rates and at the same time have worse alternative care at home, it is plausible that they benefit more from attending center-based care. Thus, the higher IV coefficients.

These results can not reject that the IV estimates are biased. However, they also show that the OLS estimates are biased downwards. Rather than stating causality, the results should be considered as lower and upper bounds of the effects of childcare center attendance for children of low-educated mothers.

The approach of dividing the sample becomes even more valid after estimating the same models restricting to high-educated mothers. Table A.1 in Appendix shows that there are no significant effects, and the IV model is not suitable.[11]

[9] The attendance ratio of children from mothers with uncompleted high-school is 52.14%, whereas just completed high-school is 57.93%. The magnitude of the difference is then 5.78%, and the *t-test* is significant at the 5% level. Nonetheless, differences are larger between just high-school and tertiary education. The attendance ratio of children from the latter group is 67.88%. The difference is 9.95%, and significant at the 1% level.

[10] Even though there is an effect at the 10% level in the IV estimations for CBCL, the *p-value* is high (0.098), and the DWH *p-value* does not reject the null hypothesis for exogeneity. The OLS results show no significant effects.

[11] For this subsample, the F-statistic of the first stage drops to 0.98, and the IV estimates are 55.23 and 44.10 times higher than OLS for TADI and PPVT. This shows that, even though the validity of the IV approach is not beyond question for children with low-educated mothers, it is certainly not appropriate for children with high-educated mothers.

Table 3: Effects of childcare center attendance - Low-educated mothers

	TADI		PPVT		CBCL	
	(1) OLS	(2) IV	(3) OLS	(4) IV	(5) OLS	(6) IV
Variable of interest						
Attendance between waves (1 = yes)	0.266***	1.246**	0.145***	1.033**	-0.044	-0.841*
	(0.054)	(0.513)	(0.055)	(0.497)	(0.056)	(0.509)
Observations	1,400	1,400	1,400	1,400	1,400	1,400
R^2	0.280		0.219		0.249	
Partial R^2		0.012		0.012		0.012
F-statistic (first stage)		17.406		17.406		17.406
DWH endogeneity test p-value		0.026		0.048		0.115

Author's own elaboration based on ELPI 2010 and 2012. Robust standard errors in parentheses. Control variables include child's age in months in 2010 and 2012, their respective squares, Battelle z-scores in 2010 in communication, cognitive and socio-personal dimensions, child's sex at birth, indigenous descent condition, premature condition, mother's age in years, mother's schooling, WAIS numeric and vocabulary scores, working condition at childbirth, depression, cigarettes and alcohol consumption post pregnancy, father's presence in the household, income per capita, SUF subsidy receipient, a dummy variable for rural or urban area, and dummy variables for month of evaluation in 2012. OLS controls also include municipality of residence in 2010. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Thus, it is relevant to state that the results for the whole sample in Table 2 are biased by the inclusion of the high-educated group. Table A.2 shows the same results of Table 3 including all control variables.

Having stated the validity of the approach and the significant results for the children of low-educated mothers, Table 4 shows the estimates for this subsample on the four TADI dimensions.

OLS coefficients are positive and significant at the 1% level for all dimensions, ranging from 0.18 standard deviations in language to 0.26 standard deviations in motor skills. IV estimations show significant effects only for language and socio-emotional dimensions, 7.96 and 4.38 times higher than the OLS coefficients, respectively.[12] It is important to emphasize that OLS and IV coefficients are similar between PPVT and the language dimension of TADI (even though TADI coefficients are larger, by approximately 20% in OLS and 35% in the IV models). This evidence supports the hypothesis that center-based care positively affects language abilities of children with low-educated mothers.

[12] Only for the language dimension the null hypothesis of exogeneity is rejected. The partial R^2 and F-statistic are the same as in Table 3. Table A.3 in Appendix shows the same results as Table 4 with all control variables.

Table 4: Effects of childcare center attendance - Low-educated mothers (TADI dimensions)

	TADI							
	Cognitive		Language		Motor		Socio-emotional	
	(1) OLS	(2) IV	(3) OLS	(4) IV	(5) OLS	(6) IV	(7) OLS	(8) IV
Variable of interest								
Attendance between waves (1 = yes)	0.192***	0.797	0.175***	1.394***	0.260***	0.796	0.234***	1.026**
	(0.055)	(0.496)	(0.056)	(0.538)	(0.056)	(0.485)	(0.057)	(0.510)
Observations	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400
R^2	0.258		0.223		0.215		0.225	
Partial R^2		0.012		0.012		0.012		0.012
F-statistic (first stage)		17.406		17.406		17.406		17.406
DWH endogeneity test p-value		0.202		0.006		0.216		0.075

Author's own elaboration based on ELPI 2010 and 2012. Robust standard errors in parentheses. Control variables include child's age in months in 2010 and 2012, their respective squares, Battelle z-scores in 2010 in communication, cognitive and socio-personal dimensions, child's sex at birth, indigenous descent condition, premature condition, mother's age in years, mother's schooling, WAIS numeric and vocabulary scores, working condition at childbirth, depression, cigarettes and alcohol consumption post pregnancy, father's presence in the household, income per capita, SUF subsidy receipient, a dummy variable for rural or urban area, and dummy variables for month of evaluation in 2012. OLS controls also include municipality of residence in 2010. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

4.2. Effects of time spent in childcare centers

Now, the approach is the same as the previous value-added model estimated by OLS, but a variation is included to account for interactions between variables. The sample of children with complete attendance information is divided into four categories: boys with high-educated mothers (omitted category), boys with low-educated mothers, girls with high-educated mothers, and girls with low-educated mothers.

