Prospects
https://doi.org/10.1007/s11125-021-09541-1

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The roles of childhood circumstances and schooling on adult reading skills in low- and middle-income countries

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Accepted: 15 January 2021

Abstract The article investigates the roles of childhood circumstances (including parental socio-economic status, parental education, parental engagement, and sibling composition) and schooling on adult reading skills in low- and middle-income countries. Using regression models and data from surveys of urban labor-force participants in Armenia, Bolivia, Colombia, Georgia, Ghana, Kenya, Ukraine, and Vietnam, the study reaches several conclusions. First, childhood circumstances predict adult reading skills in all eight countries. Second, among the childhood circumstances variables, parental education is the most frequent predictor of adult reading skills. Third, schooling is at least as important as the childhood circumstances variables in explaining adult reading skills. Finally, an extra year of schooling is associated with larger gains in adult reading skills in the relatively lower income countries.

We are very grateful to an anonymous referee and to *Prospects* Executive Editor, Simona Popa. We also thank Luis Benveniste, Christian Bodewig, Marc DeFrancis, Deon Filmer, Sean Kelly, Juan Manuel Moreno, David Newhouse, Harry Patrinos, Sebastian Taborda, Namrata Tognatta, Halsey Rogers for helpful comments and discussions. We acknowledge Marc DeFrancis for editorial assistance and Ji Liu for research assistance. The World Bank financially supported this study. The findings, interpretations, and conclusions expressed in this study are entirely those of the authors.

The original data are freely downloadable from the World Bank's STEP Skills and Measurement Program website (http://microdata.worldbank.org/index.php/catalog/step). The authors are happy to share the data and code with bona fide researchers. Please email the authors for access to the data and code.

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Keywords Childhood · Social mobility · Adult literacy · Cognitive skills · Reading proficiency

Research on social mobility undertaken in high-income countries has established the critical role that childhood economic and social circumstances play in determining adult outcomes (Almond et al. 2018; Chetty, Hendren, Lin, Majerovitz, and Scuderi 2016; Green, Green, and Pensiero 2015). With large segments of the population across the world remaining in poverty from one generation to the next, identifying effective interventions to facilitate social mobility has been a long-standing policy concern (Glewwe 2013; Milanovic 2016; Ravallion 2014; Torche 2014; World Bank 2016). Schooling has long been considered one of those powerful interventions, able to reduce the influence of childhood circumstances and to improve adult outcomes (Schiefelbein and Farrell 1984; UNESCO 2015; World Bank 2018). Indeed, global and national education expansion efforts since World War II were often based on the premise that schooling improves social mobility (Barro and Lee 2015; Schultz 1980). Nevertheless, while this has been empirically established in high-income countries, relatively little quantitative research has been undertaken to confirm the linkages between childhood circumstances, schooling, and adult outcomes in low- and middle-income countries. A key reason for this is limitations in the available data: cross-sectional surveys of adults do not typically ask questions about childhood, and longitudinal data from childhood to adulthood are rare. The resulting lack of comparative evidence has made it difficult to assess the nature of social mobility within and across low- and middle-income countries.

In this article, we assess the importance of childhood circumstances in determining adult reading skills in low- and middle-income countries. To do so, we use regression models and cross-sectional data from the World Bank's Skills Towards Employability and Productivity (STEP) surveys of adult labor-force participants in urban areas in Armenia, Bolivia, Colombia, Georgia, Ghana, Kenya, Ukraine, and Vietnam. The STEP surveys combine desirable items found in traditional household surveys, student assessments, and labor-force surveys. Notably, the surveys gather data on childhood circumstances, including retrospective data on parental socio-economic status, parental education, parental engagement, and sibling composition. To measure adult reading skills in the STEP surveys, we use a reading-proficiency assessment that measures real-world cognitive skills (European Commission 2013).

Consistent with existing research from high-income countries (Almond, Currie, and Duque 2018; Blanden 2013; Putnam 2015), we find that childhood circumstances variables are statistically associated with adult outcomes (in this case, adult reading skills) in all eight countries. Second, among the childhood circumstances variables, parental education is the most frequent predictor of adult reading skills. Third, an extra year of schooling is associated with larger gains in skills in the relatively lower income countries. Finally, the statistical tests suggest that the effects of childhood circumstances on adult reading skills operate both directly and indirectly through schooling.

