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ARTÍCULO ORIGINAL

Maternal Education and Child Labor Dynamics Children's Educational Attainment in Peru (2002-2016)

Educación materna y dinámicas del trabajo infantil: el logro educativo de los niños en el Perú (2002-2016)

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Abstract

Context: research on child labor and its educational implications has been predominantly cross-sectional, limiting its conceptualization as a dynamic process involving entry, exit, and persistence. **Aim**: to longitudinally examine, from a life course perspective, the association between maternal education, patterns of child labor participation, and subsequent educational attainment. **Methodology**: the analysis uses data from the older cohort of the Young Lives study in Peru. Structural equation models examine three pathways: the association between maternal education and child labor dynamics; the association between child labor trajectories and educational attainment; and the direct association between maternal education and educational attainment. **Results**: children whose mothers completed basic education were significantly less likely to engage in persistent child labor. In addition, children who worked across multiple survey rounds attained fewer years of schooling than those who never worked. **Conclusion**: the findings show that maternal education and persistent child labor participation are jointly associated with children's educational trajectories, highlighting the importance of examining child labor from a longitudinal perspective.

Keywords: child labor, educational attainment, maternal education, Peru

Resumen

Contexto: la investigación sobre el trabajo infantil y sus implicancias educativas ha sido mayormente transversal, lo que limita su comprensión como un proceso dinámico de ingreso, salida y persistencia. **Objetivo**: examinar longitudinalmente, desde la teoría del curso de vida, la asociación entre la educación materna, los patrones de participación en el trabajo infantil y el logro educativo posterior. **Metodología**: se analizan datos de la cohorte de mayor edad de Niños del Milenio en Perú. Mediante modelos de ecuaciones estructurales, se examinan tres vías: la asociación entre educación materna y dinámicas de trabajo infantil; la asociación entre trayectorias de trabajo infantil y logro educativo; y la asociación directa entre educación materna y logro educativo. **Resultados**: los niños cuyas madres completaron la educación básica tuvieron una probabilidad significativamente menor de participar persistentemente en el trabajo infantil. Además, quienes trabajaron en múltiples rondas alcanzaron menos años de escolaridad que quienes nunca trabajaron. **Conclusión**: los hallazgos muestran que la educación materna y la participación persistente en el trabajo infantil se asocian conjuntamente con las

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BDAS: conceptualización, análisis formal, administración de proyecto, investigación, metodología, tratamiento de datos, validación, visualización de resultados, redacción: borrador original, redacción: revisión y edición.

Declaración de conflicto de intereses

Los autores declaran que no existe ningún conflicto de intereses financiero, profesional o personal que pudiera haber influido en los resultados presentados en este estudio.

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Este estudio no involucró experimentación con seres humanos ni animales; por tanto, no requirió aprobación por un comité de ética.

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Los autores declaran que los datos utilizados en esta investigación se encuentran disponibles para su consulta y acceso a través de la página oficial de Young Lives: https://www.younglives.org.uk/data

El do file necesario para replicar los resultados puede ser solicitado al autor de correspondencia.

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trayectorias educativas, destacando la importancia de analizar el trabajo infantil desde una perspectiva longitudinal.

Palabras clave: trabajo infantil, logros educativos, nivel educativo de la madre, Perú

In 1989, the United Nations Convention of the Rights of the Child recognized children as rights-bearing individuals entitled to full physical, mental, and social development and called nations and families to protect children from economic exploitation and work that interferes with schooling (United Nations, 1989; United Nations Children's Fund [UNICEF], 2006). Yet, more than three decades later, child labor remains widespread. The most recent estimates from UNICEF (2025) indicate that approximately 138 million children are still affected by paid and unpaid forms of child labor, confirming that the global goal for 2025 will not be met. Despite global commitments to children's rights, child labor remains both common and stratified by poverty, heightening risks to children's health, learning, and long-term opportunities. Peru illustrates the stakes and the policy urgency. About 25.8% of Peruvians aged 5 to 17—more than 1 million children—engage in an economic activity, a rate that is far above the 9.6% global average and 6% in the Latin America and the Caribbean region (National Institute of Statistics and Informatic [INEI], 2024; International Labour Organization [ILO] & UNICEF, 2021). Children's work in Peru is concentrated in low-paid-quality jobs, often in agriculture and informal services, and frequently coexists with schooling in ways that comprise learning and educational progress (Rodriguez & Vargas, 2010; Verdera, 1995).

