Comprehensive Early Childhood Development Support Systems and Academic Achievement

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Comprehensive Support Systems

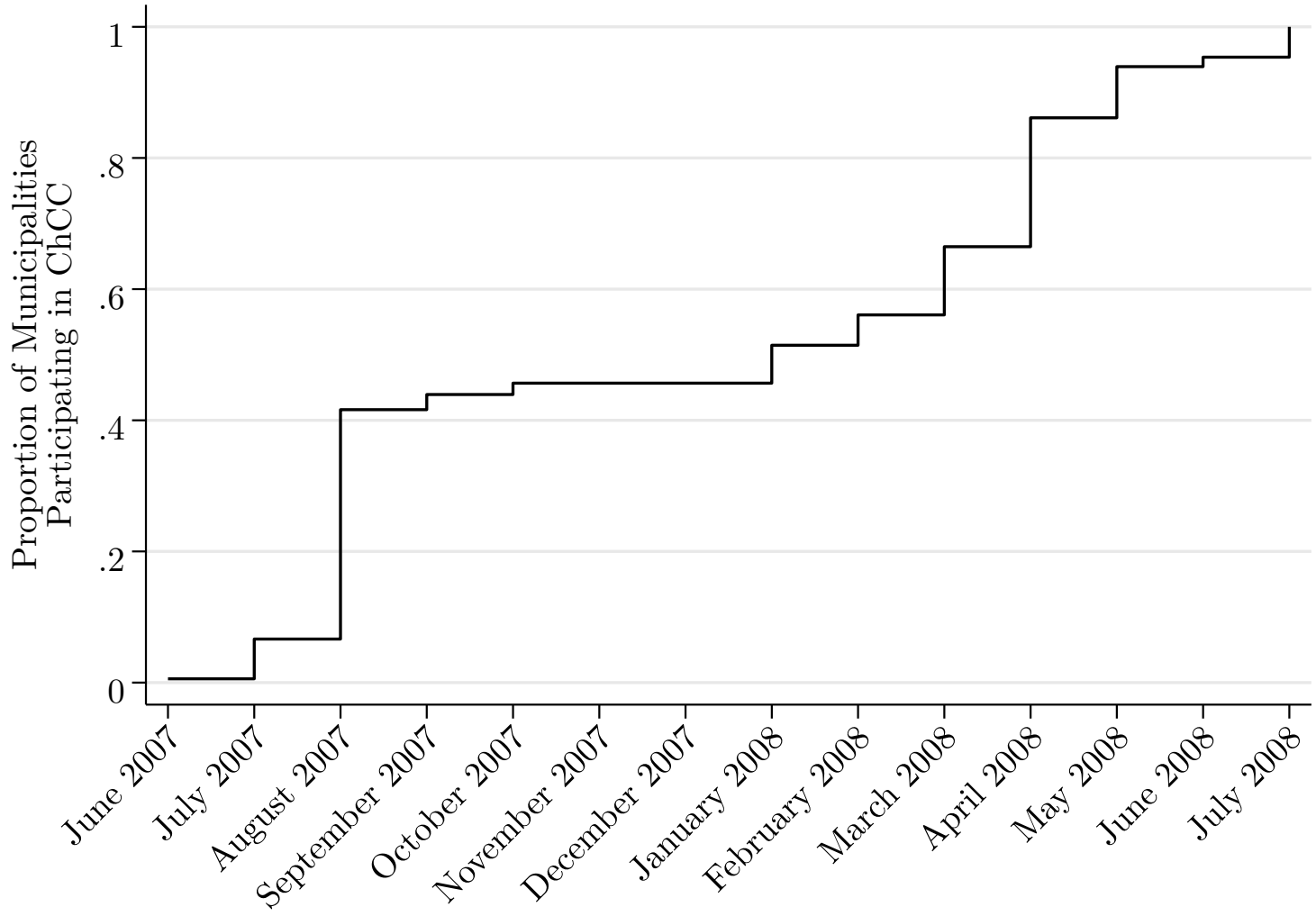
- Early childhood interventions aims to reduce early inequalities.
- Shonkoff and Philips (2000): fragmented + multiple entry points $\Rightarrow$ inconsistent early **detection** systems and lack of **complementarity** of interventions to solve complex problems.
- **Comprehensive support systems** Array of early detection systems and array of services for children and their families.
- 2007: **Chile Crece Contigo** (*Chile Grows with You*)

Chile Crece Contigo Institutional Background

- Objective: *promote the development of children who participate in the public health network*
- Target Population: all children and their families from gestation until the first years of schooling.
- Changes introduced:
  - Introduce **coordination** of all services for children and their mothers from age zero to five.
  - Supply of services **expanded** with the focus changed from biomedical to bio-psychosocial approach.
- ChCC offers multiple services to all children that attends the public health system, but some services are offered only based on need.
- Gradual Implementation: June 2007 - July 2008

▸ Services Provided ▸ Annual Budget

Chile Crece Contigo Rollout



This paper

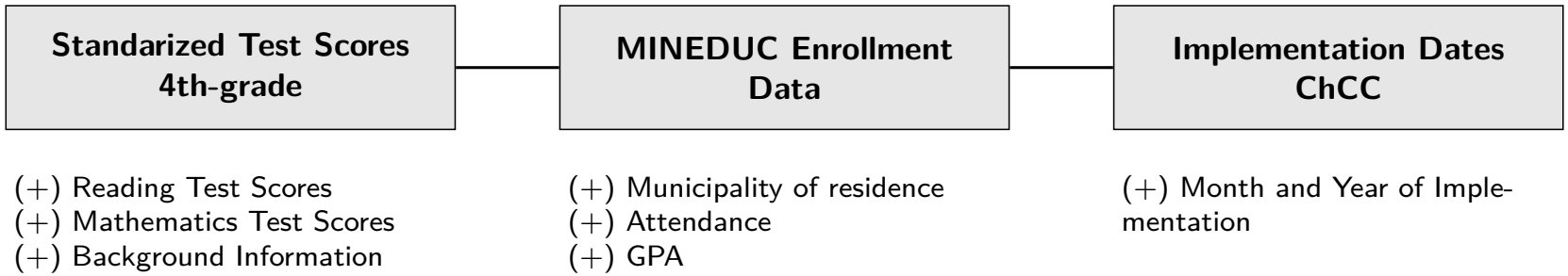
Research Question

What are the long-term effects of exposure to the comprehensive support system in human capital accumulation?