We make several contributions to the research. The representativeness of the STEP data permits us to make generalizations that were not possible with small-scale quantitative studies of education and social mobility in low- and middle-income countries (e.g., Schiefelbein and Farrell 1984). While the literature on social mobility in low- and middle-income countries has focused on adult educational attainment (e.g., Asadullah and Yalonetsky 2012; Aydemir and Yazici 2019; Azam and Bhatt 2015; Hertz, Jayasundera, Piraino,

Selcuk, Smith, and Verashchagina 2007), we contribute to the emerging literature that considers adult cognitive outcomes (e.g., Shafiq, Devercelli, and Valerio 2018). Furthermore, through our comparative approach, we add to the newer literature that addresses contextual differences across countries (e.g., Shafiq, Toutkoushian, and Valerio 2019). Lastly, the rich data on childhood circumstances allow us to contribute to the comparative-education literature on the determinants of adult literacy (Comings 2019; Wagner 2010).

Conceptual framework

To guide our analysis of the roles of childhood circumstances and schooling, we begin with a conceptual framework that draws from the social-mobility and intergenerational-inequality frameworks of Goldthorpe (2014), Roemer (1998), and Young (1958). We focus on two parts of the framework: (1) the *direct effect* of childhood circumstances on adult outcomes; and (2) the *indirect effect* of childhood circumstances on adult outcomes via schooling.

Following the seminal contributions of Gary Becker (e.g., Becker and Tomes 1986) and James Coleman (e.g., 1988), we consider the following childhood circumstances that affect schooling and adult cognitive skills: parental socio-economic status, parental education, parental engagement, and sibling composition. *Parental socio-economic status* typically refers to parental income and wealth, and it affects schooling and adult cognitive skills because it leads to greater access to books, school supplies, nutrition, health care, and shelter. *Parental education* simply refers to parental educational attainment such that better-educated parents impart knowledge and habits that help children with schooling and cognitive skill development. *Parental engagement* refers to the relationships children have with parents that enhance their sense of security and support with schooling and cognitive skill development. Finally, *sibling composition* is relevant inasmuch as the presence of siblings can affect schooling and cognitive skills through the availability of parental time and study opportunities with siblings (Juhn, Rubinstein, and Zuppann 2015).

Indirectly, childhood circumstances affect schooling, which in turn affects adult cognitive skills. In more technical terms, schooling is the mediator variable. Individuals from advantaged childhood circumstances are able to afford both a greater quantity and higher quality of schooling through better school cultures and more instructional inputs, thereby increasing their odds of having better adult cognitive skills. Similarly, parental education and parental engagement with knowledge, habits, and support lead to more years of schooling, which in turn raises adult cognitive skills. The presence of siblings may also affect cognitive skills via schooling in positive ways (e.g., studying with an elder sibling) and negative ways (e.g., reduced attention from parents).

In examining the *direct effects* of childhood circumstances on adult cognitive skills, we are focusing on obstacles to adult cognitive skills regardless of the amount of schooling. Let us consider two people with identical levels of schooling but different childhood circumstances. The person with less-educated and lower-income parents does not have strong access to the information on school quality and social networks (e.g., educated role models) that result in higher cognitive skills.

The *net effect* of childhood circumstances depends on the strength of both the direct and the indirect effects. In a country with social immobility, the direct effect of childhood circumstances on adult cognitive skills may be so strong that while schooling helps it does

Table 1 Country backgrounds

	Armenia	Bolivia	Colombia	Georgia	Ghana	Kenya	Ukraine	Vietnam
Population, millions	3.00	10.56	47.79	4.50	26.78	44.86	45.36	90.73
GDP growth rate	4.7%	5.8%	4.5%	4.8%	6.9%	5.2%	−2.2%	5.5%
Per-capita income	$3620	$3236	$7904	$3670	$1443	$1358	$3083	$2052
Gini coefficient	31.5	48.1	53.5	40.0	42.8	47.7	24.6	38.7
Social mobility rank	56th	–	65th	53rd	70th	–	46th	50th

Sources: World Development Indicators (WDI), 2015: https://databank.worldbank.org/reports.aspx?source=world-development-indicators; Social Mobility Report, 2020: https://www.weforum.org/reports/global-social-mobility-index-2020-why-economies-benefit-from-fixing-inequality.

Notes: The population, growth, and income numbers were obtained from the WDI and correspond to the STEP survey years. The Social Mobility rankings were obtained from the Social Mobility Report 2020; earlier versions (corresponding to the STEP survey years) do not exist. The Social Mobility Report 2020 ranked 82 countries and did not include Bolivia, Kenya, and other low-income countries.

not ultimately overcome disadvantaged childhood circumstances. By contrast, in a country with social mobility, disadvantaged individuals who were able to acquire schooling can overcome disadvantaged childhood circumstances. In other words, as long as individuals from disadvantaged and advantaged circumstances have the same level of schooling, their adult skills should be similar; Young (1958) described such societies as skills-based meritocracies. In the following sections, we consider the social-mobility contexts of the eight countries and examine the indirect and direct effects of childhood circumstances in our analyses.

