Supplementary online materials for the article

What can parents do? The causal mediating role of parenting in explaining SES differences in children's language development

Alejandra Rodríguez Sánchez

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Descriptive statistics

Table S1: Descriptive Statistics by Parents' Socioeconomic Status, NEPS SC1

	All	Socioeconomic Status Latent Classes			
	n (%)	Very Low (N = 221)	Low (N = 553)	Medium (N = 261)	High (N = 857)
Baby's gender assigned at birth					
Boy	981 (52)	117 (53)	293 (53)	145 (56)	426 (50)
Girl	911 (48)	104 (47)	260 (47)	116 (44)	431 (50)
Birth Order					
First	631 (33)	57 (26)	161 (29)	101 (39)	312 (36)
Second or later	1,261 (67)	164 (74)	392 (71)	160 (61)	545 (64)
Premature birth					
Yes	112 (6)	16 (7)	29 (5)	13 (5)	54 (6)
No	1,780 (94)	205 (93)	524 (95)	248 (95)	803 (94)
Low birthweight (< 2500g)					
Yes	108 (6)	20 (9)	30 (5)	12 (5)	46 (5)
No	1,784 (94)	201 (91)	523 (95)	249 (95)	811 (95)
Smoke while pregnant					
Yes, regularly, now and then	194 (10)	112 (51)	62 (11)	6 (2)	14 (2)
No, never	1,698 (90)	109 (49)	491 (89)	255 (98)	843 (98)
Drank alcohol while pregnant					
Yes, regularly, now and then	129 (7)	10 (5)	30 (5)	16 (6)	73 (9)
No, never	1,763 (93)	211 (95)	523 (95)	245 (94)	784 (91)
Months breastfed					
Not breastfed	212 (11)	75 (34)	76 (14)	15 (6)	46 (5)
Btw. 1-3 months	284 (15)	71 (32)	117 (21)	25 (10)	71 (8)
Btw. 4-6 months	1,135 (60)	61 (28)	302 (55)	165 (63)	607 (71)
More than 6 months	261 (14)	14 (6)	58 (10)	56 (21)	133 (16)
Mother's feelings of depression					
Never	670 (35)	49 (22)	182 (33)	87 (33)	352 (41)
Seldom	723 (38)	78 (35)	211 (38)	111 (43)	323 (38)
Sometimes	355 (19)	61 (28)	114 (21)	50 (19)	130 (15)
Often/always	144 (8)	33 (15)	46 (8)	13 (5)	52 (6)
Mother's age					
Mean (sd)	32.46 (5.11)	27.43 (5.81)	31.18 (4.99)	32.43 (4.24)	34.59 (3.92)
Median	32	27	31	32	34
Family structure at birth					
Two biological parent	1,717 (91)	122 (55)	519 (94)	231 (89)	845 (99)
Two parents (stepfather)	16 (1)	5 (2)	6 (1)	0 (0)	5 (1)
Lone mother	159 (8)	94 (43)	28 (5)	30 (11)	7 (1)
Family owns house they live in					
Yes	815 (43)	9 (4)	238 (43)	59 (23)	509 (59)
No	1,077 (57)	212 (96)	315 (57)	202 (77)	348 (41)
Residence location in Germany					
East	505 (27)	113 (51)	143 (26)	123 (47)	126 (15)
West	1,387 (73)	108 (49)	410 (74)	138 (53)	731 (85)
Cultural capital index					
Mean (sd)	8.69 (2.98)	7.21 (2.18)	8.02 (2.58)	9.64 (3.11)	9.22 (3.13)
Median	8	7	7	9	9
Number of adults in household					
One	140 (7)	83 (38)	22 (4)	28 (11)	7 (1)
Two	1,694 (90)	126 (57)	502 (91)	230 (88)	836 (98)
More than two	58 (3)	12 (5)	29 (5)	3 (1)	14 (2)

Table S1: Descriptive Statistics by Parents' Socioeconomic Status, NEPS SC1 *(continued)*

	All	Socioeconomic Status Latent Classes			
	n (%)	Very Low (N = 221)	Low (N = 553)	Medium (N = 261)	High (N = 857)
ELFRA-2P wave 3 sum score					
Mean (sd)	147.42 (63.80)	105.00 (66.20)	142.25 (66.59)	157.57 (58.01)	158.60 (57.85)
Median	158	99	153	167	166
PPVT-4 wave 4 sum score					
Mean (sd)	49.11 (28.25)	37.37 (27.09)	46.29 (27.84)	52.42 (28.45)	52.94 (27.74)
Median	55	39	52	60	58
PPVT-4 wave 6 sum score					
Mean (sd)	83.92 (22.36)	71.05 (21.68)	80.54 (22.21)	86.29 (23.00)	88.69 (20.75)
Median	84	72	80	85	89

Note: NEPS-SC1. Own calculations.