As explained in Section 3, the variable of interest, rather than a dummy variable for attendance between waves, is the logarithm of the number of hours that the child attended center-based care. Several additional restrictions were imposed on the sample to reduce endogeneity concerns. Since time spent is endogenous, the sample was restricted to children that did not attend childcare before turning two years old. Children that attended at two years but not at three were also excluded, as exiting may be due to health or environmental problems.

Table 5 shows the coefficients for attendance (as a dummy variable). As discussed in the previous subsection, it is not surprising that the positive effects are only significant for the group with low-educated mothers. For girls, effects are significant for all tests, except for CBCL.

The effects range from 0.2 standard deviations in TADI socio-emotional dimension to 0.28 standard deviations in the total score. Coefficients between PPVT and TADI language dimensions are similar (0.21 and 0.20 standard deviations, respectively). For boys with low-educated mothers, the effects are significant for TADI total score, driven by significant effects in motor and socio-emotional

dimensions. Only the socio-emotional dimension has a positive and statistically significant effect on girls with high-educated mothers. Table A.4 in Appendix contains all control variables.

Table 5: Effects of childcare center attendance - Interaction terms

	TADI						
	Total	Cognitive	Language	Motor	Socio-emotional	PPVT	CBCL
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variable of interest							
Attendance to center-based care for boys with high-educated mothers	0.051	0.249	0.029	-0.105	-0.015	0.034	-0.186
	(0.156)	(0.175)	(0.163)	(0.176)	(0.165)	(0.176)	(0.150)
Attendance to center-based care for boys with low-educated mothers	0.233***	0.106	0.127*	0.275***	0.249***	0.053	-0.037
	(0.074)	(0.076)	(0.075)	(0.078)	(0.075)	(0.073)	(0.080)
Attendance to center-based care for girls with high-educated mothers	0.231	0.189	-0.042	0.217	0.383**	0.057	-0.077
	(0.163)	(0.162)	(0.158)	(0.169)	(0.160)	(0.171)	(0.138)
Attendance to center-based care for girls with low-educated mothers	0.276***	0.253***	0.201***	0.237***	0.200***	0.212***	-0.064
	(0.072)	(0.072)	(0.075)	(0.074)	(0.076)	(0.074)	(0.072)
Observations	1,758	1,758	1,758	1,758	1,758	1,758	1,758
R^2	0.264	0.244	0.212	0.189	0.210	0.224	0.243

Author's own elaboration based on ELPI 2010 and 2012. Robust standard errors in parentheses. Control variables include a categorical variable for boys with high-educated mothers, boys with low-educated mothers, girls with high-educated mothers, and girls with high-educated mothers. They also include child's age in months in 2010 and 2012, their respective squares, Battelle z-scores in 2010 in communication, cognitive and socio-personal dimensions, indigenous descent condition, premature condition, mother's age in years, mother's schooling, WAIS numeric and vocabulary scores, working condition at childbirth, depression, cigarettes and alcohol consumption post pregnancy, father's presence in the household, income per capita, SUF subsidy receipient, a dummy variable for rural or urban area, dummy variables for month of evaluation in 2012, and municipality of residence in 2010. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Arguably, enough evidence has been shown to assert that the positive effects of center-based care are contained in the low-educated mother's children, with a higher effect on girls.

However, the effects of time spent in center-based care are not the same. Table 6 shows the results for the variable of interest in the value-added approach with interaction terms of time spent in center-based care. Interestingly, the results are only statistically significant for boys with low-educated mothers, in general development and motor skills. Doubling the hours spent in center-based care for boys with low-educated mothers is associated with 0.17 standard deviations higher motor abilities. Table A.5 in Appendix contains all control variables.

The average time between waves was 25.97 months, whereas the average time spent in center-based care for those who attended was 7.59 months (5.19 SD). The average of hours spent was 931.41 (800.95 SD). Results of Table 6 are robust to specifying the variable of interest as the logarithm of weeks and logarithm of months spent in center-based care, with minor variation in coefficients.

Results suggest a positive effect for attendance on both boys and girls with low-educated mothers, but that these are not enhanced by time spent in childcare centers. One possible explanation is

that these children have worse alternative care at home. Attending center-based care generates a positive effect, but the quality of the centers may not be sufficient to generate a positive effect on those who are already attending.

Table 6: Effects of time spent in childcare centers - Interaction terms

	TADI						
	Total	Cognitive	Language	Motor	Socio-emotional	PPVT	CBCL
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variable of interest							
Log hours spent in center-based care for boys with high-educated mothers	0.093	0.132	0.108	-0.008	0.063	0.178*	0.002
	(0.093)	(0.097)	(0.104)	(0.087)	(0.088)	(0.104)	(0.092)
Log hours spent in center-based care for boys with low-educated mothers	0.132**	0.079	0.111*	0.165***	0.075	0.084	0.075
	(0.060)	(0.060)	(0.062)	(0.061)	(0.062)	(0.059)	(0.061)
Log hours spent in center-based care for girls with high-educated mothers	0.104	0.053	0.120	0.026	0.133	0.090	-0.035
	(0.122)	(0.130)	(0.127)	(0.118)	(0.124)	(0.128)	(0.092)
Log hours spent in center-based care for girls with low-educated mothers	0.008	0.018	-0.020	0.015	0.013	-0.022	0.044
	(0.053)	(0.052)	(0.058)	(0.054)	(0.055)	(0.053)	(0.059)
Observations	974	974	974	974	974	974	974
R^2	0.297	0.270	0.251	0.241	0.243	0.268	0.272