- Main results:
  - Exposed since gestation vs Non-eligible: 0.25SD in mathematics and 0.30SD language standardized test scores.
  - Heterogeneous returns and heterogeneous exposure
    - ★ Male recipients have higher returns to exposure than female recipients.
    - ★ Referral mechanism partially explains these differences.
- Main contributions:
  - Contributes to the existing literature on the effects of early childhood interventions later in school outcomes.
  - Provides evidence of the returns of comprehensive support systems
  - Contributes to the limited evidence of Chile Crece Contigo.

Data

- Combines three sources of data: Ministry of Education, Quality of Education Agency and Ministry of Social Development.
- Seven cohorts of first-time 4th graders (2012-2018) in public or private subsidized schools
- Born between July 2001 and June 2009.



▸ Descriptive Statistics

Empirical Strategy: Measuring Exposure to ChCC

- Leverage institutional implementation: (i) gradual roll-out of the policy and (ii) only children younger than 60 months eligible.
- Child i who lived in municipality m born in period t had A_{imt} when ChCC was implemented

$$A_{imt} = t - E_{mt}$$

.

- Level of exposure D_{imt}

$$D_{imt} = \begin{cases} 1 & \text{if } A_{imt} < -8 \\ (67 - A_{imt})/67 & \text{if } -8 < A_{imt} < 60 \\ 0 & \text{if } A_{imt} \geq 60 \end{cases} \quad (1)$$

▸ Exposure Distribution

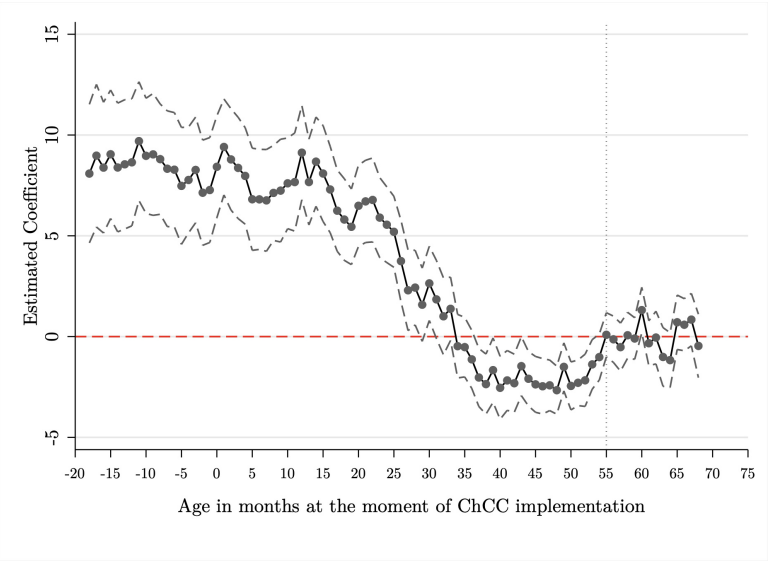
Empirical Model: Cumulative Exposure Event-study design

- Event-study design

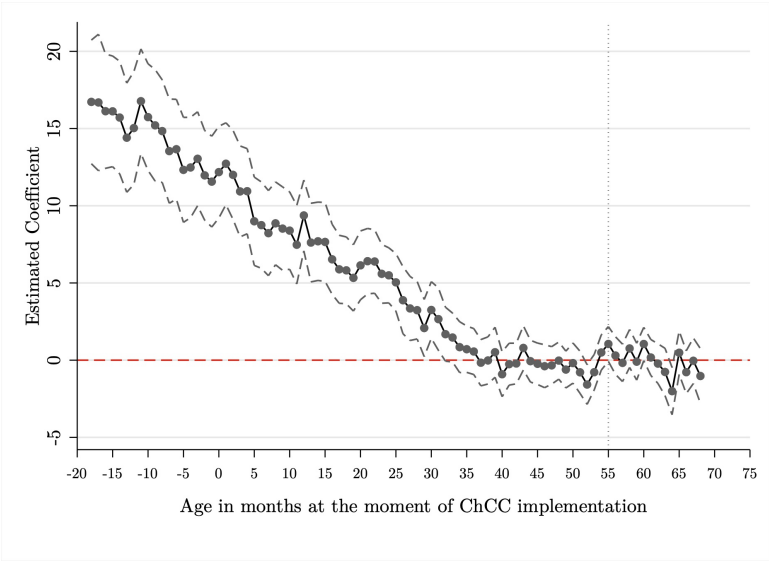
$$Y_{imt} = \alpha + \sum_{a=-18[a\neq 60]}^{70} \pi_a \mathbb{1}[A_{imt} = a] + X_{imt}\beta + \gamma_m + \tau_r t + \delta_s + \epsilon_{imt} \quad (2)$$

  Where:
  - Y_{icst}: outcome (annual attendance, language and mathematics test scores)
  - X_{ics}: vector of control variables: maternal schooling, and gender and age of the student (in months).
  - γ_m: municipality time-invariant effects.
  - δ_s: school time-invariant effects.
  - $\theta_r \times t$: regional month-of-birth trends
  - ϵ_{imst}: error term clustered at municipality level.
- This models allow me to estimate difference only "from above" (Hoynes et al. (2016),Bailey et al. (2021),Bailey et al. (2020))