Children who work face increased risks to their health, learning, and long-term opportunities, particularly when their work takes place outside the household, is hazardous, or displaces schooling and study time (Heady, 2003; Keane et al., 2022; Post, 2011). Despite economic growth and educational expansion, child labor persists, suggesting that poverty alone cannot fully explain which children work, under what conditions, and with what long-term consequences. Family resources may offer a closer explanation, especially parental schooling, which can shape the value that households place on education, the family decision-making processes, and the allocation of children's time between school and work (Dubow et al., 2009; Post & Pong, 2009). Evidence from low- and middle-income countries further suggests that maternal schooling improves children's wellbeing and early development (Frost et al., 2005; Mensch et al., 2019; Smith-Greenaway et al., 2012), in ways that are consistent with both family resource-based and decision-making mechanisms. Higher parental education is linked with lower probability and intensity of child labor (Abaidoo, 2024; Bai & Wang., 2020; Ersado, 2005). Taken together, the literature suggests a possible pathway: parental education reduces children's labor exposure, thereby supporting stronger and continued educational trajectories. Yet, most studies in the field are cross-sectional,

treat child labor as a static status, or lacks the follow-up necessary to connect childhood work patterns to later educational attainment.

This article uses longitudinal data from the Young Lives Peru study, which follows two cohorts of children from childhood into early adulthood and oversamples poor communities (Cueto et al., 2010, 2016, 2018). By focusing on the older cohort, I leverage five rounds of data to model child labor as a trajectory. Guided by a life course perspective (Elder, 1994; George, 2007), this study treats child labor not as a binary but as a trajectory characterized by entry, exit, and persistence across middle childhood and adolescence. The main objective is to identify the potential associations between parental education and child labor from a dynamic perspective, and whether this is later associated with children's educational attainment. To do this, I examine how parental education levels shape the dynamics of child labor participation using data from the first three rounds, when children were between 8 and 15 years old. Later, I assess how these patterns of labor participation affect educational attainment at age 21-22, using data from the fifth round. I expect that higher levels of parental education are associated with lower rates of sustained child labor participation, and that participation in child labor negatively affects educational attainment. This framework positions parental education not only as a socioeconomic indicator, but also as a key determinant of the family decision-making process that shapes children's life trajectories.

Background section

Defining and measuring child labor

The International Labor Organization (ILO) defines child labor as work that is mentally, physically, socially, or morally dangerous and harmful to children or interferes with schooling (ILO, 1999, 2006). Operationally, ILO conventions distinguish between "light work," which may be supportive of children's development as well as permissible, and labor that undermines their wellbeing, setting age thresholds for different forms of employment (ILO, 1999). Peru, in their Third National Plan for the Eradication of Child Labor and Protection of Adolescent Workers, similarly defined child labor as any physical or mental activity—paid or unpaid—related to the production, sale, or distribution of goods or services, conducted by individuals under 18, either independently or under employment (Comité Interinstitucional para la Erradicación del Trabajo Infantil y la Protección del Joven Trabajador , 2003).

Scholars have further refined these definitions; for instance, by defining child labor as children's participation in the production and sale of goods not intended for household consumption, as well as services rendered to third parties (Staelens, 1993). Other authors have restricted the definition of child labor to work performed for third parties in exchange for income, but excluding subsistence production or unpaid work inside the child's home (Edmonds & Shady, 2012). Across legal and academic definitions, three elements vary: the age range considered, the intensity and conditions of work

(e.g., light vs. hazardous), and whether unpaid domestic and subsistence activities are included.

Building on these definitions and the variables available in the Young Lives dataset, I consider for this study child labor as any form of paid or unpaid economic activity undertaken by children younger than 18 years old (legal age to work in Peru) that is not related to formal schooling. Domestic chores are excluded, given the difficulty in the data to distinguish normative contributions to household maintenance from exploitative forms of domestic work, and to avoid overstating economic labor. Accordingly, child labor is understood as participation in family business too, as well as agricultural and non-agricultural production, wage work, among other forms of labor.

Parental education, children's wellbeing and child labor

Parental education sits at the center of a rights-based framework that identifies families' primary responsibilities for children's development and calls on nations to expand access to quality education, health and social services (UNICEF, 2006; United Nations Educational, Scientific and Cultural Organization [UNESCO], 2007). Across contexts, higher parental schooling—especially maternal—is linked with children's academic achievement, grade progression, and eventual occupational status, with longstanding evidence indicating that effects persist across time (Dubow et al., 2009; Khan et al., 2015; Ou, 2008; Post & Pong, 2009). Recent reviews and quasi-experimental work strengthen the case for causality. That is, increases in maternal schooling are associated with lower fertility, but also lower child mortality and improvements in child nutrition and cognition (Keats, 2018; Mensch et al., 2019). Studies for the Peruvian case are consistent, tying parental education with lower probabilities of dropping out and repetition, stronger educational trajectories and mobility, and better early development (Alcazar, 2009; Benavides & Etesse, 2012; Cueto et al., 2010; Leon et al., 2020; Torres et al., 2018). Together, these findings suggest that parental education should not be treated only as a socioeconomic marker, but as a resource that shapes beliefs, aspirations, information, and everyday practices that structure children's opportunities and life trajectories.

Beyond schooling, parental education may also operate as a protective mechanism against early and hazardous entry into the labor force. Children of more educated parents are less likely to work, and when they do, they tend to work fewer hours and in safer, less exploitative jobs (Abaidoo, 2024; Mukherjee & Das, 2008). Evidence from Peru aligns with this gradient and suggests compositional shifts toward less harmful work among children with more educated parents (Ersado, 2005; Ray, 2000; Rodriguez & Vargas, 2009).