Author's own elaboration based on ELPI 2010 and 2012. Robust standard errors in parentheses. Control variables include a categorical variable for boys with high-educated mothers, boys with low-educated mothers, girls with high-educated mothers, and girls with high-educated mothers. They also include child's age in months in 2010 and 2012, their respective squares, Battelle z-scores in 2010 in communication, cognitive and socio-personal dimensions, indigenous descent condition, premature condition, mother's age in years, mother's schooling, WAIS numeric and vocabulary scores, working condition at childbirth, depression, cigarettes and alcohol consumption post pregnancy, father's presence in the household, income per capita, SUF subsidy receipient, a dummy variable for rural or urban area, dummy variables for month of evaluation in 2012, and municipality of residence in 2010. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

5. Conclusions

In this paper, I used a Chilean nationally representative longitudinal survey of early childhood to address the effects of attendance and time spent in childcare centers between two and three years of age on children's outcomes. I utilized a value-added approach, with OLS and IV models, to estimate these effects, controlling for children's test scores in 2010. The sample was restricted to children that did not attend childcare centers before two years of age, as previous attendance is correlated with future attendance.

The instrumental variable used is the ratio of enrollment in childcare centers in the municipality of residence of the child in the relevant period. That is, the ratio of three-year-olds enrolled in 2012. Given that there were policies aimed at increasing the supply of childcare centers prior to this period, the instrument is likely to be exogenous (Noboa-Hidalgo & Urzúa, 2012).

The instrument is not weak, measured by the first stage F-statistic, for children whose mothers have a high-school education or lower. However, the partial R^2 of the first stage is low, suggesting that

the instrument does not have enough explanatory power (Bound et al., 1995).

Results show positive and statistically significant effects of attendance in general and language development, measured by TADI (Child Learning and Development Test) and PPVT (Peabody Picture Vocabulary Test). The effects are approximately 0.2 standard deviations in OLS and 1.2 in IV estimations. These are only significant for children with low-educated mothers.

Considering the large difference between estimations, it is not possible to assert a causal effect. However, evidence is strong enough to suggest that the results of OLS estimations are biased downwards. Then, results should be considered as lower and upper bounds of the effects of childcare center attendance for children of low-educated mothers.

The evidence on non-cognitive development is mixed, since there are significant and positive results for the socio-emotional dimension of the TADI test, but this is not the case for CBCL (Child Behavior Checklist).

I only used the OLS model regarding the effects of time spent in center-based care, since the instrument was not valid for this specification. The variable used to analyze this effect is the logarithm of hours spent in center-based care. I restricted the sample further to decrease endogeneity concerns.

Following Reynold's (2022) methodology, I explore heterogeneous effects of child's sex and mother's educational attainment, as suggested by the results on attendance. Results also show positive and significant effects, but only for boys with low-educated mothers, and only in the motor skills dimension of TADI. These findings suggest that doubling time spent increases test scores by 0.17 standard deviations.

These findings align with similar studies, such as Narea et al. (2020) and Reynolds (2022). Narea et al. (2020) find a positive effect on attending center-based care at two years of age, whereas Reynolds (2022) finds an effect on time spent for children from low socio-economic households at two and three years of age.

There are several contributions of this paper when compared to the aforementioned. First, I use a plausibly exogenous source of variation to see the effect of attendance as a dichotomous variable, finding that OLS estimates are likely to be biased downwards.

Second, I explore different heterogeneous effects, finding that the results are only significant for children with low-educated mothers. Third, I show that the effects of attendance and time spent in childcare centers differ. Positive effects of attendance are mainly driven by improvements in cognitive and language abilities in girls of less-advantageous backgrounds. These differential effects by gender are not conclusive in the relevant literature, but there are some examples of larger effects of center-based care for girls (Anderson, 2008).

For time spent in childcare centers, positive effects are found on the motor abilities of boys with low-educated mothers. A possible explanation for the differences between attendance and time spent effects, is worse alternative care at home for children with low-educated mothers. Then,

attending center-based care generates a positive effect compared to full-time home care. However, the centers' quality may not be sufficient to generate positive effects within those who attend. The fact that time spent in center-based care enhances only motor skills for boys may be driven by a gender bias, where boys might be more encouraged to participate in activities that develop motor abilities.

There are also several limitations of this paper. First, it does not consider the long-term effects of center-based care, even though the ELPI has a third wave in 2017. An attempt was made to analyze the long-term effects. Nevertheless, due to high attrition rates (38%) and the already not large original sample size (1,758), long-term results were not consistent and therefore disregarded. Effects gained before entering the school system may dissipate over time for more vulnerable children if the quality of schools is poor (Barnett, 2011; Vogel et al., 2010). The ELPI data does not allow to control for childcare centers' quality, so it is not possible to address heterogeneous short-term effects by this characteristic.