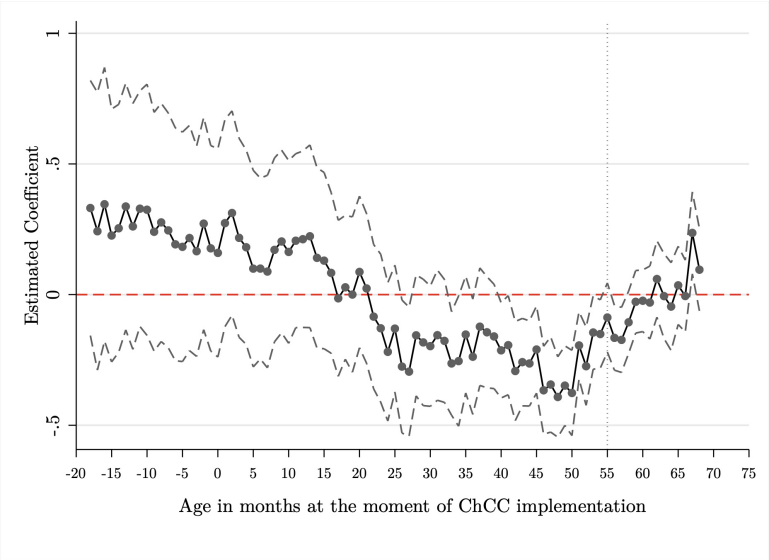
Event Study Parameters, full sample



(a) Mathematics

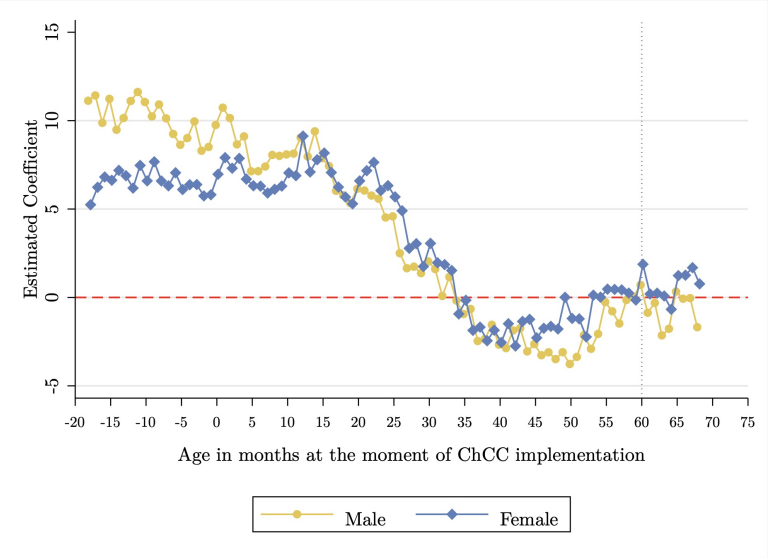


(b) Language

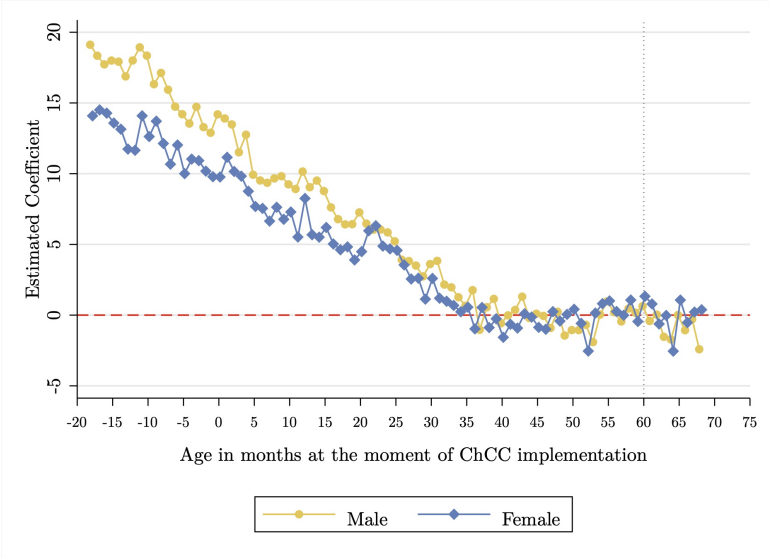


(c) Annual Attendance

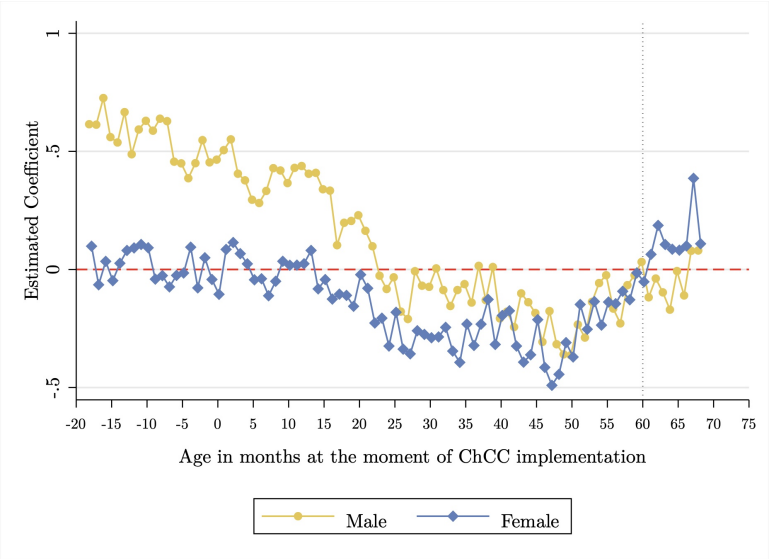
Event Study Parameters, by student gender



(a) Mathematics



(b) Language



(c) Annual Attendance

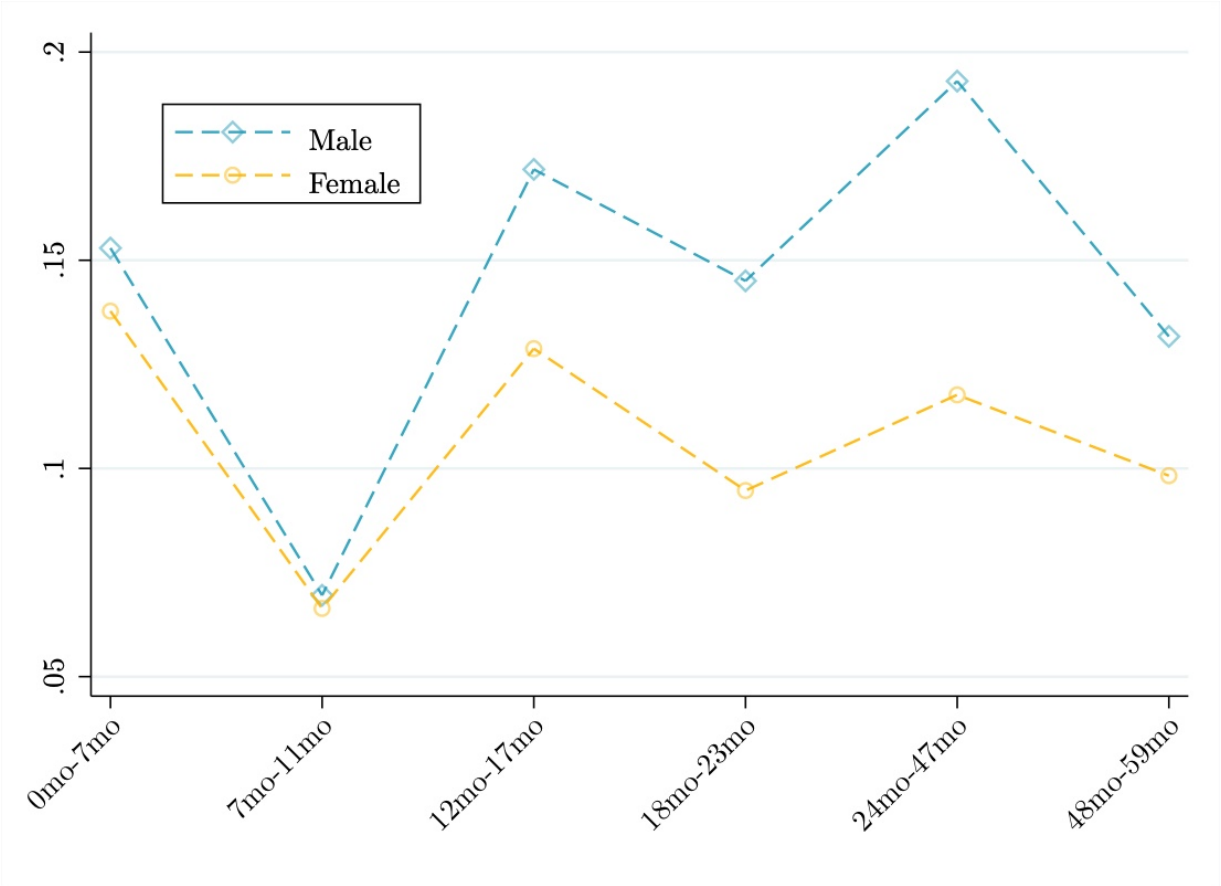
Gender Differences (cont)