A large body of literature links child labor with worse learning and educational attainment. The most damaging associations arise when economic works crowds out school attendance or study time, especially in economic scenarios where child labor occurs outside of the household, and when the exposure is sustained during critical schooling years, compounding

disadvantages in learning and educational progress (Heady, 2003; Keane et al., 2022; ILO, 2006; Post, 2011;). Evidence from Peru mirrors this pattern and highlights the heterogeneity by urban and rural contexts, task assignments in child labor, and children's prior cognitive and nutritional contexts, while also documenting heavier total workloads for those who study and work; policy analyses further warn that children in the worst forms of child labor rarely achieve minimum school competencies (Benavides & Etesse, 2012; ILO, 2006; Ponce, 2012; Rodriguez & Vargas, 2010; Sequeira, 2013; Verdera, 1995). Beyond looking at all children who "ever worked", timing and persistence might be shadowing relevant heterogeneity among the group of children who were ever involved in child labor. For this reason, measuring child labor as trajectories of entry, exit and persistence, and testing how these trajectories map onto young-adulthood attainment is key for a deeper understanding of the associations of child labor, especially among those families who rely on it more than others.

Anchoring this research in Peru's context of high informality and uneven school access and quality (Cisneros-Acevedo, 2022; Glewwe et al., 2017; Maurizio et al., 2023; Serrano Rodriguez et al., 2023) sharpens why a life course perspective (Elder, 1994; George, 2007) is useful. Children's labor is not a long-standing choice but an aged-graded process that is embedded in linked lives, where parental resources and set of expectations and beliefs shape children's time-varying exposure and recovery from child labor and their school involvement. Household temporal constrains may push children's entry into child labor, whereas its recovery may take them out temporarily or permanently.

Current study

Most research on child labor in low- and middle-income countries still treats labor as a static exposure and relies on cross-sectional data or short panels, which obscures when children enter to work, how long they remain, and whether they exit before reaching key schooling milestones. As a result, little is known about how the timing and persistence of child labor are associated with later educational attainment, or how parental education relates to children's patterns of entry, exit, and persistence in work.
This study addresses these gaps by adopting a life course approach and leveraging the Young Lives Peru panel to examine child labor as a dynamic process. I analyze how parental education is associated with children's educational attainment, with child labor serving as a mediating variable. Drawing on Elder's (1994) life course framework, this study considers that maternal education may shape children's labor trajectories, which in turn may be related to subsequent educational outcomes. Maternal education is selected as the key explanatory variable for child labor based on extensive empirical evidence showing its central role in child development outcomes, including health, learning, and labor participation (ILO, 2013; León et al., 2020). Similarly, child labor is examined as a predictor of educational attainment, grounded in literature suggesting that work, particularly in its

worst forms, may hinder school progress (ILO, 2006). By aligning linked lives, timing, and turning points with longitudinal data, this study moves beyond cross-sectional poverty correlations to discuss what it could be a policy-relevant pathway through which maternal schooling may interrupt, or entrench, educational inequality.

Data and sample

I use panel data from Young Lives, a longitudinal study that tracks the life trajectories of children living in poverty to inform social policy and program design (Escobal & Flores, 2018). Young Lives follows two birth cohorts—a younger cohort (born in 2001) and an older cohort (born in 1994)—from their childhood through adolescence and early adulthood. Five survey rounds (2002, 2006, 2009, 2013, 2016) collect detailed information on schooling, health, household conditions, and aspirations. This study focuses on the older cohort in Peru and uses data from all five rounds. At baseline (2002), the Peruvian sample included 2052 children in the younger cohort and 714 in the older cohort. Because attrition is expected in long panels, the analytic sample comprises 580 older-cohort respondents observed in all five rounds (see table 1).

Table 1

Number of children surveyed per round

	First round (2002)	Second round (2006)	Third round (2009)	Fourth round (2013)	Fifth round (2016)	Panel sample (2002-2016)
Older cohort	714	685	678	635	608	580
Male	386	368	362	341	320	307
Female	328	317	316	294	288	273

Note. Author's calculations based on Young Lives (2002-2016) data.

All analyses are conducted on this balanced panel to ensure consistent observation histories and to leverage within-person change over time. This approach allows for the identification of patterns and pathways that static cross-sectional data cannot reveal, supporting a dynamic understanding of child labor and education. For the first objective—estimating the associations between parental education and the dynamics of child labor—I use rounds 1-3, when children were approximately ages 8-15. For the second objective—assessing links between labor participation and educational attainment—analyses draw on rounds 4 and 5, capturing the transition to early adulthood (ages 21-22).