Secondly, the evidence given by the IV approach is not clear. Further research may explore other exogenous sources of variation. For example, Dussaillant (2016) combined ELPI and administrative data from the Chilean Ministry of Education regarding distance to childcare centers, concluding a significant association between shorter distances and attendance.

A third limitation is that the sample was restricted to children that did not attend before turning two years old. Development patterns may differ between those who attended earlier and children who entered center-based care between two and three years old (Narea et al., 2022).

Overall, the results of this paper suggest that center-based care has a positive effect on children's development. Therefore, policies aimed at increasing attendance and time spent in center-based care are beneficial, as they might positively reduce child development gaps between children from less and more-advantageous initial backgrounds.

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Appendix

Table A.1: Effects of childcare center attendance - High-educated mothers

	TADI		PPVT		CBCL	
	(1) OLS	(2) IV	(3) OLS	(4) IV	(5) OLS	(6) IV
Attendance between waves (1 = yes)	0.085	4.694	0.086	3.793	-0.112	2.953
	(0.129)	(4.633)	(0.153)	(4.226)	(0.124)	(3.341)
Battelle communication 2010 (z-score)	0.078	0.209	0.139	0.270	0.064	0.143
	(0.088)	(0.199)	(0.096)	(0.184)	(0.073)	(0.150)
Battelle cognitive 2010 (z-score)	-0.023	-0.136	-0.022	-0.083	-0.063	-0.039
	(0.075)	(0.170)	(0.089)	(0.149)	(0.067)	(0.128)
Battelle socio-personal 2010 (z-score)	0.104	0.290	0.100	0.231	0.065	0.089
	(0.089)	(0.214)	(0.098)	(0.190)	(0.075)	(0.152)
Child's sex (1 = female)	0.288**	0.623	0.223	0.484	0.072	0.426
	(0.138)	(0.493)	(0.152)	(0.456)	(0.108)	(0.351)
Indigenous descent (1 = yes)	-0.324	-0.031	-0.205	0.175	-0.109	0.085
	(0.244)	(0.529)	(0.247)	(0.443)	(0.280)	(0.352)
Premature child (1 = yes)	-0.168	0.465	0.144	0.520	0.053	0.553
	(0.248)	(0.784)	(0.300)	(0.675)	(0.223)	(0.599)
Mother's age (years)	-0.018	-0.013	0.004	0.008	0.001	0.013
	(0.015)	(0.026)	(0.017)	(0.024)	(0.012)	(0.020)
Mother's schooling (years)	-0.068	0.111	0.002	0.141	-0.064	0.040
	(0.051)	(0.148)	(0.061)	(0.131)	(0.041)	(0.106)
WAIS Numeric	0.027	0.027	0.029	0.038	0.016	-0.004
	(0.029)	(0.047)	(0.028)	(0.039)	(0.022)	(0.033)
WAIS Vocabulary	0.019	-0.027	0.014	-0.019	0.046**	0.035
	(0.024)	(0.052)	(0.026)	(0.046)	(0.021)	(0.038)
Father's presence in the household (1 = yes)	0.006	0.319	0.086	0.329	0.059	0.248
	(0.183)	(0.458)	(0.200)	(0.409)	(0.142)	(0.335)
Income per capita (CLP Thousands 2010)	0.000*	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Receives SUF government subsidy (1 = yes)	0.184	0.181	0.123	0.084	-0.099	-0.062
	(0.255)	(0.451)	(0.270)	(0.396)	(0.205)	(0.361)
Area (1 = urban)	0.148	-0.448	0.198	-0.505	-0.114	-0.593
	(0.324)	(0.776)	(0.286)	(0.696)	(0.239)	(0.601)
Constant	-7.726	-0.251	-6.795	3.356	-13.225	-4.753
	(17.477)	(26.830)	(16.560)	(23.035)	(12.231)	(19.721)
Observations	358	358	358	358	358	358
R^2	0.398		0.350		0.475	
Partial R^2		0.003		0.003		0.003
F-statistic (first stage)		0.975		0.975		0.975
DWH endogeneity test p-value		0.010		0.070		0.053

Author's own elaboration based on ELPI 2010 and 2012. Robust standard errors in parentheses. Control variables also include child's age in months in 2010 and 2012, their respective squares, working condition of the mother at childbirth, depression, alcohol and cigarettes consumption after pregnancy, and dummy variables for month of evaluation in 2012. OLS controls also include municipality of residence in 2010. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A.2: Effects of childcare center attendance - Low-educated mothers