- Previous research have shown higher returns for girls compared to boys (Conti et al., 2019; García et al., 2018; Magnuson et al., 2016; Heckman et al., 2013).
- If $\hat{\pi}_a^j = Pr(N = 1|j) \times \Delta^j$ for $j = M, F$
- Then, from the previous results,

$$\begin{aligned} \hat{\pi}_a^M - \hat{\pi}_a^F = Pr(N = 1|M)\Delta^M - Pr(N = 1|F)\Delta^F &> 0 \\ \underbrace{\frac{Pr(N = 1|M)}{Pr(N = 1|F)}}_{>1} \frac{\Delta^M}{\Delta^F} &> 1 \end{aligned}$$

- If $Pr(N = 1|M) > Pr(N = 1|F)$ it is possible have higher returns for female recipients but exposure returns higher for male recipients.

Ratio of Tested Children Referred to Stimulation Services, by gender and age



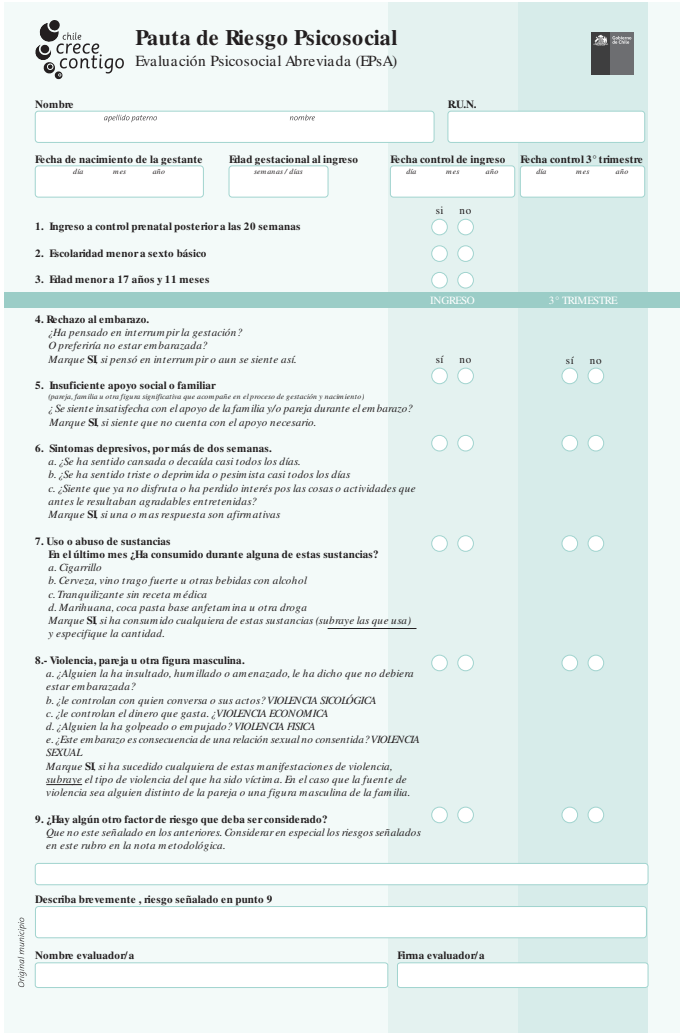
Note: Author's calculation based on the 2018 Monthly Statistical Reports from the Chilean Department of Health Statistics and Indicators (DEIS). Each point represents the proportion of children that a psycho-motor screening test was applied and receive a referral to assist to stimulation services. This can be calculated based on the sum of service code 06902601, 06902602, and 06902603 divided service code 02021740 for each age and gender group.

Conclusion

- Children exposed since the prenatal period have returns of 0.25σ in mathematics and 0.3σ in language.
- Returns concentrate in the first 36 months of age.
- Male recipients have 50% higher returns in mathematics and 30% in language when exposed before 12 months of age.
- Intensity of treatment is higher for male recipients (need-based services).