Country contexts

A feature of the comparative approach is that context matters. In the case of our study, we expect that the roles of childhood circumstances and schooling should vary by regional and economic characteristics. The eight countries we review represent several world regions: East Africa (Kenya), West Africa (Ghana), South America (Bolivia and Colombia), Southeast Asia (Vietnam), Eurasia (Armenia and Georgia), and a former Soviet state (Ukraine). Table 1 presents economic metrics for these countries, such as per-capita incomes, economic growth rates, Gini coefficients, and social-mobility rankings.

Since the STEP data were collected between 2012 and 2014, we use the World Bank's 2014 income classifications. Of the eight countries considered in this study, the only low-income country (defined as having per-capita income below US$1046) is Kenya ($840). The lower-middle-income countries (defined as having per-capita incomes of between $1046 and $4125) are Armenia ($3720), Bolivia ($2220), Georgia ($3280), Ghana ($1550), Ukraine ($3500), and Vietnam ($1400). The sole upper-middle-income country (defined as having a per-capita income of between $4126 and $12,735) is Colombia ($6990). The link between social mobility and per-capita income is conceptually unclear. In the lower-income countries such as Ghana and Kenya, disadvantaged circumstances entail severe hardships such as starvation, which make it harder to achieve better adult outcomes. Yet, there may actually be greater potential for upward mobility in the lower-income countries:

Since larger shares of people have less schooling, people should enjoy large gains from an extra year of schooling.

Strong economic growth rates are potentially associated with improving social mobility for those with greater schooling. The mean economic growth rate in the 2012–2014 period exceeds 4.5 percent for all countries except Ukraine, which experienced a recession and a negative growth rate of 2.2 percent. These figures suggest that holding all else constant, the economic changes are conducive to overcoming disadvantaged childhood circumstances in the seven countries with high economic growth rates.

Gini coefficients are a common proxy for social mobility (Milanovic 2016). In the context of this study, income inequality is linked with barriers to acquiring schooling and attaining better adult outcomes. Gini coefficients range from 0 (perfectly equal) to 100 (perfectly unequal), and coefficients of 40 and above are regarded as the international warning level for dangerous levels of income inequality. We would expect childhood circumstances to be a stronger predictor of adult outcomes in severely unequal countries such as Colombia (Gini = 53.5), Bolivia (48.1), Kenya (47.7), Ghana (42.8), and Georgia (40.0). It follows that childhood circumstances should matter less in countries with relatively equal income distribution, which include Vietnam (38.7), Armenia (31.5), and especially Ukraine (24.6).

We also report the World Economic Forum's social-mobility rankings of eighty countries (World Economic Forum 2020). These rankings are based on the following components: health, education access, education quality and equity, lifelong learning, technology access, work opportunities, fair wage distribution, working conditions, social resilience, and inclusive institutions. Given the data requirements to construct the index, the countries selected for the index are high-income and middle-income countries; lower-income

Table 2 Variable names and descriptions

Variable	Description
Dependent variable	
Reading	Adulthood literacy score in ETS-administered reading assessment, 0–500 range
Childhood circumstances	
Parentses1	Dummy = 1 if family status during childhood is "poorest"
Parentses2	Dummy = 1 if family status during childhood is "middle class"
Parentses3	Dummy = 1 if family status during childhood is "upper middle class" or "rich"
Parentedu	Index = 1 if most-educated parent has primary; = 2 if most-educated parent has secondary; = 3 if most-educated parent has higher education
Parentengage	Dummy = 1 if parents are "highly engaged" in *i*'s education during childhood
Elderbrothers	Number of elder brothers
Eldersisters	Number of elder sisters
Youngbrothers	Number of younger brothers
Youngsisters	Number of younger sisters
Other independent variables	
Schooling	Years of schooling
Age	Age
Age2	Age squared

countries such as Bolivia and Kenya were not selected. There is some correlation between Gini coefficients and social-mobility rankings; given that Bolivia and Kenya had Gini coefficients higher than the lowest ranked country in our study (Colombia, which ranked seventieth), we suspect that both countries would rank at least as low as Colombia. As Table 1 shows, the rankings of the other countries included in our study range from forty-sixth (Ukraine) to seventieth (Ghana). Again, we expect to observe weaker correlations between childhood circumstances and adult reading skills in countries with higher social mobility.

