Supplementary online material

Center-based care is a significant predictor of lower body mass index in early childhood: Longitudinal evidence from Chile

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i) Model specification A: Propensity score matching estimation.

Propensity score matching estimation: Logit model to determine the propensity score

$$1.\text{- ATT: } (\delta_1) = E(\text{BMI}_{1i} - \text{BMI}_{0i})|\, CBC_i = 1$$

$$2.\text{- } P(CBC = 1|X_i, \ldots, X_n) = \frac{e^{(\alpha+\beta_k X_{ij})}}{1+ e^{(\alpha+\beta_k X_{ij})}} \;;$$

Then the scores obtained were used as weights as the following:

$$\text{Treated case weight} = \frac{1}{\text{PS}}$$

$$\text{Untreated case weight} = \frac{1}{1-\text{PS}}$$

Notes: CBC: center-based care, PS: propensity score, ATT: average treatment effect on the treated

ii) Model specification B: Logistic regression.

We used a logistic regression (Eq. 4) to estimate the probability of a child being overweight at follow-up (dichotomous variable, child was overweight=1, otherwise=0). β_k shows the change associated to a unit increase in the covariate "*k*" on the log odds of the probability of being overweight, or an $e^{\beta k}$ change in the odds of the probability of being overweight:

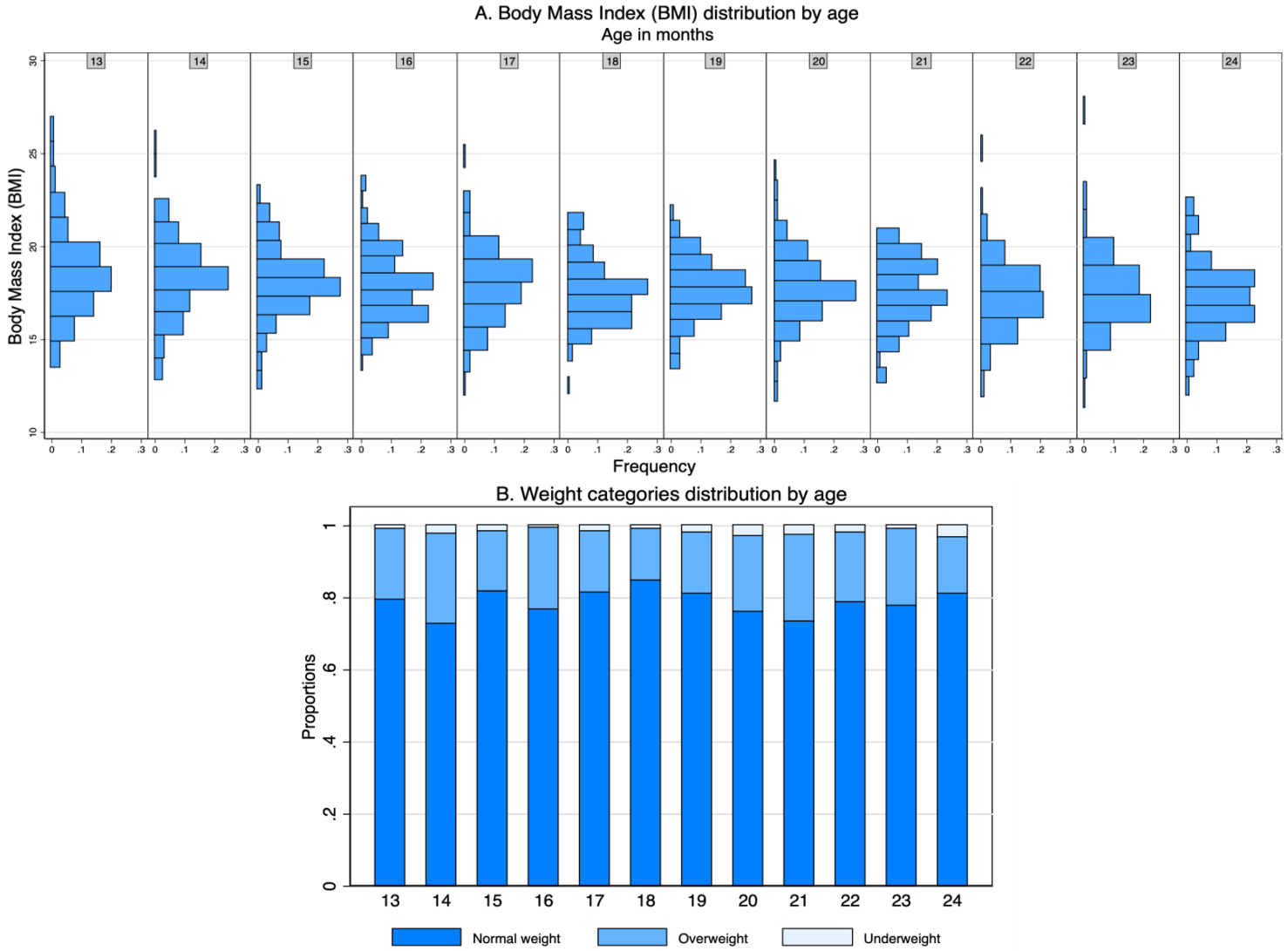
$$\ln\left[\frac{\Pr(\,Overweight_{\,i}=1 \mid X_i)}{1-\Pr(\,Overweight_{\,i}=1 \mid X_i)}\right] = \alpha_0 + \beta_k X_{ki} + \mu_0 \quad \text{(Eq. 4)}$$