Thank you

Bio-psychosocial evaluation applied during prenatal care stage



chile crece contigo

Pauta de Riesgo Psicosocial

Evaluación Psicosocial Abreviada (EPsA)

Nombre (apellido paterno, nombre) **R.U.N.**

Fecha de nacimiento de la gestante (día mes año) **Edad gestacional al ingreso** (semanas / días) **Fecha control de ingreso** (día mes año) **Fecha control 3° trimestre** (día mes año)

	si	no	INGRESO		3° TRIMESTRE	
1. Ingreso a control prenatal posterior a las 20 semanas	○	○				
2. Escolaridad menor a sexto básico	○	○				
3. Edad menor a 17 años y 11 meses	○	○				

	sí	no	sí	no
4. Rechazo al embarazo. *¿Ha pensado en interrumpir la gestación? O preferiría no estar embarazada? Marque SI si pensó en interrumpir o aun se siente así.*	○	○	○	○
5. Insuficiente apoyo social o familiar *(pareja, familia u otra figura significativa que acompañe en el proceso de gestación y nacimiento) ¿ Se siente insatisfecha con el apoyo de la familia y/o pareja durante el embarazo? Marque SI si siente que no cuenta con el apoyo necesario.*	○	○	○	○
6. Síntomas depresivos, por más de dos semanas. *a. ¿Se ha sentido cansada o decaída casi todos los días. b. ¿Se ha sentido triste o deprimida o pesimista casi todos los días c. ¿Siente que ya no disfruta o ha perdido interés pos las cosas o actividades que antes le resultaban agradables entretenidas? Marque SI si una o mas respuesta son afirmativas*	○	○	○	○
7. Uso o abuso de sustancias **En el último mes ¿Ha consumido durante alguna de estas sustancias?** *a. Cigarrillo b. Cerveza, vino trago fuerte u otras bebidas con alcohol c. Tranquilizante sin receta médica d. Marihuana, coca pasta base anfetamina u otra droga Marque SI si ha consumido cualquiera de estas sustancias (subraye las que usa) y especifique la cantidad.*	○	○	○	○
8.- Violencia, pareja u otra figura masculina. *a. ¿Alguien la ha insultado, humillado o amenazado, le ha dicho que no debiera estar embarazada? b. ¿le controlan con quien conversa o sus actos? VIOLENCIA SICOLÓGICA c. ¿le controlan el dinero que gasta. ¿VIOLENCIA ECONOMICA d. ¿Alguien la ha golpeado o empujado? VIOLENCIA FISICA e. ¿Este embarazo es consecuencia de una relación sexual no consentida? VIOLENCIA SEXUAL Marque SI si ha sucedido cualquiera de estas manifestaciones de violencia, subraye el tipo de violencia del que ha sido víctima. En el caso que la fuente de violencia sea alguien distinto de la pareja o una figura masculina de la familia.*	○	○	○	○
9. ¿Hay algún otro factor de riesgo que deba ser considerado? *Que no este señalado en los anteriores. Considerar en especial los riesgos señalados en este rubro en la nota metodológica.*	○	○	○	○

Describa brevemente , riesgo señalado en punto 9

Nombre evaluador/a **Firma evaluador/a**

Original municipio

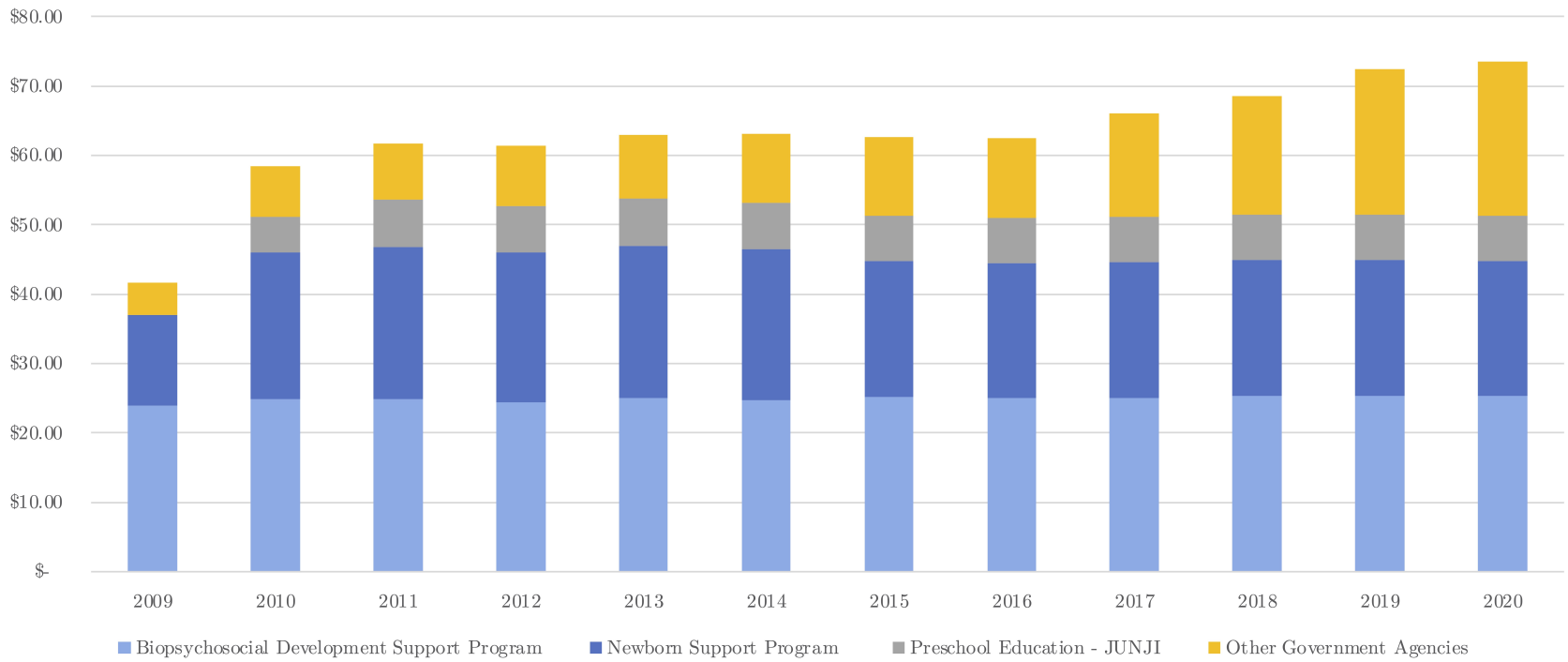
Services Provided by ChCC

Three main components:

- Newborn Support Program (PARN)
  - Materials (trousseau) and educational workshops about newborn care and basics of early parenting and respectful parenting
  - Annual Budget (2019): $19.61M USD (107 USD per beneficiary)
- Biopsychosocial Development Support Program (PADB)
  - Main program in ChCC ("Programa Eje")
  - Detection Instruments + Interventions + Nutrition
  - Annual Budget (2019): 25.36M USD (46 USD per beneficiary)
- Mental Health Support Program (PASMI)
  - Target population: 5-9 years old
  - Screening services and interventions to detect and support the alterations in the socio-emotional development

▸ Background

Chile Crece Contigo Annual Budget



Note: Figure based on the annual budget report by the Chilean Budget Office. The amount are in US dollars of October 2021.