Data

We use the STEP Skills Measurement surveys, collected between March 2012 and July 2014. The surveys are similar to the OECD's Programme for the International Assessment of Adult Competencies (PIAAC) surveys but are conducted in low- and lower-middle-income countries. The data include information on household characteristics and in-depth information from a randomly selected member of each household on their education, skills, and employment (Pierre, Sanchez, Valerio, and Rajadel 2014). The household questionnaire was administered through paper and pencil in all countries except Colombia and Kenya, where computer-assisted personal interviews were carried out. The reading literacy assessment was systematically administered through paper and pencil. We use sampling weights to ensure that the members of the sample contribute to the population estimates only in the proportions in which they exist in the population. In detail, the STEP survey uses basic population weights, which have been estimated to represent the urban population of the countries surveyed. Thus, in the following analyses, we apply population weights. Although the STEP survey includes individuals in the 15–64 age group, we restrict our analysis to labor-force participants in the 20–64 age group. Table 2 presents the STEP survey variables for our analysis.

Dependent variable: Adult reading skills

Adult reading proficiency is a type of cognitive skill. Labor economists consider reading to be a form of human capital and have documented its labor-market benefits (Chiswick and Miller 2007). In STEP, the reading-proficiency variable is constructed using a psychometrically proven assessment designed by the Educational Testing Service (ETS) and is scored on the same scale as the test in the OECD's PIACC. According to the PIAAC Literacy Expert Group (2009), the ETS assessment approach goes beyond the "literate versus illiterate" dichotomy in the following ways: The material is placed in adult contexts and is not school-based; the questions are task-oriented, requiring the respondent to access and identify information as well as to interpret it; and it has varying levels of difficulty. Compared to self-reported approaches (where individuals typically exaggerate their own proficiency), the STEP assessment approach reduces measurement error. The assessment also takes into consideration the difficulties of measuring an individual's true proficiency in large-scale assessment data in education (von Davier, Gonzalez, and Mislevy 2009). Accordingly, it is modeled using Item Response Theory, employing a scale that ranges from 0 to 500 and presents multiple values for each respondent. We follow the plausible-values methodological guidelines of Macdonald (2008) and Taborda (2014) in all computations.

Explanatory variables: Childhood-circumstances, control, and schooling variables

As explained earlier, we consider four categories of childhood-circumstances variables: parental socio-economic status, parental education, parental engagement, and sibling composition. The indicator variables on parental socio-economic status (*parentses1*, *parentses2*, *parentses3*) reflect the parents' income, expenditure, and assets when the individuals surveyed were age 15. The index variable for parental education (*parentedu*) corresponds to the highest level of education of the most-educated parent: primary education, secondary education, or higher education. We construct a parental-engagement variable (*parentengage*) using the STEP question, "When you were attending primary school, did either of your parents/guardians actively keep themselves informed of your exam/test results or grades?" Response choices include "Yes, always or almost always", "Yes, sometimes", and "No, never or almost never". Given the high prevalence of the "Yes" responses, we code high parental engagement only for the response, "Yes, always or almost always". To measure sibling composition, we construct variables on the number of elder brothers (*elderbrothers*), elder sisters (*eldersisters*), younger brothers (*youngbrothers*), and younger sisters (*youngsisters*). We acknowledge the possibility of reference bias arising because of retrospective reporting. We have compared the distribution of socio-economic status at age 15 to the distribution of current assets as part of our preliminary analysis. Using information on dwelling characteristics and types of assets, we employed factor analysis to create an asset index for each of the countries in the sample. Measures of assets and dwellings with extremely skewed distributions, agricultural assets, and those showing low factor loadings were excluded from the asset index. We find no evidence that the retrospective data are upwardly biased.

STEP data limitations prevent us from considering some potentially important social-origin variables, such as culture, race, and ethnicity (Putnam 2015). Thus, we are cautious about the generalizability of our findings. Indeed, the fact that STEP surveys contain urban individuals implies that our results may not hold for rural individuals. Due to cultural and ethnic differences, rural populations face serious obstacles in their quest for better adult outcomes. Related to this, it may be the case that schooling can potentially improve the adult outcomes of some racial and ethnic groups but not others. However, we must leave the inclusion of rural individuals and racial and ethnic subpopulation analyses for future research.

Regarding control variables, we include age and age squared. We also separately analyze males and females because the relationship between childhood circumstances and adult reading may vary depending on gender (Chetty, Hendren, Lin, Majerovitz, and Scuderi 2016)

To measure the schooling variable, we use the question regarding years of formal education, which means we focus on the quantity of schooling. STEP data limitations prevent us from considering quality and input aspects of schooling, such as textbook availability, class size, and per-pupil expenditure (Farrell and Schiefelbein 1985; Grawe 2010). Thus, we are unable to address the extent to which differences in schooling quality and inputs contribute to differences in adult outcomes. The STEP data also do not allow us to consider community variables during childhood that may have short-term and long-term effects such as infrastructure, health-care facilities, and marriage cultures (Chudgar and Shafiq 2010).