Measures

As the outcome variable, I consider *educational attainment*, which is measured as the total of completed years of schooling at round 5 (ages 21-22), treated as continuous. For key independent variables and mediators, *child labor* is measured as a categorical trajectory variable (ages 8-15) built from rounds 1-3 reports of economic activities, capturing whether a child never worked, worked in one round or worked in two rounds. I define child labor as any paid or unpaid economic activity undertaken by children aged

8-15 that is not directly related to formal schooling. Domestic chores are excluded, given the difficulty in distinguishing normative contributions to household maintenance from exploitative domestic work in the available data, and to avoid overstating economic labor. Accordingly, participation in family businesses, agricultural and non-agricultural production for market, or wage work outside the household, regardless of remuneration, is also considered as child labor. This definition aligns with ILO (1999) guidance on economic activity and focuses the analysis on forms of work that can most likely compete with schooling and affect educational trajectories. *Mother's educational attainment* is measured as a dichotomous variable: mother did not complete secondary education (high school) as 0; and mother completed at least secondary education (high school).

The models are controlling for geographic areas; specifically, *area of residency*, measured as a binary variable that captures if the child lives in and urban or rural areas, and *region of residency*, which is measures as a categorical variable that captures if the child lives in the coast, highlands or jungle (geographically distinct regions in Peru). As child covariates, I control for child's *sex* (female or male); first language (Spanish or indigenous / native language); *literacy skills* in rounds 1 and 2 as a dichotomous variable that take the value of 1 if the child can read and write a sentence without difficulty or 0 if not. Additionally, the models also consider family and household covariates. First, *family's migration*, capturing if they moved from rural to urban areas, from urban to rural areas or did not migrate; *family's wealth*, as the average of the household quality index, the consumer durable index, and the services index, and takes a value from 0 to 1. I also consider variation in wellness, capturing the change in the wealth index between round 1-3. If the family experienced a disruptive family event (e.g., divorce, illness, or bereavement), I control it as a *family shock* dichotomous variable. Lastly, I additionally control for the household chore participation as a dichotomous variable for each round.

Analytic approach

This study employs structural equation modeling (SEM) to analyze the association of parental education on children's educational attainment, with child labor serving as a mediating variable. The model consists of two equations. First, an ordinal logistic model estimating the probability of child labor participation (categorized as none, one round, or multiple rounds) as a function of maternal education and covariates. This type of model allows for the analysis of a dependent variable with ordered categories, using a set of explanatory variables.

Second, a linear regression model estimating years of education completed (by age 21-22) as a function of child labor history, maternal education, and the same control variables. This model allows for the quantitative estimation of a linear dependence between the endogenous variable (educational attainment) and the exogenous variables (parental education, child labor dynamics, and control variables). In doing so, the

model produces a mathematical expression that describes the relationship between the explanatory variables and the dependent variable. The structural equation system to be estimated is specified as follows:

$$child\ labor_{r1,r2,r3} = \beta_1 + \beta_2 mother's\ education_{r1} + \beta_i covariates + \varepsilon_t \quad (1)$$

$$educational\ attainment_{r5} = \theta_1 + \theta_2 child\ labor_{r1,r2,r3} + \theta_3 mother's\ education_{r1} + \theta_4 covariates + \varepsilon_t \quad (2)$$

Where the estimated coefficients are defined as follows:

β_1 = Intercept of the child labor model.

θ_1 = Intercept of the educational attainment model.

β_i = Coefficients associated with the explanatory variables in the child labor model.

θ_i = Coefficients associated with the explanatory variables in the educational.

The ordinal logistic model is appropriate given the ordered nature of the child labor variable. As McCullagh (1980) suggests, this model suits cases with evenly distributed ordinal outcomes and interprets coefficients as associations on the likelihood of transitioning between labor categories. The educational attainment model, estimated via Ordinary Least Squares (OLS), quantifies the relationship between exogenous factors and years of schooling. To evaluate model performance, standard fit indices are applied. For the ordinal model, Chi-squared and pseudo-R^2 values assess explanatory power. For the linear regression, R^2 indicates the proportion of explained variance. As sensitivity checks, we ran a Heckman selection model to account for potential selective attrition.

Results

Descriptive results

The Young Lives survey collects information on children's economic activities over the twelve months prior to each round, including both paid work and unpaid labor contributing to the family income. For the final sample, 28.45% reported labor in multiple rounds (see table 2). Some children showed intermittent participation—working in round 1, exiting in round 2, and re-entering in round 3—while others worked in two or all three rounds. Table 3 details the labor transitions of children between the first three survey rounds, showing that 35.34% entered labor between rounds 1 and 2, and 30.34% between rounds 1 and 3. Additionally, 23.45% worked continuously between rounds 2 and 3.

Table 2

Distribution of children's working condition

	Frequency	Percentage
Did not work in any round	204	35.17%
Worked in only one round	211	36.38%
Worker in more than one round	165	28.45%
Total	580	100.00%

Note. Author's calculations based on Young Lives (2002-2016) data.

Table 3

Distribution of child labor transitions between survey rounds

	Round 1 to 2		Round 1 to 3		Round 2 to 3	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Exited labor	29	5.00	36	6.21	129	22.24
Entered labor	205	35.34	176	30.34	93	16.03
Remained out of labor	286	49.32	315	54.31	222	38.28
Remained in labor	60	10.34	53	9.14	136	23.45
Total	580	100.00	580	100.00	580	100.00

Note. Author's calculations based on Young Lives (2002-2016) data.