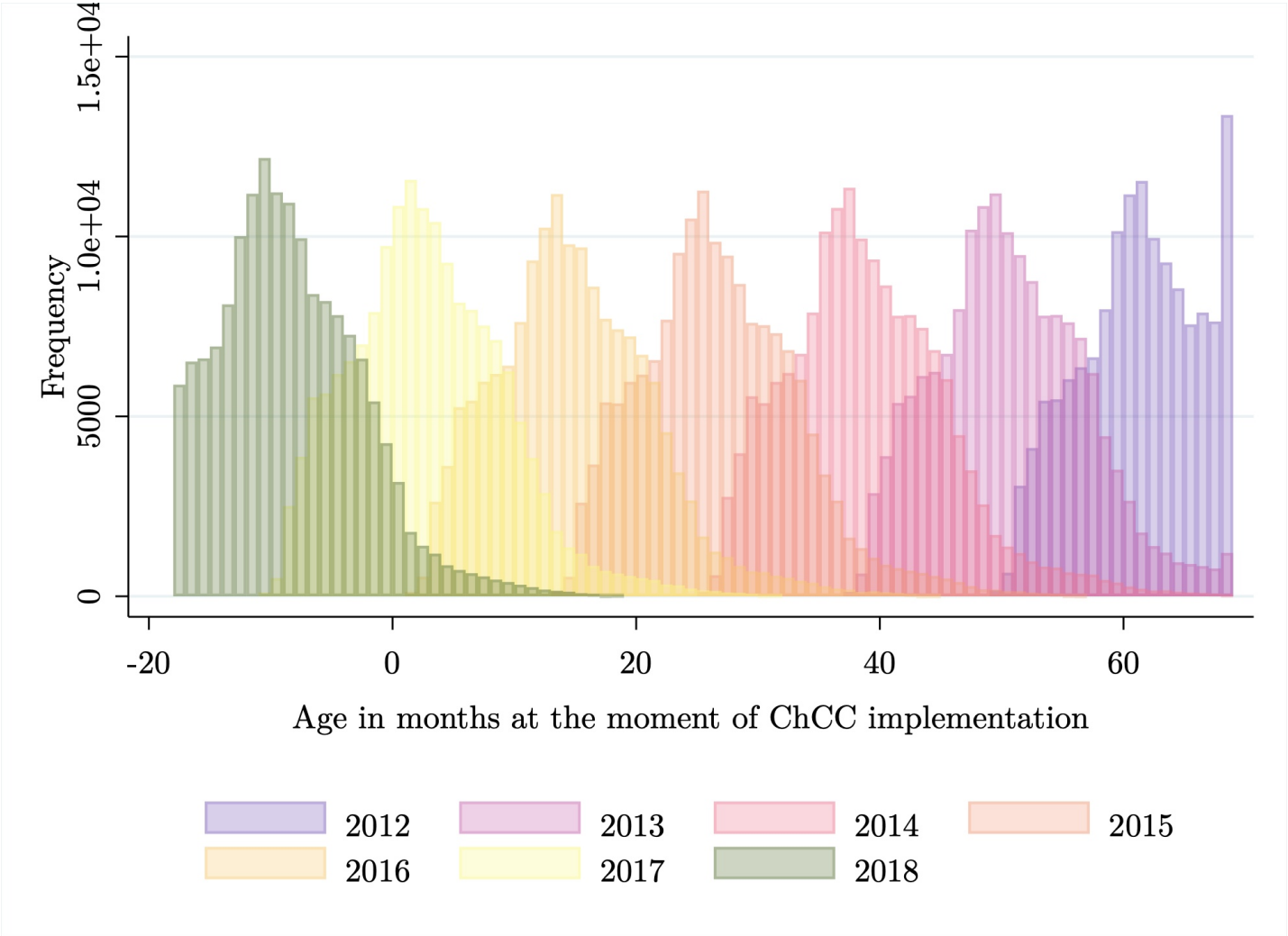
▸ Background

Descriptive Statistics

	Full-Sample		Low-SES Sample		Fully Exposed		Not Exposed	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Outcomes								
Attendance	93.20	(5.89)	92.91	(6.21)	93.53	(5.70)	93.03	(6.19)
Language	266.04	(51.09)	258.98	(50.78)	270.50	(52.44)	263.45	(51.89)
Mathematics	260.76	(48.10)	253.71	(48.02)	261.99	(46.83)	259.07	(50.07)
Background Characteristics								
Gender (Male=1)	0.50	(0.50)	0.49	(0.50)	0.48	(0.50)	0.52	(0.50)
Attended PreK	0.88	(0.33)	0.85	(0.35)	0.90	(0.30)	0.79	(0.41)
Attended Kindergarten	0.95	(0.22)	0.93	(0.25)	0.94	(0.24)	0.89	(0.31)
Mother MS Dropout	0.09	(0.28)	0.13	(0.33)	0.06	(0.23)	0.13	(0.34)
Mother HS Dropout	0.23	(0.42)	0.30	(0.46)	0.19	(0.39)	0.28	(0.45)
Mother HS Graduate	0.38	(0.49)	0.38	(0.49)	0.42	(0.49)	0.36	(0.48)
Mother College Dropout	0.11	(0.31)	0.08	(0.28)	0.09	(0.29)	0.07	(0.25)
Mother Two-Year College	0.11	(0.32)	0.07	(0.26)	0.14	(0.35)	0.10	(0.30)
Mother Four-Year College	0.08	(0.28)	0.03	(0.17)	0.10	(0.30)	0.06	(0.23)
Low SES	0.51	(0.50)	1.00	(0.00)	0.51	(0.50)	0.50	(0.50)
Age	9.58	(0.58)	9.60	(0.60)	9.51	(0.51)	9.82	(0.66)
N	1,148,296		584,716		215,796		124,089	

▸ Data

Cumulative Distribution of Exposure to ChCC IU-5, by year of birth



▸ Empirical Strategy

Empirical Model: Linear Cumulative Exposure

- Based on Equation 1 it is possible to estimate the linear cumulative exposure effect to ChCC.
- Linear Cumulative exposure model

$$Y_{imt} = \alpha + \varphi D_{imt} + X_{imt}\beta + \gamma_m + \tau_r t + \delta_s + \epsilon_{imt} \tag{3}$$