Notes: "Pr" stands for probability, and "ln" for natural logarithm.

2. Supplementary results

2.1 Descriptive results: body mass index, children 13-24 months old in 2010

Figure S1. Body-mass index (BMI) by density and categories across children's age in 2010.



Notes: Weights categories are calculated based on Body mass index distributions by age, and categories of nourishment in children aged 12-24 years in 2010.

2.2 Propensity score matching estimation and balance of the sample after matching

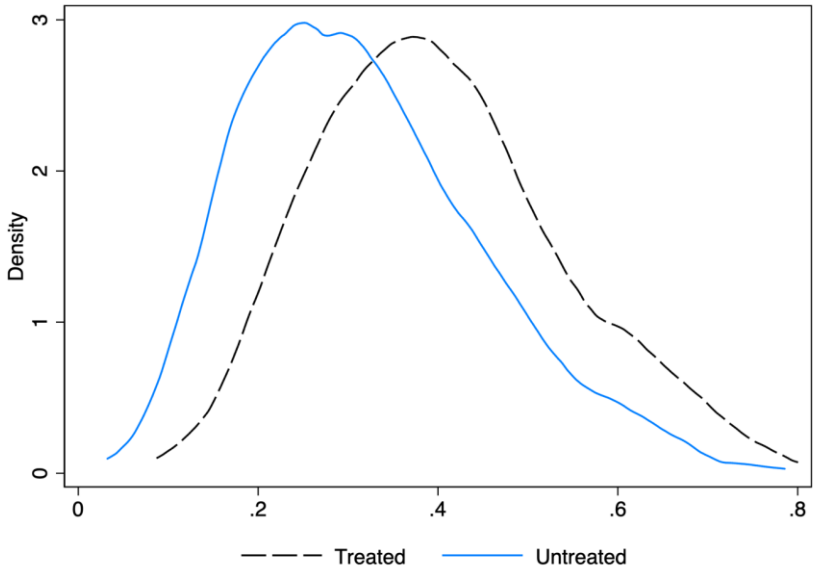
Table S1. Propensity score matching estimation

Probability of attending center-based care		
Main independent outcomes	$\boldsymbol{\beta}$	**SE**
Child characteristics		
Age	0.26	0.22
Age squared	-0.01	0.01
Female	-0.08	0.13
Television	-0.15***	0.04
Premature	0.07	0.23
Video-games	-0.01	0.06
Sleep	-0.32***	0.05
Caesarean	0.04	0.13
Illness	0.18**	0.07
Older sibling	-0.18	0.16
BMI at birth	0.20	0.14
Mother characteristics		
Age	-0.11	0.08
Age squared	0.00	0.00
Ethnicity	-0.01	0.24
BMI	0.00	0.01
Married	-0.11	0.15
Worked before birth	0.27*	0.16
Smokes	0.42*	0.22
Depression	0.28	0.19
Chronic disease	0.05	0.05
Cigarettes	0.00	0.00
Household characteristics		
SES	0.22**	0.10
Region	-0.02	0.02
Auxiliary variable		
Home score	0.02	0.02
Constant	2.09	2.35
Number of observations	1,273	
R^2	0.07	
P-Value	0.00	

Notes: * p < 0.1; ** p < .05; *** p < .01 (two-tailed tests). BMI: body-mass index; SE: standard error; SES: socioeconomic status.

Figure S2 and Table S2 show the balance of the sample after matching. Figure S2 shows a substantial overlap of individuals by "treatment" group (CBC and maternal care). Table S2 shows PSM created a balanced sample (based on observable characteristics).

Figure S2. Propensity score matching overlap, kernel distributions for the probability of attending center-based care.