Summary statistics

Tables 3 and 4 present the variable means and standard deviations (in parentheses) for male and female labor-force participants. We use the sample weights provided in STEP. Regarding the outcome variable, reading proficiency ranges from 172 to 268 and is highest in the former Soviet Union countries of Ukraine, Armenia, and Georgia. Within Latin America, scores in Colombia are higher than those in Bolivia. Within Sub-Saharan Africa, scores in Kenya are higher than those in Ghana, particularly for females. Females outperform males in Armenia, Georgia, and Ukraine. In Vietnam, there is gender parity in reading-proficiency scores. Within countries, adult reading-score variability (as measured by the standard deviations) is typically higher in countries with income variability (as measured by Gini coefficients) and lower social-mobility ranking (see Table 1).

As expected, individuals in lower-income countries report lower means for the social-origin variables, such as the share identifying high parental socio-economic status (*parentses3*) and parental education (*parentedu*). However, there is no relationship between parental engagement (*parentengage*) and a country's income level. As documented in the demography literature, the mean number of siblings is considerably larger in lower-income countries (UNFPA 2016). The mean years of schooling are also lower in lower-income countries, and the standard deviations are relatively smaller in countries with less income inequality and more social mobility.

Table 3 Variable means and standard deviations (in parentheses), male labor-force participants

	Armenia	Bolivia	Colombia	Georgia	Ghana	Kenya	Ukraine	Vietnam
Dependent variable								
Reading	255	207	238	240	172	188	268	246
	(34)	(72)	(57)	(47)	(93)	(84)	(41)	(57)
Childhood circumstances								
Parentses1	.105	.357	.331	.128	.171	.244	.186	.326
Parentses2	.498	.571	.566	.575	.638	.628	.625	.608
Parentses3	.396	.072	.103	.297	.191	.128	.189	.066
Parentedu	2.48	1.32	1.44	2.61	2.03	1.45	2.42	1.21
Parentengage	.752	.806	.822	.309	.661	.574	.866	.899
Elderbrothers	.50	.95	1.04	.31	1.56	1.56	.35	1.03
Eldersisters	.56	1.01	.98	.47	1.39	1.43	.29	1.00
Youngbrothers	.49	.99	.90	.43	1.25	1.19	.27	.89
Youngsisters	.45	.83	.84	.35	1.08	1.06	.28	.81
Other variables								
Schooling	13.4	12.6	10.5	14.7	11.8	10.2	13.2	11.5
	(2.9)	(4.2)	(3.8)	(3.0)	(4.2)	(4.5)	(2.1)	(4.0)
Age	40.0	36.4	36.4	39.2	33.6	32.9	38.6	40.1
	(12.5)	(11.6)	(11.9)	(12.5)	(10.2)	(9.6)	(11.7)	(11.3)
Agesq/100	17.8	14.7	14.8	17.0	12.5	12.0	16.2	17.5
Observations	494	690	832	626	518	1355	518	918

Source: Authors' analysis based on STEP data for ages 20–64.

Notes: Data are weighted to account for survey design effects. Sampling in Colombia and Vietnam are only in large metropolitan cities.

Table 4 Variable means and standard deviations (in parentheses), female labor-force participants

	Armenia	Bolivia	Colombia	Georgia	Ghana	Kenya	Ukraine	Vietnam
Dependent variable								
Reading	258	195	234	251	128	174	275	244
	(35)	(82)	(56)	(41)	(92)	(84)	(37)	(59)
Childhood circumstances								
Parentses1	.058	.314	.304	.057	.155	.237	.152	.313
Parentses2	.479	.599	.577	.470	.571	.643	.660	.611
Parentses3	.464	.087	.120	.473	.274	.119	.188	.076
Parentedu	2.57	1.31	1.37	2.71	2.05	1.45	2.42	1.24
Parentengage	.804	.783	.813	.894	.641	.594	.880	.882
Elderbrothers	.51	1.06	1.07	.39	1.31	1.58	.33	1.08
Eldersisters	.59	1.00	.89	.45	1.24	1.38	.28	1.08
Youngbrothers	.56	1.04	.94	.42	1.16	.96	.31	.91
Youngsisters	.61	.95	1.02	.43	1.03	1.04	.25	.89
Other variables								
Schooling	14.0	11.5	10.2	15.3	10.2	9.4	13.7	11.3
	(2.6)	(4.6)	(3.7)	(2.7)	(4.5)	(4.4)	(2.1)	(4.0)
Age	39.6	35.4	37.2	39.4	33.6	30.9	40.1	39.0
	(12.4)	(10.9)	(11.7)	(11.9)	(9.4)	(8.4)	(11.7)	(10.7)
Agesq/100	17.2	13.8	15.3	16.9	12.2	10.3	17.3	16.4
Observations	889	864	908	929	592	1224	842	1220

Source: Authors' analysis based on STEP data for ages 20–64.