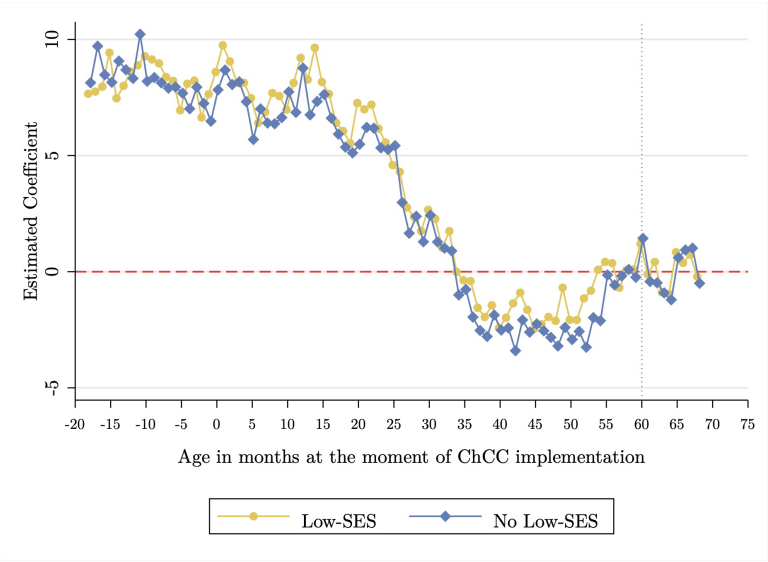
Where:

- Y_{icst}: outcome (annual attendance, language and mathematics test scores)
- X_{ics}: vector of control variables: maternal schooling, and gender and age of the student.
- γ_m: municipality time-invariant effects.
- δ_s: school time-invariant effects.
- $\theta_r \times t$: regional month-of-birth trends
- ϵ_{imst}: error term clustered at municipality level.

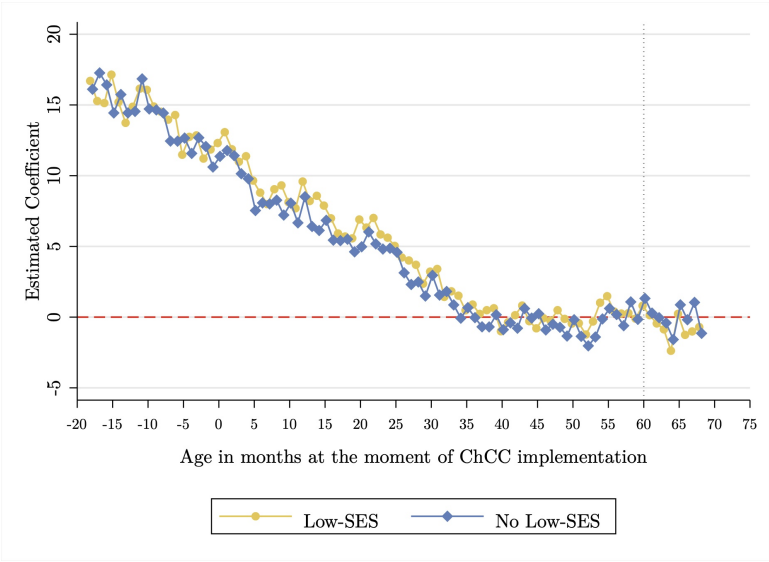
Estimation Results of Cumulative Exposure to ChCC on Educational Achievement

	Attendance	Language	Mathematics
Exposure to ChCC IU-5	1.069	8.457	12.708
	(0.179)***	(1.557)***	(1.105)***
Low SES	-0.729	-4.527	-3.335
	(0.030)***	(0.116)***	(0.107)***
Gender (Male=1)	-0.071	-8.846	3.758
	(0.011)***	(0.163)***	(0.151)***
Mother HS Dropout	-0.238	3.754	3.946
	(0.028)***	(0.208)***	(0.186)***
Mother HS Graduate	0.294	10.780	10.914
	(0.032)***	(0.231)***	(0.248)***
Mother College Dropout	-0.312	14.234	13.173
	(0.041)***	(0.292)***	(0.280)***
Mother Two-Year College	0.264	14.972	14.123
	(0.037)***	(0.313)***	(0.322)***
Mother Four-Year College	0.140	22.192	20.359
	(0.040)***	(0.407)***	(0.403)***
R2	0.15	0.16	0.23
N	1,148,296	1,148,296	1,148,296
Municipality Dummy	Yes	Yes	Yes
Age Polynomial	Yes	Yes	Yes
School Dummy	Yes	Yes	Yes
Region Month of Birth Trends	Yes	Yes	Yes

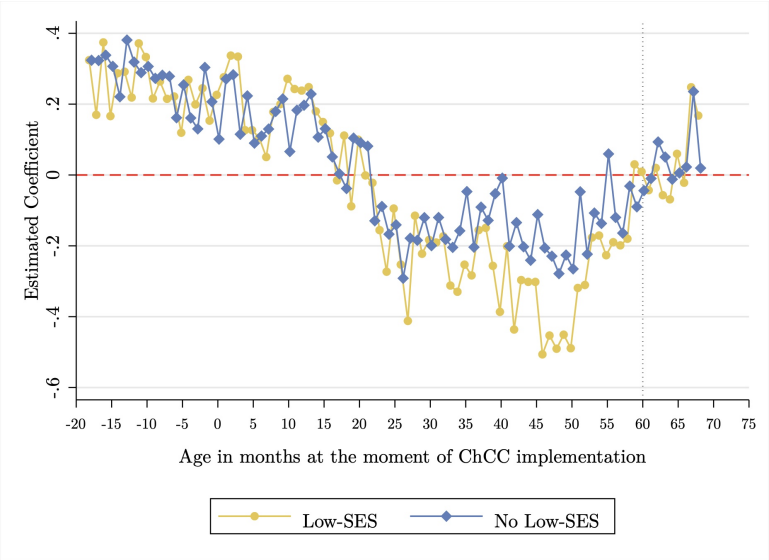
Event Study Parameters, by low-SES classification