Notes. Treated: children attending center-based care at 24-36 months of age.

Table S2. Balance of the sample after propensity score matching

Variable	Matching status	Treated (mean)	Control (mean)	P-value mean difference[a]
Child characteristics				
Age	Unmatched	18.84	18.43	0.046
	Matched	18.84	19.15	0.172
Female	Unmatched	0.47	0.50	0.434
	Matched	0.47	0.51	0.281
Television	Unmatched	2.32	2.58	0.004
	Matched	2.32	2.32	1.000
Premature	Unmatched	0.08	0.08	0.594
	Matched	0.08	0.09	0.721
Video-games	Unmatched	0.67	0.67	0.977
	Matched	0.67	0.67	1.000
Sleep	Unmatched	10.48	10.92	0.000
	Matched	10.48	10.44	0.608
Caesarean	Unmatched	0.42	0.41	0.793
	Matched	0.42	0.40	0.632
Illness	Unmatched	0.92	0.75	0.001
	Matched	0.92	0.92	0.970
Older sibling	Unmatched	0.53	0.64	0.000
	Matched	0.53	0.54	0.840
BMI at birth	Unmatched	0.34	0.28	0.029
	Matched	0.34	0.35	0.723
Mother characteristics				
Age	Unmatched	27.21	28.84	0.000
	Matched	27.21	27.27	0.894
Ethnicity	Unmatched	0.07	0.09	0.356
	Matched	0.07	0.07	0.895
Overweight status	Unmatched	57.56	64.62	0.119
	Matched	57.56	63.90	0.110
Married	Unmatched	0.73	0.79	0.011
	Matched	0.73	0.71	0.548
Worked before birth	Unmatched	0.22	0.19	0.231
	Matched	0.22	0.17	0.075
Smokes	Unmatched	0.12	0.09	0.100
	Matched	0.12	0.12	0.916
Depression	Unmatched	0.15	0.11	0.037
	Matched	0.15	0.15	0.924
Chronic disease	Unmatched	1.00	0.83	0.035
	Matched	1.00	0.83	0.078
Cigarettes	Unmatched	6.70	6.10	0.777
	Matched	6.70	8.22	0.553
Household characteristics				
SES	Unmatched	0.08	-0.04	0.003
	Matched	0.08	0.12	0.396
Region	Unmatched	8.75	8.92	0.457
	Matched	8.75	8.89	0.603
Auxiliary variable				
Home score	Unmatched	15.16	14.92	0.199
	Matched	15.16	15.14	0.906
Number of observations		1,273 (Matched sample)		

Notes: "Treated" stands for children who attended center-based care programs. "Control" stands for children in maternal care. Matching status define whether the mean comparison came from unmatched children or matched. BMI: body-mass index; SES: socioeconomic status. [a] P-value was calculated based on mean differences using t-tests between treated and control groups.

2.3 Robustness checks: raw results of the association between center-based care and BMI

Table S3. Correlation between center-based care and BMI excluding covariates. Estimates are shown for the sample with and without propensity score matching.

	OLS DID[a]		GLS FE[b]	
Main Independent Outcomes	β	SE	β	SE
Without propensity score matching				
Center-based care	-0.14	0.12	-0.85***	0.09
Constant	-0.71***	0.07	17.54***	0.016
Sample size (n)	1,273		1,268	
R^2	0.001		0.048	
P-value (given F-test)	0.25 (1.29)		<0.01 (62.44)	
Using propensity score matching				
Center-based care	-0.25**	0.14	-0.91***	0.12
Constant	-0.69***	0.08	17.59***	0.03
Sample size (n)	1,273		1,268	
R^2	0.003		0.077	
P-value (given F-test)	0.05 (3.40)		<0.01 (76.78)	

Notes: * p < 0.1; ** p < .05; *** p < .01 (two-tailed tests). DID: difference in differences; FE: fixed-effects; GLS: generalized least squares; OLS: ordinary least squares; PSM: propensity score matching; SE: standard error. Main results from PSM estimation are shown in Table S1 and Table S2.