	TADI		PPVT		CBCL	
	(1) OLS	(2) IV	(3) OLS	(4) IV	(5) OLS	(6) IV
Variable of interest						
Attendance between waves (1 = yes)	0.266***	1.246**	0.145***	1.033**	-0.044	-0.841*
	(0.054)	(0.513)	(0.055)	(0.497)	(0.056)	(0.509)
Child's characteristics						
Battelle communication 2010 (z-score)	0.147***	0.191***	0.073**	0.115***	-0.057*	-0.073*
	(0.033)	(0.039)	(0.033)	(0.039)	(0.033)	(0.038)
Battelle cognitive 2010 (z-score)	0.005	-0.011	0.008	-0.005	0.024	0.017
	(0.033)	(0.037)	(0.032)	(0.034)	(0.033)	(0.034)
Battelle socio-personal 2010 (z-score)	-0.004	0.002	-0.008	-0.015	0.115***	0.092**
	(0.032)	(0.034)	(0.031)	(0.032)	(0.035)	(0.036)
Child's sex (1 = female)	0.162***	0.190***	0.130**	0.185***	0.135**	0.072
	(0.052)	(0.061)	(0.053)	(0.059)	(0.054)	(0.062)
Indigenous descent (1 = yes)	-0.189**	-0.263***	-0.149*	-0.132	-0.119	0.088
	(0.087)	(0.084)	(0.087)	(0.081)	(0.100)	(0.102)
Premature child (1 = yes)	0.064	0.034	-0.020	-0.076	0.084	0.090
	(0.104)	(0.118)	(0.101)	(0.108)	(0.101)	(0.114)
Mother's characteristics						
Mother's age (years)	0.007*	0.012**	0.013***	0.018***	0.011***	0.007
	(0.004)	(0.005)	(0.004)	(0.005)	(0.004)	(0.005)
Mother's schooling (years)	0.041***	0.028*	0.051***	0.039***	0.024*	0.030*
	(0.013)	(0.015)	(0.011)	(0.015)	(0.014)	(0.016)
WAIS Numeric	0.022*	0.030**	0.005	0.022*	-0.008	-0.011
	(0.012)	(0.013)	(0.011)	(0.012)	(0.012)	(0.013)
WAIS Vocabulary	0.018**	0.022**	0.017*	0.013	0.030***	0.027***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.010)	(0.010)
Working at childbirth (1 = yes)	-0.033	0.056	-0.032	0.024	0.047	-0.003
	(0.058)	(0.063)	(0.061)	(0.065)	(0.060)	(0.065)
Depression post pregnancy (1 = yes)	-0.078	-0.021	-0.028	0.015	-0.231***	-0.225***
	(0.072)	(0.079)	(0.074)	(0.079)	(0.077)	(0.082)
Cigarettes consumption post pregnancy (1 = yes)	-0.045	-0.043	-0.017	-0.044	-0.141*	-0.167*
	(0.079)	(0.091)	(0.082)	(0.084)	(0.084)	(0.086)
Alcohol consumption post pregnancy (1 = yes)	0.013	0.114	0.065	0.070	-0.135	-0.186*
	(0.110)	(0.119)	(0.111)	(0.120)	(0.090)	(0.101)
Household's characteristics						
Father's presence in the household (1 = yes)	-0.015	-0.031	0.017	0.010	-0.008	-0.036
	(0.062)	(0.067)	(0.063)	(0.065)	(0.066)	(0.069)
Income per capita (CLP Thousands 2010)	0.000	0.000	0.000	-0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Receives SUF government subsidy (1 = yes)	-0.116**	-0.146**	-0.227***	-0.274***	0.003	0.090
	(0.057)	(0.063)	(0.060)	(0.063)	(0.063)	(0.068)
Area (1 = urban)	-0.001	-0.029	0.060	0.072	-0.032	0.007
	(0.101)	(0.101)	(0.095)	(0.100)	(0.098)	(0.111)
Constant	-3.891	-0.806	-1.951	1.697	-2.670	-6.247
	(5.260)	(6.259)	(5.360)	(6.076)	(5.792)	(6.454)
Observations	1,400	1,400	1,400	1,400	1,400	1,400
R^2	0.280		0.219		0.249	
Partial R^2		0.012		0.012		0.012
F-statistic (first stage)		17.406		17.406		17.406
DWH endogeneity test p-value		0.026		0.048		0.115

Author's own elaboration based on ELPI 2010 and 2012. Robust standard errors in parentheses. Control variables also include child's age in months in 2010 and 2012, their respective squares, and dummy variables for month of evaluation in 2012. OLS controls also include municipality of residence in 2010. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A.3: Effects of childcare center attendance - Low-educated mothers (TADI dimensions)

