Critical and Sensitive Periods of Health for Cognitive Achievement in Young Peruvian Children

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Introduction:

Previous academic research has shown the importance of early health on later life outcomes. Almond and Currie (2011) state that the first 1,000 days of life is a "critical period" of health where later life outcomes can be set. Cunha and Heckman (2007) introduce the idea of critical and sensitive periods to describe how investment has different impacts at different periods of time.

This study aims to combine these theories by looking at a life course analysis of the first five years of a child's life. The data comes from the Young Lives Survey of Peru, focusing on a cohort of 2,000 children. It uses height for age z-scores at ages 1-2 and 4-5 to determine if health has different impacts on cognitive ability at different points in time. Instruments are used to find causal estimates. These are checked by weak identification robust confidence intervals.

Table 1: Regression Results

	(1) OLS	(2) IV	(3) Lewbel IV	(4) Stunted	(5) Not Stunted
Height for Age 4-5 years old	0.0954***	-0.318	0.128	0.149***	0.0600*
	(0.0253)	(0.198)	(0.134)	(0.0439)	(0.0324)
Height for Age 1-2 years old	0.0335	0.266*	0.0814	0.0921***	-0.0270
	(0.0240)	(0.148)	(0.100)	(0.0293)	(0.0392)
Observations	1318	1318	1318	419	899
R-squared	0.357	0.252	0.352	0.369	0.282
Under-ID		8.295	5.706		
Weak-ID		9.843	3.449		

Standard errors in parentheses
Robust Standard Errors, clustered on sentinel site
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Model and method:

The model being estimated is the following production function of skills:

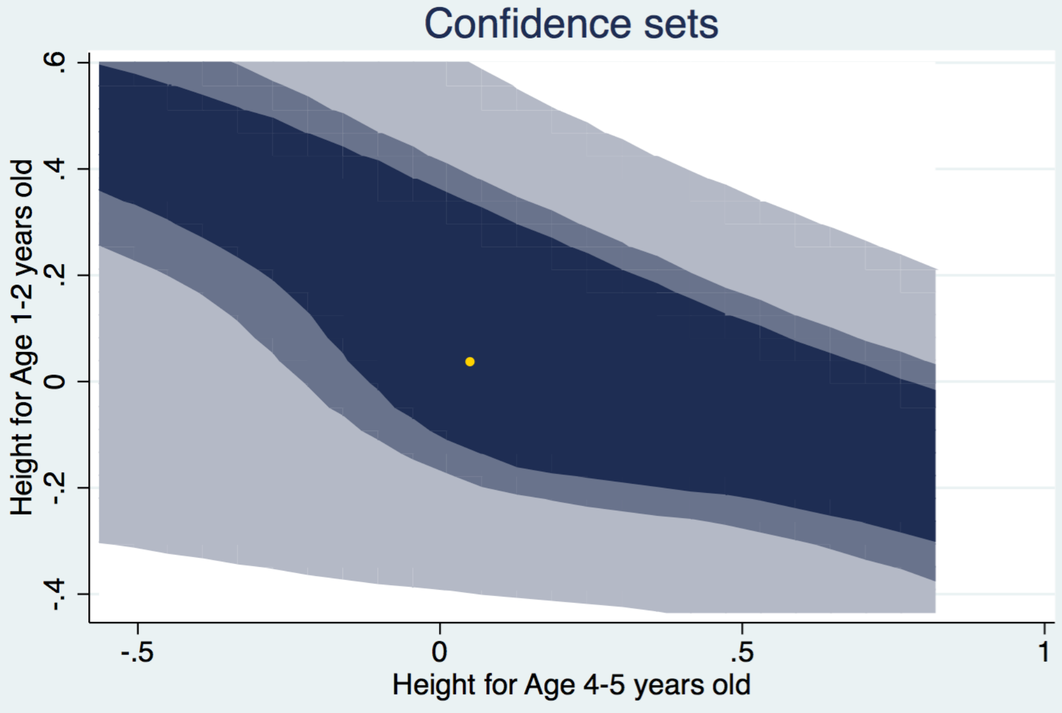
$$\theta_{it} = f(H_{i1000}, H_{it-l}, X_{it}, I_{t-1}, \mu_i)$$

Critical periods (1) are when health investment has a return in one period alone. Sensitive periods (2) are when there is a larger return in one period than others (s≠t).

$$\frac{\partial \theta_{it}}{\partial H_{is-l}} \neq 0 \; ; \; \frac{\partial \theta_{it}}{\partial H_{it-l}} = 0 \; (1) \; ; \; \frac{\partial \theta_{it}}{\partial H_{is-l}} > \frac{\partial \theta_{it}}{\partial H_{it-l}} \neq 0 \; (2)$$

Health in this case is endogenous because of reverse causality and parents changing investment based on unobserved factors. Instruments include birth weight, mother's height, and heteroskedasiticty generated instruments (Lewbel [2012]).

Anderson Rubin Weak IV Confidence Interval



Light blue is 99% CI, Medium is 95% CI, Dark is 90% CI

Note: Gold point denotes point estimates from col. 3

Conclusions:

There are three key results from the study:

- There is not evidence of a causal relationship between health in the first five years of life and cognitive ability across the full sample.
- The weak instrument robust confidence intervals show that health is not identified by the instruments used in the past as well as the Lewbel heteroskedasticity generated instruments. This is important in comparison to the past literature.
- There is evidence however that there is a sensitive period of development for children who have been stunted at one point in their lives. It is possible that investment in health has diminishing marginal returns once stunting is alleviated.

References:

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Young Lives
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Please use the QR code to read the most recent version of the paper. The data used in this publication come from Young Lives, a 15-year study of the changing nature of childhood poverty in Ethiopia, India, Peru and Vietnam (www.younglives.org.uk) Young Lives is funded by UK aid from the Department for International Development (DFID), with co-funding from Irish Aid. The views expressed here are those of the author(s). They are not necessarily those of Young Lives, the University of Oxford, DFID or other funders.