Table 4 disaggregates labor dynamics by demographic and household characteristics. Children whose first language is an Indigenous or native language are disproportionately affected: 64.52% worked in more than one round, compared to 24.13% of Spanish-speaking peers, while only 8.06% of the former never worked (vs. 38.42% of the latter). Rural children and those living in the highlands or jungle also faced higher labor participation than urban or children living in the coast, with migration trends echoing these patterns. Children moving from rural to urban areas showed better outcomes than those who moved in the opposite direction. Maternal education seems to be correlated with labor participation: 33.69% of children whose mothers had incomplete secondary education worked in multiple rounds, compared to 18.56% those whose mothers completed secondary education. The same pattern holds for paternal education, with smaller differences for children who worked only once. Similarly, 36.06% of children who were unable to read and write in round 1 worked in multiple rounds, whereas 19.87% of their literate peers worked. The gap widened in round 2 (47.62% compared to 25.10%). A higher percentage of children in households that experienced a family shocked worked in just one round, the trend was the opposite for working in multiple rounds. This trend suggests temporary rather than persistent labor in response to shocks. Household well-being, proxied by wealth indices, was negatively associated with child labor. Children who worked in multiple rounds tended to have lower initial wealth in round 1 and greater improvement by round 3.

Table 4

Child labor participation

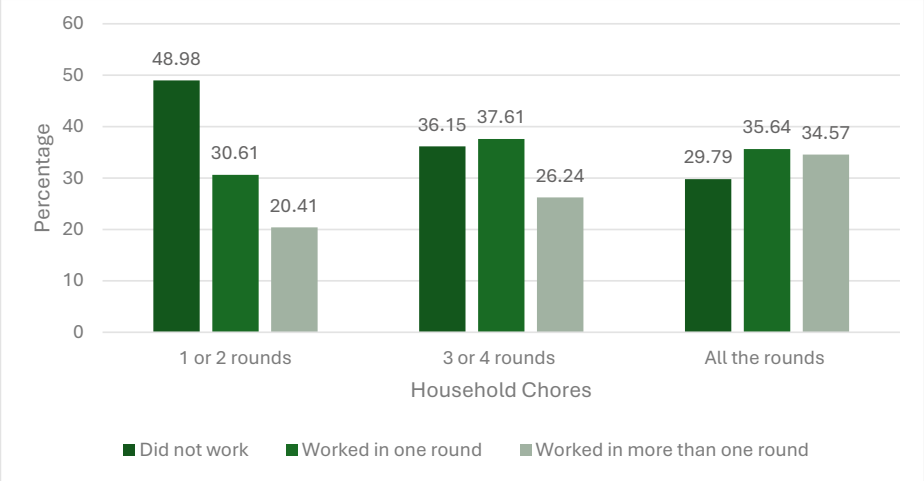
	Did not work in any round	Worked in one round	Worked in more than one round
Mother tongue (%)			
Spanish	38.42	37.45	24.13
Indigenous / Native language	8.06	27.42	64.52
Geographic region (%)			
Coast	49.79	33.74	16.47
Highlands	23.30	38.55	38.15
Jungle	28.41	37.50	34.09
Geographic area (%)			
Urban	42.67	36.34	20.99
Rural	10.95	36.50	52.55
Migration status (%)			
Migrated from rural to urban	15.79	57.89	26.32
Migrated from urban to rural	22.22	0.00	77.78
Did not migrate	36.05	36.23	27.72
Father's education (%)			
Completed secondary	48.53	34.31	17.16
Incomplete secondary	22.13	40.16	37.71
Mother's education (%)			
Completed secondary	48.97	32.47	18.56
Incomplete secondary	27.45	38.86	33.69
Sex (%)			
Female	34.07	37.73	28.20
Male	36.16	35.18	28.66
Family shock (%)			
Yes	39.79	39.80	20.41
No	34.24	35.68	30.08
Well-being index (Z-score)	0.58	0.49	0.36
Change in well-being (Z-score)	0.09	0.10	0.13
Skills (%)			
Round 1			
Can read / write	42.02	38.11	19.87
Cannot read / write	27.05	36.89	36.06
Round 2			
Can read / write	37.85	37.05	25.10
Cannot read / write	20.24	32.14	47.62

Note. Author's calculations based on Young Lives (2002-2016) data.

Figure 1 show the percentage of children's participation in household chores over time. Almost half of children who performed domestic chores in one or two rounds did not participate in any economic labor; for those with more frequent chores, labor participation rates were evenly distributed.

Figure 1

Children's participation in household chores over time (percentage)



Note. Author's calculations based on Young Lives (2002-2016) data.