	TADI							
	Cognitive		Language		Motor		Socio-emotional	
	(1) OLS	(2) IV	(3) OLS	(4) IV	(5) OLS	(6) IV	(7) OLS	(8) IV
Variable of interest								
Attended between waves (1 = yes)	0.192***	0.797	0.175***	1.394***	0.260***	0.796	0.234***	1.026**
	(0.055)	(0.496)	(0.056)	(0.538)	(0.056)	(0.485)	(0.057)	(0.510)
Child's characteristics								
Battelle communication 2010 (z-score)	0.127***	0.158***	0.135***	0.191***	0.096***	0.122***	0.116***	0.145***
	(0.033)	(0.036)	(0.032)	(0.041)	(0.034)	(0.037)	(0.035)	(0.039)
Battelle cognitive 2010 (z-score)	0.006	-0.004	0.006	-0.015	0.022	0.014	-0.017	-0.029
	(0.032)	(0.034)	(0.034)	(0.039)	(0.034)	(0.034)	(0.034)	(0.036)
Battelle socio-personal 2010 (z-score)	-0.035	-0.015	-0.007	-0.009	0.009	0.016	0.020	0.016
	(0.032)	(0.032)	(0.032)	(0.037)	(0.034)	(0.032)	(0.033)	(0.033)
Child's sex (1 = female)	0.058	0.065	0.111**	0.153**	0.154***	0.172***	0.201***	0.225***
	(0.052)	(0.057)	(0.053)	(0.065)	(0.054)	(0.058)	(0.054)	(0.061)
Indigenous descent (1 = yes)	-0.120	-0.217***	-0.169*	-0.177**	-0.186*	-0.206**	-0.136	-0.248***
	(0.086)	(0.078)	(0.088)	(0.088)	(0.098)	(0.089)	(0.088)	(0.082)
Premature child (1 = yes)	-0.006	-0.008	0.066	0.016	0.029	0.037	0.117	0.066
	(0.107)	(0.115)	(0.110)	(0.126)	(0.098)	(0.101)	(0.098)	(0.107)
Mother's characteristics								
Mother's age (years)	0.008*	0.011**	0.007*	0.013**	-0.002	-0.001	0.010**	0.015***
	(0.004)	(0.005)	(0.004)	(0.005)	(0.004)	(0.005)	(0.004)	(0.005)
Mother's schooling (years)	0.058***	0.044***	0.031**	0.013	0.027**	0.023	0.017	0.010
	(0.012)	(0.014)	(0.013)	(0.017)	(0.013)	(0.014)	(0.013)	(0.015)
WAIS Numeric	0.018	0.021*	0.026**	0.038***	0.011	0.013	0.016	0.023*
	(0.011)	(0.012)	(0.012)	(0.013)	(0.012)	(0.012)	(0.012)	(0.013)
WAIS Vocabulary	0.022**	0.025***	0.012	0.015	0.003	0.009	0.020**	0.022**
	(0.009)	(0.009)	(0.009)	(0.010)	(0.010)	(0.009)	(0.009)	(0.009)
Working at childbirth (1 = yes)	-0.009	0.081	-0.010	0.066	-0.035	0.006	-0.053	0.024
	(0.060)	(0.059)	(0.059)	(0.068)	(0.061)	(0.061)	(0.063)	(0.066)
Depression post pregnancy (1 = yes)	-0.070	-0.042	-0.089	-0.031	0.027	0.078	-0.115	-0.067
	(0.072)	(0.072)	(0.072)	(0.086)	(0.076)	(0.075)	(0.079)	(0.078)
Cigarettes consumption post pregnancy (1 = yes)	-0.068	-0.048	-0.079	-0.084	-0.022	-0.034	0.024	0.025
	(0.079)	(0.081)	(0.084)	(0.098)	(0.082)	(0.085)	(0.080)	(0.087)
Alcohol consumption post pregnancy (1 = yes)	-0.051	0.016	0.109	0.207	-0.034	0.079	0.017	0.066
	(0.110)	(0.116)	(0.115)	(0.130)	(0.112)	(0.107)	(0.107)	(0.115)
Household's characteristics								
Father's presence in the household (1 = yes)	-0.040	-0.059	-0.018	0.000	-0.024	-0.050	0.031	0.007
	(0.061)	(0.061)	(0.063)	(0.072)	(0.067)	(0.066)	(0.066)	(0.068)
Income per capita (CLP Thousands 2010)	0.000	0.000	0.000	-0.000	-0.000	-0.000	0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Receives SUF government subsidy (1 = yes)	-0.136**	-0.162***	-0.101*	-0.138**	-0.047	-0.066	-0.087	-0.103*
	(0.060)	(0.059)	(0.061)	(0.070)	(0.060)	(0.062)	(0.060)	(0.063)
Area (1 = urban)	-0.043	0.045	0.113	-0.044	-0.179*	-0.125	0.097	0.024
	(0.102)	(0.096)	(0.104)	(0.110)	(0.099)	(0.098)	(0.098)	(0.098)
Constant	-0.904	0.165	-1.741	2.767	-8.275	-8.604	-1.937	2.623
	(5.430)	(5.884)	(5.592)	(6.806)	(5.348)	(6.028)	(5.513)	(6.443)
Observations	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400
R^2	0.258		0.223		0.215		0.225	
Partial R^2		0.012		0.012		0.012		0.012
F-statistic (first stage)		17.406		17.406		17.406		17.406
DWH endogeneity test p-value		0.202		0.006		0.216		0.075

Author's own elaboration based on ELPI 2010 and 2012. Robust standard errors in parentheses. Control variables also include child's age in months in 2010 and 2012, their respective squares, and dummy variables for month of evaluation in 2012. OLS controls also include municipality of residence in 2010. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A.4: Effects of childcare center attendance - Interaction terms