Notes: Data are weighted to account for survey design effects. Sampling in Colombia and Vietnam are only in large metropolitan cities.

Methodology

To study the relationship between childhood circumstances and adult reading scores, we use ordinary least squares (OLS) models without a schooling variable and models with a schooling variable. We refer to the model without schooling as Model 1 and estimate the following:

$$Y = \theta_0 + \boldsymbol{\theta}_1 \mathbf{X} + \varepsilon_c.$$

This regression function decomposes the adult reading-skills outcome (Y) into the following components: the constant term (θ_0); the regression coefficients ($\boldsymbol{\theta}_1$) measuring the changes in outcome associated with changes in the determinants (X), which include childhood-circumstances and control variables; and the residuals unexplained by the models (ε_c). The childhood-circumstances coefficients reflect both the direct and indirect effects of childhood circumstances. We expect to find individuals with privileged childhood circumstances enjoying higher adult reading proficiency.

For Model 2, we estimate:

$$Y = \beta_0 + \boldsymbol{\beta}_1 \mathbf{X} + \beta_2 \text{schooling} + \varepsilon_w$$

In this case, the regression function decomposes the adult reading-skills outcome (Y) into the following components: the constant term (β_0); the regression coefficients ($\boldsymbol{\beta}_1$)

measuring the changes in outcome associated with changes in the determinants (X), which include childhood-circumstances and control variables; the coefficient (β_2) measuring changes in outcome associated with changes in the years of schooling (*schooling*); and the residuals unexplained by the models (ε_w). By controlling for schooling, the childhood-circumstances coefficients provide suggestive evidence of the direct effects of childhood circumstances. A side-by-side comparison of the coefficients from Model 1 and Model 2 provide suggestive evidence of the "direct effects plus indirect effects" and "direct effects only" respectively.

To test whether all the childhood-circumstances coefficients are zero, we conduct Wald tests after running each regression. The null hypothesis is that the childhood-circumstances coefficients jointly equal zero. The alternative hypothesis is that the childhood-circumstances coefficients jointly are not equal to zero. Statistically significant test statistics indicate that the null hypothesis is rejected and that childhood circumstances collectively play a role in determining adult reading skills.

Results: Childhood circumstances, schooling, and adult reading skills

Tables 5 and 6 present the OLS results on adult reading-skill determinants among male and female labor-force participants. For each country, we present Model 1 results without the schooling variable and Model 2 results with the schooling variable. We present adjusted Wald tests of joint significance of the childhood circumstances variables (*parentses2*, *parentses3*, *parentedu*, *parentengage*, *elderbrothers*, *eldersisters*, *youngerbrothers*, and *youngersisters*). Again, a statistically significant Wald test suggests that childhood circumstances matter in determining adult reading skills. The tables also present the R-squared values, such that comparison of the R-squared values in Model 1 and Model 2 reveal the additional share in variation explained by schooling. Furthermore, cases where the Wald test is significant for Model 1 but insignificant for Model 2 provide statistical evidence that childhood circumstances affect adult skills indirectly, through schooling, but not directly.

To allow comparisons between countries, we have chosen to preserve the original literacy scores and not standardize. To understand the magnitude of the coefficients, each coefficient should be compared to the mean reading score and standard deviation (SD) presented in Tables 3 and 4. According to Table 3, the mean literacy scores for males range between 172 (SD 93) for Kenya and 255 (SD 34) for Armenia. Table 4 showed that the mean literacy scores for females range between 174 (SD 35) for Kenya and 258 (SD 84) for Armenia.

Parental socio-economic status and adult reading skills

The parental socio-economic status coefficients suggest that growing up with medium socio-economic status (*parentses2*) or high socio-economic status (*parentses3*) is associated with higher reading skills than growing up with low socio-economic status (*parentses1*), holding other observable characteristics constant. The results show that parental socio-economic status typically matters more for determining female reading skills than it does for determining male reading skills. We also find that once we control for schooling, socio-economic status coefficients are substantially smaller in magnitude or no longer

Table 5 OLS results: childhood circumstances as predictors of adult reading proficiency, male labor-force participants