Educational attainment data from round 5 (when participants were 21-22 years old) reveals that 66.54% completed secondary education, while 14.36% attained only primary, and 14.19% achieved non-university higher education. Table 5 presents the average number of years of schooling completed by children, disaggregated by selected characteristics. On average, children completed 11.87 years of schooling. Differences by subgroup were generally modest, but a key finding is that children whose mothers completed higher education consistently attained at least one more year of schooling than those whose mothers had incomplete higher education. Spanish-speaking children averaged more years of education than Indigenous-language speakers; however, having a mother that completed secondary education reversed the trend, highlighting maternal education's critical role in disrupting intergenerational disadvantage. Finally, children in the lowest wealth tercile completed approximately two fewer years of schooling than those in the highest.

Table 5

Average years of schooling attained

	Full sample	Mothers with completed secondary	Mothers with incomplete secondary
Mother tongue			
Spanish	12.00	12.76	11.56
Indigenous or native languages	10.82	14.00	10.72
Geographic region			
Coast	11.78	12.51	11.25
Highlands	11.95	13.10	11.50
Jungle	11.92	12.90	11.61
Geographic area			
Rural	11.32	12.74	11.55
Father's education			
Completed secondary	12.60	-	-
Incomplete secondary	11.41	-	-
Mother's education			
Completed secondary	12.77	-	-
Incomplete secondary	11.42	-	-
Female	11.88	12.98	11.46
Family shock	11.03	12.75	11.38
Household chores			
1 or 2 rounds	11.64	12.79	10.57
3 or 4 rounds	12.08	12.83	11.59
All rounds	11.57	12.57	11.32
Wealth index			
First tercile	11.10	11.70	11.06
Second tercile	12.03	12.39	11.70
Third tercile	13.14	13.40	12.68
Change in wealth index (rounds 1 to 3)			
Improved	11.74	12.78	11.31
Declined	12.31	12.75	11.95
Skills			
Round 1			
Can read / write	12.40	12.88	12.06
Cannot read / write	11.31	12.54	10.94
Round 2			
Can read / write	12.00	12.75	11.60
Cannot read / write	11.13	12.93	10.64

Note. Author's calculations based on Young Lives (2002-2016) data.

Maternal education and child labor participation

Table 6 presents the estimates from the ordinal logistic regression and associated marginal effects. The proportional odds assumption is supported by the Chi-squared test, validating the use of the ordinal logit model. Children whose mothers completed basic education are 15 percentage points (PP) more likely to not have worked at all, and 2 and 12 PP less likely to have worked in one or more rounds, respectively, compared to those whose mothers did not complete basic education. Household's well-being also significantly reduces the likelihood of child labor. Children from wealthier households are more likely to never have worked and less likely to have worked in one or more rounds. Similarly, improvements in household's well-being between survey rounds increase the likelihood of non-participation in labor, supporting existing findings on the protectiveness of improved living conditions.

Relevant differences arise across linguistic and geographic lines. Children whose first language is indigenous, or native were less likely to have never worked and more likely to have worked across rounds than Spanish speakers. A similar pattern is observed for children residing in the highland's region. Children with basic literacy skills are more likely to never have worked and less likely to have engaged in labor, underscoring the inverse relationship between early academic ability and child labor participation. While household shocks did not yield significant associations, they were associated with a higher likelihood of non-participation in labor and a reduced likelihood of child labor, possibly due to post-divorce economic stabilization (Valdés et al., 2011).

Table 6

Estimation of maternal education and the dynamics of child labor participation

Ordinal logit regression	Estimated coefficients	Marginal effects		
		Did not work in any round	Worked in one round	Worked in more than one round
Mother's education	-0.81***	0.15***	-0.03***	-0.13***
Welfare level (round 1)	-3.45***	0.67***	-0.11***	-0.56***
Change in welfare level (round 3 and 1)	-2.00***	0.39***	-0.06**	-0.32***
Family shock	-0.26	0.05	-0.01	-0.04
Language (indigenous)	0.85***	-0.16***	0.03*	0.14***
Sex (female)	0.01	0.00	0.00	0.00
Geographic region (ref. coast)				
Geographic region (mountains)	0.57***	-0.11***	0.02**	0.09***
Geographic region (jungle)	0.34	-0.07	0.01	0.05
Migration (ref. rural to urban area)				
Migration (urban to rural area)	1.63*	-0.32*	0.05	0.27*
No migration	0.29	-0.06	0.01	0.05
Skills (read and write)	-0.71**	0.14**	-0.02*	-0.12**
Domestic work (ref. 1 o 2 round)				
Domestic work (3 o 4 round)	0.23	-0.05	0.01	0.04
Domestic work (all the round)	0.43	-0.08	0.01	0.07
Cut1	-1.00			
Cut2	0.89			
LR	142.42***			
Sample size	554			

Note. *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

Child labor participation dynamics and educational attainment

Table 7 contains the results of the linear regression model estimating the determinants of children's educational attainment. Children who participated in child labor across multiple survey rounds attained significantly fewer years of education (-0.68) compared to those who never worked. In contrast, working in only one round had no statistically significant association, suggesting that the intensity and duration of labor are relevant. Children in higher-wealth households in round 1 completed, on average, more than four additional years of schooling, while those who experienced improved well-being between rounds 1 and 3 completed over two additional years. Maternal education also has a significant positive association with children's educational outcomes, reinforcing the role of mothers as agents for educational advantage. Similarly, literacy skills in early rounds are linked to approximately one extra year of schooling by early adulthood. Experiencing a family shock was positively associated with educational attainment; this may reflect intra-household dynamics, such as older children taking on greater educational responsibilities when family structure changes (Saldarriaga, 2011).