	TADI						
	Total	Cognitive	Language	Motor	Socio-emotional	PPVT	CBCL
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variable of interest							
Attendance to center-based care for boys with high-educated mothers	0.051	0.249	0.029	-0.105	-0.015	0.034	-0.186
	(0.156)	(0.175)	(0.163)	(0.176)	(0.165)	(0.176)	(0.150)
Attendance to center-based care for boys with low-educated mothers	0.233***	0.106	0.127*	0.275***	0.249***	0.053	-0.037
	(0.074)	(0.076)	(0.075)	(0.078)	(0.075)	(0.073)	(0.080)
Attendance to center-based care for girls with high-educated mothers	0.231	0.189	-0.042	0.217	0.383**	0.057	-0.077
	(0.163)	(0.162)	(0.158)	(0.169)	(0.160)	(0.171)	(0.138)
Attendance to center-based care for girls with low-educated mothers	0.276***	0.253***	0.201***	0.237***	0.200***	0.212***	-0.064
	(0.072)	(0.072)	(0.075)	(0.074)	(0.076)	(0.074)	(0.072)
Categories							
Boys with low-educated mothers	-0.119	0.113	-0.084	-0.162	-0.257*	-0.040	-0.214
	(0.145)	(0.165)	(0.148)	(0.170)	(0.152)	(0.159)	(0.144)
Girls with high-educated mothers	0.111	0.191	0.203	0.019	-0.057	0.193	0.016
	(0.184)	(0.198)	(0.181)	(0.208)	(0.182)	(0.202)	(0.168)
Girls with low-educated mothers	0.008	0.077	-0.022	0.001	-0.032	0.003	-0.069
	(0.146)	(0.166)	(0.151)	(0.169)	(0.154)	(0.159)	(0.144)
Child's characteristics							
Battelle communication 2010 (z-score)	0.135***	0.122***	0.125***	0.091***	0.097***	0.083***	-0.026
	(0.029)	(0.029)	(0.029)	(0.030)	(0.031)	(0.030)	(0.029)
Battelle cognitive 2010 (z-score)	0.010	0.020	-0.007	0.012	0.008	0.013	0.016
	(0.029)	(0.029)	(0.030)	(0.030)	(0.030)	(0.029)	(0.028)
Battelle socio-personal 2010 (z-score)	0.013	-0.012	0.011	0.021	0.021	0.007	0.093***
	(0.029)	(0.029)	(0.030)	(0.030)	(0.030)	(0.029)	(0.031)
Indigenous descent (1 = yes)	-0.204**	-0.147*	-0.235***	-0.138	-0.138*	-0.137*	-0.065
	(0.080)	(0.080)	(0.084)	(0.091)	(0.079)	(0.082)	(0.086)
Premature child (1 = yes)	0.016	-0.011	0.056	-0.067	0.068	-0.027	0.065
	(0.094)	(0.097)	(0.102)	(0.086)	(0.093)	(0.093)	(0.087)
Mother's characteristics							
Mother's age (years)	0.003	0.004	0.002	-0.002	0.007*	0.011***	0.010***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Mother's schooling (years)	0.035***	0.049***	0.026**	0.026**	0.011	0.050***	0.015
	(0.012)	(0.011)	(0.012)	(0.012)	(0.012)	(0.011)	(0.013)
WAIS Numeric	0.022**	0.018*	0.020*	0.013	0.019*	0.010	-0.005
	(0.010)	(0.010)	(0.010)	(0.011)	(0.010)	(0.010)	(0.010)
WAIS Vocabulary	0.017**	0.022***	0.012	0.001	0.021**	0.016*	0.035***
	(0.008)	(0.008)	(0.008)	(0.009)	(0.008)	(0.009)	(0.008)
Working at childbirth (1 = yes)	-0.020	0.027	-0.011	-0.032	-0.049	-0.054	0.059
	(0.051)	(0.052)	(0.052)	(0.053)	(0.055)	(0.053)	(0.051)
Depression post pregnancy (1 = yes)	-0.017	-0.045	-0.028	0.089	-0.065	0.018	-0.259***
	(0.065)	(0.064)	(0.067)	(0.068)	(0.068)	(0.067)	(0.065)
Cigarettes consumption post pregnancy (1 = yes)	-0.025	-0.045	-0.082	0.010	0.036	0.010	-0.093
	(0.071)	(0.072)	(0.074)	(0.077)	(0.072)	(0.076)	(0.075)
Alcohol consumption post pregnancy (1 = yes)	0.060	-0.032	0.134	0.034	0.058	0.079	-0.164**
	(0.094)	(0.096)	(0.098)	(0.094)	(0.096)	(0.101)	(0.079)
Father's presence in the household (1 = yes)	-0.036	-0.046	-0.044	-0.036	0.010	0.016	-0.040
	(0.055)	(0.055)	(0.057)	(0.058)	(0.059)	(0.057)	(0.057)
Income per capita (CLP Thousands 2010)	0.000*	0.000	0.000***	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Receives SUF government subsidy (1 = yes)	-0.121**	-0.136**	-0.111*	-0.046	-0.095*	-0.215***	-0.015
	(0.054)	(0.057)	(0.057)	(0.057)	(0.056)	(0.057)	(0.059)
Area (1 = urban)	0.036	0.033	0.125	-0.149	0.099	0.080	-0.021
	(0.093)	(0.093)	(0.095)	(0.093)	(0.091)	(0.088)	(0.089)
Constant	-6.697	-3.497	-4.461	-10.391**	-3.560	-1.871	-5.890
	(5.040)	(4.986)	(5.116)	(5.039)	(5.172)	(5.107)	(4.983)
Observations	1,758	1,758	1,758	1,758	1,758	1,758	1,758
R^2	0.264	0.244	0.212	0.189	0.210	0.224	0.243

Author's own elaboration based on ELPI 2010 and 2012. Robust standard errors in parentheses. Control variables also include child's age in months in 2010 and 2012, their respective squares, dummy variables for month of evaluation in 2012, and municipality of residence in 2010. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A.5: Effects of time spent in childcare centers - Interaction terms