Clarifications on causal mediation analysis

The casual mediation analysis I am using in the paper is suited for the case of a single exposure (SES), whose total effect on an outcome (Y), goes through multiple sequential mediators (M^P, M^I, M^S). To deal with mediator-outcome confounders affected by exposure, and other confounders, I employ the g-formula approach. Following the diagram in Figure 1 in the paper, this approach relies on the estimation of a series of models: an outcome regression for the language skills of children at a given age ($Y = f(SES, M, C, C^M)$); various mediator regressions of parenting mechanisms ($M^D = g_D(SES, C, C^M)$ for each of the D parenting dimensions (P, I, or S) – and more precisely each of the mediators that are being considered); and regressions for mediator-outcome confounders affected by the exposure ($C^M = w_l(SES, C)$ for each exposure-induced confounder l affected by exposure SES), where f, g_m and w_l are functions to be estimated. These functions are estimated via generalized linear models, adjusted to each type of dependent variable (i.e., linear, binary, or ordinal). After estimating these models, and based on its predictions, the g-formula is applied to obtain the counterfactual outcomes and compute the respective randomized direct and indirect effects. In the paper, I have outcomes at three time points, Y_1, Y_2, and Y_3, hence, for later outcomes, all the in-between mediators and exposure-induced confounders, early, middle, and late, are used to compute the counterfactual distribution. In this sense, the hypothetical intervention corresponds to a sustained intervention, not just a one point in time. Therefore, for later outcomes, the mediating mechanisms become more complex, involving early and later mediators. In the models, I include all parenting mediators that have taken place before the measurement of the outcome, and adjust for all observed potential exposure induced confounders in between, as described in Table 1 in the main paper.

Robustness check employing mother's edudcational attainment instead of latent class approach to SES

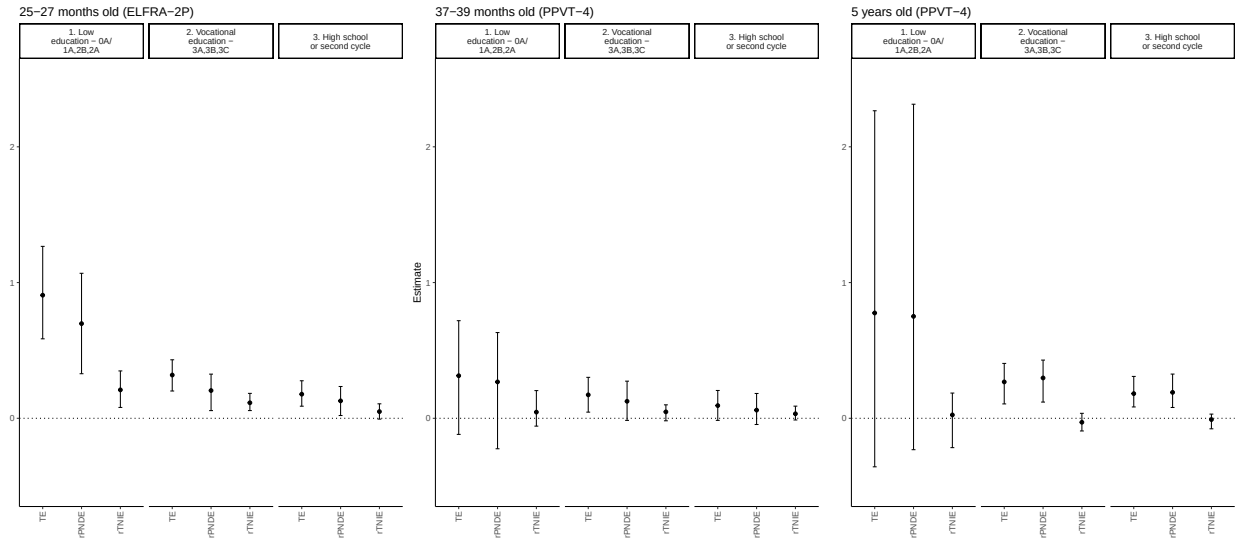

Figure 1: Interventional/Randomized mediation effects by maternal education (ISCED) on language skills at three time points with respect to mothers with university education