Table 7

Model on child labor (ages 8-15) and educational attainment (age 21)

Linear regression	Estimated coefficients
Child labor (ref. did not work)	
Child labor (1 round)	-0.39
Child labor (more than 1 round)	-0.68**
Mother's education	0.45*
Welfare level (wave 1)	4.10***
Change in welfare level (rounds 3 and 1)	2.79***
Family shock	0.24
Lenguage (indigenous)	-0.11
Sex (female)	0.03
Geographic region (ref. coast)	
Geographic region (highlands)	1.04***
Geographic region (jungle)	0.96***
Migration (ref. rural to urban area)	
Migration (urban to rural area)	-1.39
No migration	-0.54
Skills (read and write)	0.92***
Domestic work (ref. 1 or 2 rounds)	
Domestic work (3 or 4 rounds)	0.52
Domestic work (all the rounds)	0.44
F	8.20
Sample size	540

Note. *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

In my Structural Equation Model (SEM), I assess the association of maternal education mediated by children's labor dynamics on children's educational attainment. First, table 8 presents the results from the first equation of the structural equation model, assessing the association of maternal education on children's labor participation dynamics. Second, table 9 presents the results for the second equation in the structural equation model, estimating the association of child labor dynamics on educational attainment. Lastly, figure 2 depicts the SEM model.

Table 8

Structural model: Estimation of the association of maternal education on the dynamics of child labor participation

Ordinal logit regression	Estimated coefficients
Mother's education	0.07
Welfare level (1 round)	-3.45***
Change in welfare level (rounds 3 and 1)	-2.00***
Family shock	-0.26
Lenguage (indigenous)	0.85***
Sex (female)	0.01
Geographic region (ref. coast)	
Geographic region (highlands)	0.57***
Geographic region (jungle)	0.34
Migration (ref. rural to urban area)	
Migration (urban to rural area)	1.63*
No migration	0.29
Skills (read and write)	-0.71**
Domestic work (ref. 1 or 2 rounds)	
Domestic work (3 or 4 rounds)	0.23
Domestic work (all the rounds)	0.43
Cut1	-2.36
Cut2	-0.49
Sample size	554

Note. *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

Table 9

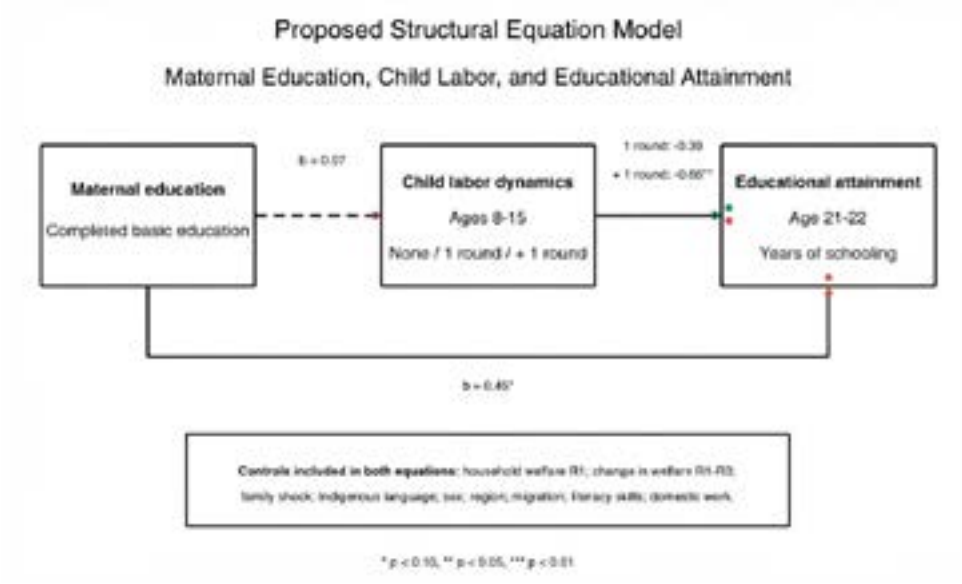
Structural model: Estimation of the association of child labor (ages 8–15) on educational attainment (age 21)

Linear regression	Estimated coefficients
Child labor (ref. did not work)	
Child labor (1 wave)	-0.38
Child labor (more than 1 round)	-0.66**
Mother's education	0.45*
Welfare level (wave 1)	4.11***
Change in welfare level (rounds 3 and 1)	2.79***
Family shock	0.24
Lenguage (indigenous)	-0.11
Sex (female)	0.03
Geographic region (ref. coast)	
Geographic region (mountains)	1.04***
Geographic region (jungle)	0.96***
Migration (ref. rural to urban area)	
Migration (urban to rural area)	-1.39
No migration	-0.54
Skills (read and write)	0.92***
Domestic work (ref. 1 or 2 rounds)	
Domestic work (3 or 4 rounds)	0.52
Domestic work (all the rounds)	0.44
Sample size	540