	TADI						
	Total	Cognitive	Language	Motor	Socio-emotional	PPVT	CBCL
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variable of interest							
Log hours spent in center-based care for boys with high-educated mothers	0.093	0.132	0.108	-0.008	0.063	0.178*	0.002
	(0.093)	(0.097)	(0.104)	(0.087)	(0.088)	(0.104)	(0.092)
Log hours spent in center-based care for boys with low-educated mothers	0.132**	0.079	0.111*	0.165***	0.075	0.084	0.075
	(0.060)	(0.060)	(0.062)	(0.061)	(0.062)	(0.059)	(0.061)
Log hours spent in center-based care for girls with high-educated mothers	0.104	0.053	0.120	0.026	0.133	0.090	-0.035
	(0.122)	(0.130)	(0.127)	(0.118)	(0.124)	(0.128)	(0.092)
Log hours spent in center-based care for girls with low-educated mothers	0.008	0.018	-0.020	0.015	0.013	-0.022	0.044
	(0.053)	(0.052)	(0.058)	(0.054)	(0.055)	(0.053)	(0.059)
Categories							
Boys with low-educated mothers	-0.166	0.260	0.007	-0.854	0.008	0.641	-0.527
	(0.748)	(0.748)	(0.811)	(0.710)	(0.721)	(0.777)	(0.700)
Girls with high-educated mothers	0.272	0.646	0.097	0.200	-0.067	0.812	0.399
	(1.029)	(1.072)	(1.088)	(0.985)	(0.977)	(1.065)	(0.830)
Girls with low-educated mothers	0.811	0.774	0.987	0.247	0.588	1.523**	-0.199
	(0.717)	(0.717)	(0.790)	(0.680)	(0.678)	(0.766)	(0.679)
Child's characteristics							
Battelle communication 2010 (z-score)	0.164***	0.148***	0.158***	0.087**	0.133***	0.149***	0.028
	(0.041)	(0.040)	(0.041)	(0.043)	(0.044)	(0.041)	(0.042)
Battelle cognitive 2010 (z-score)	-0.029	0.002	-0.051	-0.005	-0.039	0.001	0.001
	(0.042)	(0.041)	(0.042)	(0.043)	(0.042)	(0.040)	(0.039)
Battelle socio-personal 2010 (z-score)	-0.009	-0.017	-0.002	0.002	-0.010	-0.013	0.079*
	(0.040)	(0.039)	(0.043)	(0.042)	(0.042)	(0.041)	(0.043)
Indigenous descent (1 = yes)	-0.130	-0.032	-0.202	-0.090	-0.095	-0.152	-0.045
	(0.115)	(0.116)	(0.125)	(0.127)	(0.109)	(0.120)	(0.126)
Mother's characteristics							
Mother's age (years)	0.009*	0.008	0.006	0.004	0.010**	0.010*	0.013**
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Mother's schooling (years)	0.019	0.027	0.010	0.012	0.012	0.052***	0.002
	(0.019)	(0.018)	(0.020)	(0.019)	(0.018)	(0.018)	(0.020)
WAIS Numeric	0.023	0.031**	0.017	0.001	0.023*	0.015	-0.005
	(0.014)	(0.014)	(0.015)	(0.015)	(0.014)	(0.014)	(0.013)
WAIS Vocabulary	0.020*	0.020*	0.020*	-0.002	0.024**	0.038***	0.044***
	(0.011)	(0.012)	(0.012)	(0.012)	(0.011)	(0.012)	(0.012)
Working at childbirth (1 = yes)	0.022	0.051	0.005	0.012	0.001	-0.154**	0.127*
	(0.069)	(0.069)	(0.072)	(0.072)	(0.074)	(0.074)	(0.070)
Depression post pregnancy (1 = yes)	0.025	-0.025	0.005	0.154	-0.045	-0.024	-0.206**
	(0.094)	(0.089)	(0.097)	(0.094)	(0.099)	(0.095)	(0.093)
Cigarettes consumption post pregnancy (1 = yes)	-0.094	-0.030	-0.152	-0.120	-0.005	-0.007	-0.045
	(0.106)	(0.101)	(0.111)	(0.109)	(0.105)	(0.116)	(0.107)
Alcohol consumption post pregnancy (1 = yes)	0.027	-0.144	0.123	0.161	-0.045	0.114	-0.239**
	(0.146)	(0.142)	(0.151)	(0.146)	(0.145)	(0.140)	(0.108)
Household's characteristics							
Father's presence in the household (1 = yes)	-0.052	-0.030	-0.047	-0.088	-0.004	-0.007	-0.074
	(0.079)	(0.078)	(0.083)	(0.081)	(0.084)	(0.079)	(0.080)
Income per capita (CLP Thousands 2010)	0.000**	0.000**	0.000**	0.001**	0.000	0.000	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Receives SUF government subsidy (1 = yes)	-0.192**	-0.162**	-0.179**	-0.054	-0.220***	-0.278***	-0.036
	(0.076)	(0.082)	(0.083)	(0.081)	(0.078)	(0.080)	(0.086)
Area (1 = urban)	0.160	0.107	0.307*	-0.075	0.169	0.145	-0.265*
	(0.158)	(0.153)	(0.169)	(0.151)	(0.146)	(0.138)	(0.140)
Constant	-2.666	1.895	-0.496	-6.845	-3.428	-0.402	-18.083**
	(8.231)	(7.692)	(8.648)	(7.626)	(8.272)	(8.190)	(7.297)
Observations	974	974	974	974	974	974	974
R^2	0.297	0.270	0.251	0.241	0.243	0.268	0.272

Author's own elaboration based on ELPI 2010 and 2012. Robust standard errors in parentheses. Control variables also include child's age in months in 2010 and 2012, their respective squares, dummy variables for month of evaluation in 2012, and municipality of residence in 2010. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.