	Armenia		Bolivia		Colombia		Georgia		Ghana		Kenya		Ukraine		Vietnam	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Parentses2	4.8	3.3	12.3	3.7	7.4	−3.3	−4.6	−4.4	8.9	−15.6	14.8**	6.8	−7.7	−7.5	23.1**	17.4**
	(6.3)	(6.2)	(7.6)	(7.6)	(6.3)	(5.2)	(7.0)	(4.8)	(15.4)	(11.7)	(6.6)	(5.6)	(10.2)	(10.2)	(5.8)	(4.8)
Parentses3	5.1	1.5	3.7	3.7	10.1	−1.3	2.8	−6.3	2.3	−25.5*	17.0*	18.9**	−12.1	−12.8	20.4**	11.3
	(6.4)	(6.4)	(2.7)	(10.1)	(7.1)	(6.3)	(7.6)	(7.2)	(17.3)	(13.6)	(9.4)	(8.2)	(9.8)	(9.7)	(7.7)	(8.0)
Parentedu	10.0**	5.3	23.3**	12.8**	14.4**	.5	8.9	3.0	32.0**	14.4**	13.7**	−.1	20.6**	18.4**	15.6**	.3
	(3.3)	(3.5)	(2.9)	(2.9)	(3.6)	(3.4)	(3.8)	(4.0)	(7.3)	(6.0)	(2.5)	(2.5)	(8.5)	(8.8)	(2.6)	(2.8)
Parentengage	9.5**	7.8**	8.8	10.0	14.2**	3.3	14.4**	11.6**	44.9**	23.0**	25.5**	12.1**	−5.6	−5.3	6.6	7.4
	(3.8)	(3.7)	(9.5)	(9.5)	(6.1)	(5.6)	(5.2)	(5.3)	(11.3)	(9.6)	(5.4)	(4.89)	(8.5)	(8.5)	(9.8)	(8.7)
Elderbrothers	.2	.3	3.7	3.4	−1.5	−.9	−2.4	−2.2	−4.1	−2.6	.4	.6	−6.3	−6.3	1.5	2.0
	(2.2)	(2.1)	(2.7)	(2.5)	(2.0)	(1.7)	(3.3)	(4.3)	(3.1)	(2.5)	(1.8)	(1.5)	(6.3)	(6.3)	(1.8)	(1.5)
Eldersisters	2.3	2.4	−1.7	−2.9	−.7	−.6	−.6	−.7	−.5	−2.0	−6.3**	−3.8*	4.3	4.7	−.5	−.4
	(2.1)	(2.1)	(2.9)	(2.6)	(2.3)	(1.8)	(2.9)	(3.0)	(3.9)	(3.1)	(2.2)	(2.0)	(6.7)	(6.8)	(2.0)	(1.7)
Youngbrothers	2.0	1.5	−5.4	−3.8	−.6	1.6	2.4	3.5	1.1	2.6	4.5*	1.9	1.9	2.1	.6	2.1
	(2.4)	(2.3)	(3.4)	(.28)	(2.5)	(2.3)	(3.3)	(3.9)	(3.7)	(2.9)	(2.6)	(2.4)	(5.6)	(5.6)	(2.3)	(2.1)
Youngsisters	−.2	.5	−1.7	4.9**	−2.6	−2.5	−4.5	−4.4	−.6	−.6	−2.7	−2.9	1.1	1.5	2.6	2.3
	(1.65)	(1.7)	(2.9)	(3.1)	(2.5)	(2.2)	(4.6)	(4.8)	(3.6)	(2.9)	(2.6)	(2.4)	(5.1)	(5.2)	(2.4)	(2.2)
Schooling	–	2.2**	–	7.4**	–	7.8**	–	3.3**	–	14.7**	–	9.5**	–	1.8	–	7.5**
		(.6)		(1.0)		(.7)		(.9)		(1.1)		(.6)		(1.2)		(.6)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	204.6**	196.0**	122.6**	89.1**	149.0**	136.2**	223.6**	213.5**	178.7**	106.5**	90.7**	63.5**	265.7**	245.2**	294.6**	205.9**
	(23.1)	(22.9)	(36.5)	(12.1)	(29.6)	(25.0)	(29.1)	(29.3)	(71.1)	(55.3)	(33.0)	(31.2)	(40.1)	(41.5)	(29.3)	(28.5)

Table 5 (continued)

	Armenia		Bolivia		Colombia		Georgia		Ghana		Kenya		Ukraine		Vietnam	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Wald test: Childhood-circum-stances variables	20.89**	10.69	100.69**	32.45**	46.72**	2.66	21.03**	10.69	44.59**	22.22**	105.60**	19.43**	9.87	7.67	62.7**	17.81**
Observations	494	494	690	690	832	832	626	626	518	518	1355	1355	518	518	918	918
R-squared	.055	.092	.318	.436	.191	.400	.073	.103	.147	.473	.099	.319	.071	.077	.155	.353

Source: Authors' analysis based on STEP data for ages 20–64.