Note. *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

Figure 2

Structural Equation Model Integrated



The findings diverge from those shown in the initial models. First, maternal education no longer shows a significant association with child labor dynamics, although a significant association still holds with educational attainment (b = 0.45), suggesting a direct association with the outcome instead of one mediated by child labor dynamics. Similarly, child labor was negatively associated with educational attainment. Working in multiple rounds was significantly associated with fewer years of schooling (b = 0.66), although this associating was not significant for those children who reported working only in one of the rounds.

Regarding the control variables, household well-being was significantly associated in both models, reinforcing its importance for the entry into child labor, as well as its later educational attainment. Consistently, improvements in well-being between rounds 1 and 3 were also significantly associated. Literacy skills measured in rounds 1 and 2 were linked to one more year of education, highlighting the long-term importance of early academic ability. Literacy skills are also inversely related to sustained child labor, suggesting that poor academic performance may prompt families—particularly mothers—to prioritize income-generating activities over schooling. First language and region of residence were also relevant covariates in the SEM model. It is relevant to outline that, as in earlier models, several control variables were included but did not reach statistical significance. Nonetheless, their direction of the association remained consistent with theoretical expectations and prior empirical findings.

Robustness checks

Although attrition is an important consideration in any longitudinal study, several features reduce concern regarding the results presented in this study. Young Lives was designed as a poverty-focused panel and intentionally oversampled poor communities rather than aiming to be nationally representative. The Peruvian sample was selected from geographic sentinel sites, with children randomly selected within clusters, allowing the study to capture meaningful variation among children growing up in disadvantaged contexts. In this study, retention in the older cohort remained relatively high: of 714 children observed at baseline, we were able to include 580 for the main analysis. As a sensitivity check, I estimated a Heckman selection model predicting educational attainment while modeling retention in the analytic sample.

The inverse Mills ratio was not statistically significant, suggesting limited evidence that non-random attrition biases the estimate association between child labor dynamics, maternal education, and later education attainment. The model was similar to the OLS estimates, supporting the robustness of the main results for attrition. Also, the test of independent equations was not statistically significant (p = 0.801), indicating no evidence that unobserved factors predicting retention were correlated with unobserved factors predicting educational attainment. In that sense, selective attrition is

unlikely driving the main findings. Nevertheless, because Young Lives is not nationally representative and the Heckman model does not rely on a strong exclusion restriction, the findings should be interpreted as longitudinal associations within a poverty-focused cohort rather than the population-level estimates for all Peruvian children.

Discussion

This study examined the influence of maternal education on children's participation in child labor and its subsequent association on educational attainment, using longitudinal data from the Young Lives study in Peru (2002-2016). Child labor was conceptualized dynamically, capturing entry, exit, and persistence across three categories. The results indicate that mothers who completed basic education significantly reduced their children's likelihood of working in multiple rounds and marginally reduced single-round participation, although this route was contested in the SEM specification. That is, maternal education appears to have a direct association with children's educational attainment, but not on the children's labor dynamics after controlling for several covariates. This could suggest that children's labor dynamics, although highly associated with what maternal education can provide (e.g., better household income, more participation in the household decisions), may respond to the family economic needs even if the mother completed basic education or not.

Relatedly, child labor was negatively associated with educational attainment. Children who worked in multiple rounds completed fewer years of schooling, although this association was not found for those who worked in only one of the rounds. These results may suggest that child labor can have long-term negative associations when it has been persistent throughout the child's early life, but not when it was temporal or for small periods of time. That is, children who worked in more than 1 round of interview, which suggest a consistent interaction with labor throughout their early life, may have been more affected by dedicating less time to school or not been able to engage with classes in a consistent way. Although the mechanisms are not tested here, future research could engage with the potential mechanisms that explain why persistent, but not short-term, involvement with child labor is associated with educational attainment.

Despite its contributions, this study faces several limitations. The Young Lives dataset, while representative of children in poverty, is not nationally representative and offers data only at survey intervals. National datasets like National Household Survey (ENAHO) may take this research further, enabling broader generalizations and year-by-year tracking. Additionally, the measure of child labor is limited by the available information on the dataset. This study was not able to explore the intensity of the tasks, the time dedicated, risk, type of occupation, or its actual impact on school-related topics, such as attendance. Similarly, in this study we did not tested for reversed causality given the structure of the collected information through rounds and the temporally situated outcomes measured (e.g., it

was non-logical to test how educational attainment was associated with engagement with child labor given the temporal order in which educational attainment was measured). However, future research should investigate how omitted covariates, and family related factors, could be driving the associations found in this study, particularly for the population mostly exposed to child labor, those in a situation of poverty.

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