(a) Mathematics



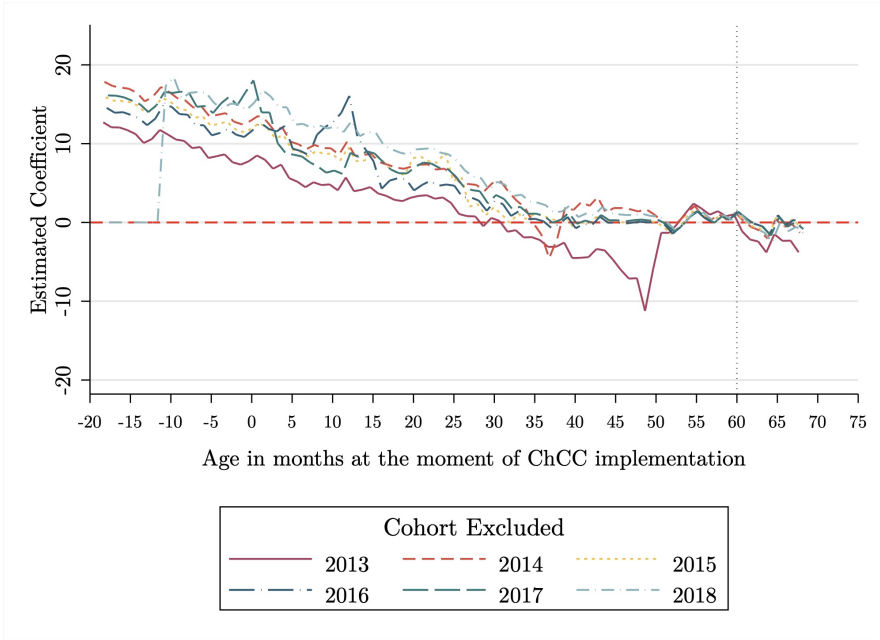
(b) Language



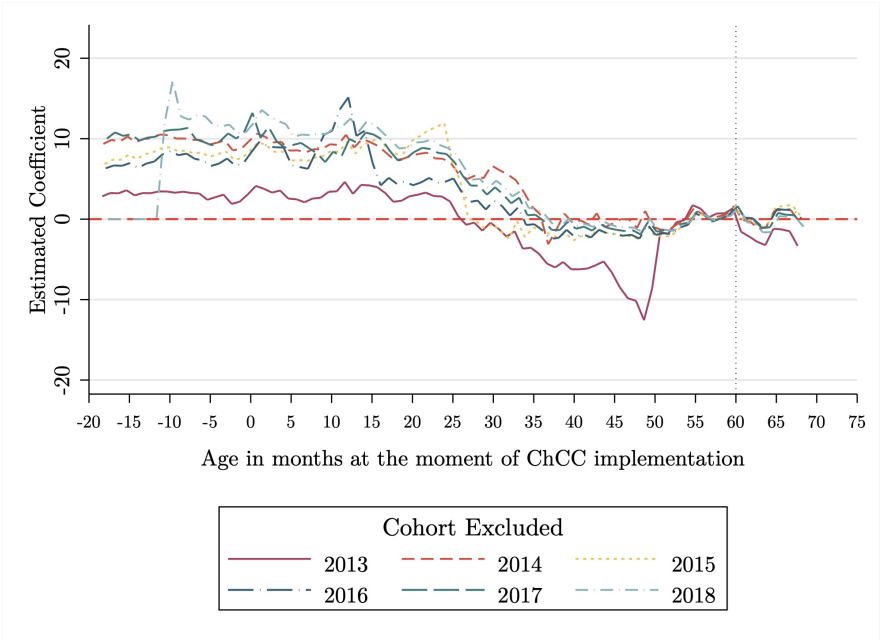
(c) Annual Attendance

Sensitivity Analysis: Cohort Exclusion

Figure: Event-study estimations excluding cohorts



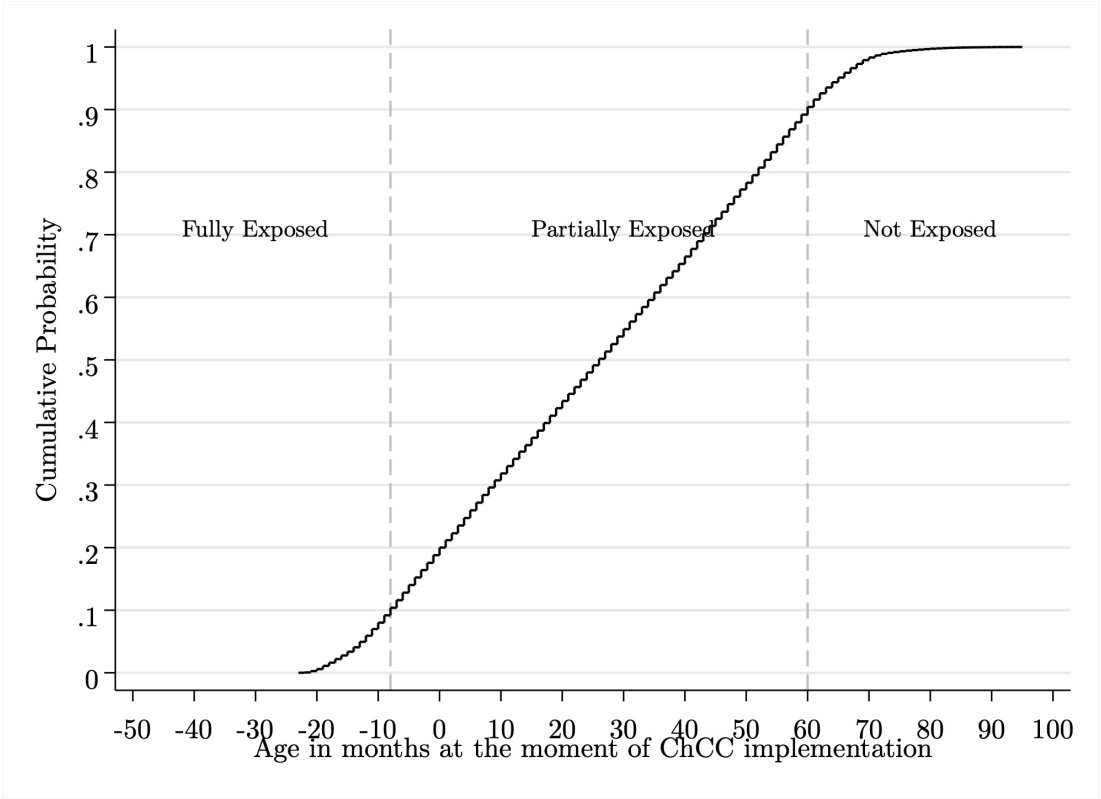
(a) Language



(b) Mathematics

▸ Event-Study Results

Distribution of Age at Implementation of ChCC



Note: The figure shows the distribution of the age of the child at the moment when ChCC was implemented A_{mt}. The implementation dates used to calculate this are the ones reported by from the Ministry of Social Development.

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