[a] OLS DID is based on Model 1

[b] GLS FE is based on Model 3

Table S4. Results of the full sample analysis including center-based care in comparison with any other type of care

	OLS DID w/PSM	
Main Independent Outcomes	β	SE
Child Characteristics		
Center-based care[a]	-0.23***	0.09
Age	0.26*	0.15
Age squared	0.00	0.00
Female	0.27***	0.08
Television	0.01	0.03
Premature	-0.04	0.17
Video-games	-0.06	0.04
Sleep	-0.05	0.04
Caesarean	-0.02	0.09
Illness	0.03	0.05
Older Sibling	-0.12	0.11
BMI at birth	-0.02	0.1
Mother Characteristics		
Age	0.06	-0.05
Age squared	0.00	0.00
Ethnicity	-0.22	0.17
BMI	0.03***	0.01
Married	0.03	0.10
Worked before birth	0.02	0.16
Smokes	0.10	0.10
Depression	0.03	0.14
Chronic disease	0.02	0.03
Cigarettes	0.00	0.00
Household characteristics		
SES	0.04	-0.06
Region	0.01	-0.01
Constant	-5.19***	-1.58
Number of individuals	2,460	
R^2	0.04	

Notes: * p < 0.1; ** p < .05; *** p < .01 (two-tailed tests). BMI: body-mass index; DID: difference-in-differences; OLS: ordinary least squares; PSM: propensity score matching; SE: Standard error; SES: socioeconomic status. PSM was not included.

[a] Stands for center-based care in comparison with any other type of care. Sampled children were aged between 24-48 months in 2012.

Figures S3-S5 show our model diagnostics (Model 1 as reference; OLS DID w/PSM). The figures suggest our model specification is adequate despite a small R^2 and meets regression assumptions. Figures S3 (kernel density plot) and S4 (standardized normal and quartile probability plots) show diagnostics for normality of the error terms for model 1 (for valid hypothesis testing), which shows a normally distributed error-term, with an average value ~0 (population mean of zero). Figure S5 shows the residuals versus fitted (predicted) values, which shows homogeneity of variance with no clear sign of heteroscedasticity, which is confirmed by the Breusch-Pagan test for heteroscedasticity (p>0.39).

Figure S3. Kernel density plot of the residuals.

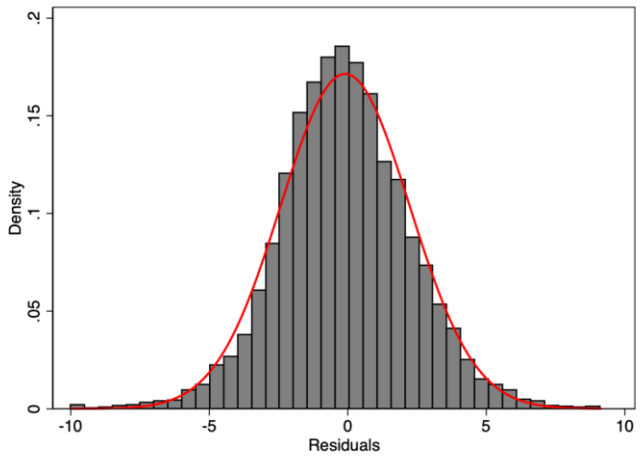


Figure S4. Standardized normal and quartile probability plots.

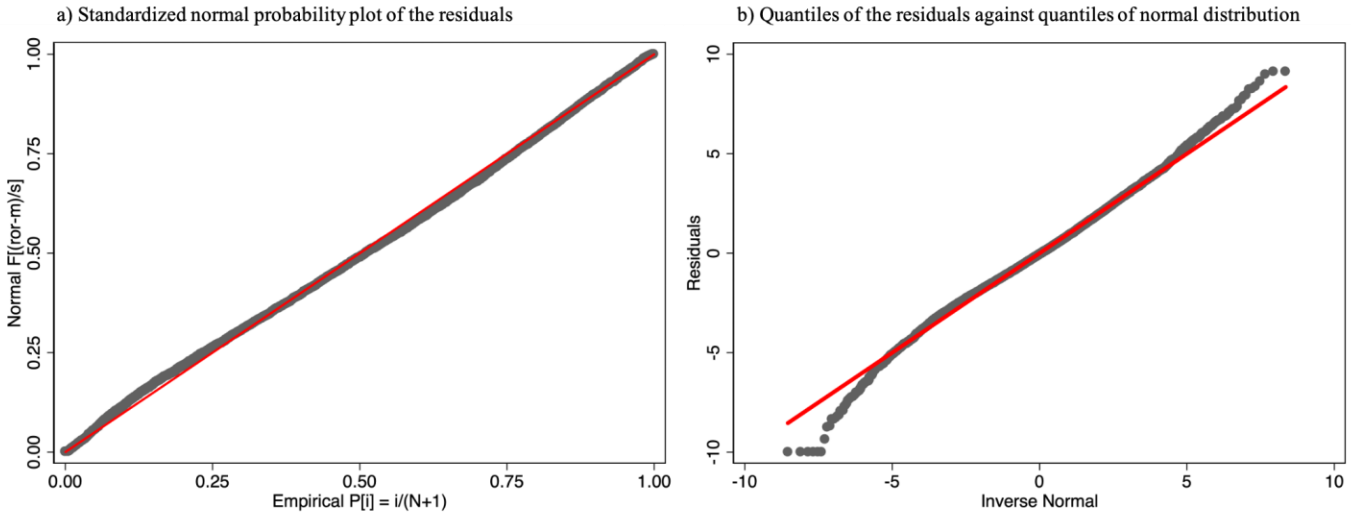
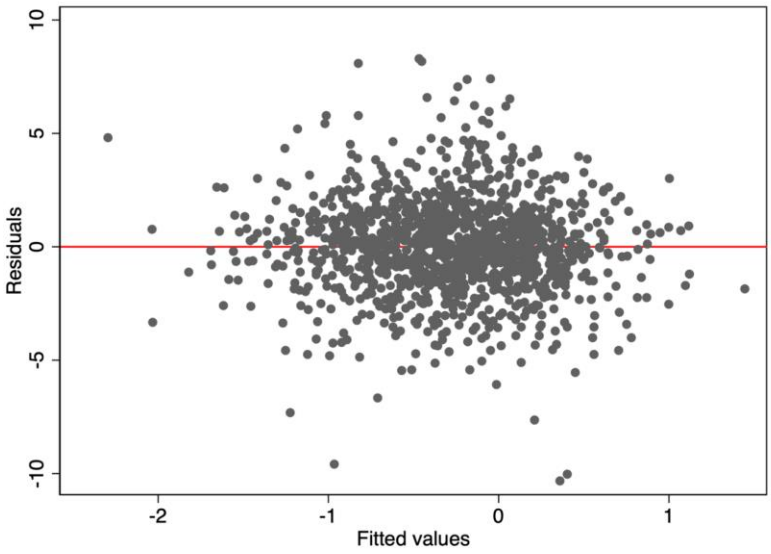


Figure S5. Residuals versus fitted predicted values.



2.4 Additional results: mechanisms that could explain main findings

Table S5. Lower second and third quintiles of socioeconomic status as moderators of observed changes in body mass index

	DID w/PSM		Full DID w/PSM	
Main outcome	β	**SE**	β	**SE**
A1. SES moderators				
A1.1: SES (40% more vulnerable)				
Center based care	-0.26	0.17	-0.28	0.18
SES<40%*Center based care	-0.03	0.27	0.05	0.27
SES<40%	-0.35**	0.17	-0.35**	0.16
Constant	-6.37***	2.43	-0.21	0.93
A1.2: SES (60% more vulnerable)				
Center based care	-0.38*	0.22	-0.41*	0.22
SES<60%*Center based care	0.16	0.27	0.23	0.28
SES<60%	-0.42**	0.17	-0.42**	0.17
Constant	-6.20**	2.44	-0.18	0.93
Sample (n)	1 273		1 268	
R^2	0.06		0.04	
P-value	0.00		0.00	

Notes: * p < 0.1; ** p < .05; *** p < .01 (two-tailed tests). SES: socioeconomic status; BMI: body-mass index; DID: difference-in-differences; PSM: propensity score matching

Table S6. Probability of being overweight in 2012 (Model 5)

	Model 5.1	
Independent outcomes	**β (OR)**	**SE**
Center based care	0.94	0.14
Child characteristics		
Age	0.99	0.02
Female	0.72**	0.10
Television	1.06	0.05
Premature	0.96	0.26
Video-games	0.85	0.15
Sleep	0.92	0.05
Caesarean	1.41**	0.21
Older sibling	0.74*	0.13
BMI at birth	0.84	0.13
Mother characteristics		
Age	1.01	0.01
Ethnicity	1.12	0.29
Overweight	1.45**	0.25
Married	0.96	0.17
Smokes	1.04	0.25
Depression	1.05	0.23
Chronic diseases	1.10**	0.05
Household Characteristics		
SES<80%	1.56**	0.36
Region	1.00	0.02
Auxiliary variable		
SES*Video-games	1.00	0.20
Constant	0.47	0.55
Number of observations	1,268	
R^2	3.11%	
P-Value of overall model (F-Test)	<0.001	

Notes: * p < 0.1; ** p < .05; *** p < .01 (two-tailed tests). *βs* are presented as Odds Ratios (OR). SES: socioeconomic status; BMI: body-mass index. Because playing video games and SES are positively correlated, we added an interaction term to the regression, but found no meaningful results (F-test= 4.3, p-value=.12).