Notes: Data are weighted to account for survey design effects. Standard errors in parentheses. Statistical significance: *p < 0.10; **p < 0.05. Controls include age and age squared.

Table 6 OLS results: childhood circumstances as predictors of adult reading proficiency, female labor-force participants

	Armenia		Bolivia		Colombia		Georgia		Ghana		Kenya		Ukraine		Vietnam	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Parentses2	9.4*	9.2	16.0*	3.6	12.7**	1.5	−4.8	−6.8	36.9**	15.3	20.8**	10.7*	5.7	3.9	18.4**	10.4**
	(5.5)	(5.5)	(8.8)	(8.5)	(5.6)	(5.5)	(6.1)	(6.0)	(11.8)	(11.3)	(6.5)	(6.3)	(5.7)	(5.4)	(4.4)	(4.2)
Parentses3	6.4	5.8	13.6	−2.9	17.8**	2.5	−3.4	−7.5*	34.7**	11.4	29.2**	10.1	2.9	.6	21.6**	11.9*
	(5.4)	(5.4)	(13.0)	(13.0)	(7.1)	(6.8)	(6.1)	(6.0)	(14.1)	(13.1)	(10.3)	(9.8)	(6.6)	(6.4)	(6.8)	(6.2)
Parentedu	8.6**	4.8*	21.5**	9.4**	14.0**	4.3	11.8**	7.9**	23.5**	7.7	20.7**	6.7**	1.8	−1.8	19.0**	4.8**
	(2.7)	(2.6)	(3.2)	(2.9)	(2.8)	(2.8)	(3.3)	(3.5)	(6.8)	(6.3)	(2.7)	(2.72)	(3.2)	(3.4)	(2.2)	(2.1)
Parentengage	−.6	−.7	16.4*	14.0*	10.8*	8.8	14.6**	12.7**	15.3	−.7	29.5**	14.8**	2.0	1.4	−.7	−.4
	(4.2)	(4.1)	(8.8)	(7.9)	(5.9)	(5.4)	(5.6)	(5.5)	(10.7)	(9.1)	(5.7)	(5.4)	(5.3)	(5.2)	(5.9)	(6.0)
Elderbrothers	.7	2.1	−1.8	−1.0	−.4	−.3	−3.3	−1.7	−2.0	−1.6	−3.9*	−1.9	−1.2	−.5	−1.2	.3
	(195)	(1.2)	(3.2)	(3.1)	(2.0)	(1.7)	(2.0)	(2.0)	(2.8)	(2.3)	(2.0)	(1.6)	(3.1)	(3.0)	(1.5)	(1.5)
Eldersisters	1.1	1.4	−1.7	−1.3*	−.4	−3.0	−1.7	−.8	−1.7	−2.2**	−1.5	−1.2	−.7	−.5	1.4	.5
	(1.7)	(1.7)	(2.8)	(2.4)	(2.0)	(1.9)	(2.1)	(2.1)	(3.1)	(2.7)	(2.0)	(1.8)	(3.2)	(3.2)	(1.5)	(1.4)
Youngbrothers	3.62	4.6**	−3.6	.1	−1.8	−1.4	−1.3	−.5	−9.7**	−5.1*	−2.5	−1.5	.3	1.4	−4.4**	−1.4
	(2.2)	(2.1)	(3.1)	(2.9)	(2.2)	(2.1)	(3.0)	(2.9)	(3.5)	(3.1)	(2.9)	(2.5)	(3.4)	(3.3)	(1.9)	(1.7)
Youngsisters	.2	.5	−4.4	−3.5	−4.3	−.6	.2	.8	2.3	2.2	−4.5*	−1.9	1.6	2.2	−4.4**	−1.9
	(1.9)	(1.9)	(3.6)	(3.4)	(.1.7)	(1.6)	(2.2)	(2.18)	(3.6)	(3.0)	(2.5)	(2.2)	(4.1)	(3.9)	(1.6)	(1.4)
Schooling	–	2.2**	–	7.5**	–	6.6**	–	2.9**	–	10.9**	–	8.4**	–	3.9**	–	7.5**
		(.5)		(1.1)		(.7)		(.7)		(1.2)		(.7)		(.94)		(.6)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	211.1**	183.3**	171.7**	127.9**	191.8**	157.3**	241.67**	228.6**	276.1**	151.0**	84.4**	39.5**	282.4**	228.7**	277.4**	191.0**
	(19.5)	(20.0)	(36.5)	(11.1)	(26.9)	(25.4)	(21.0)	(20.8)	(62.6)	(53.6)	(36.7)	(1.2)	(28.5)	(29.9)	(23.2)	(21.9)

Table 6 (continued)

	Armenia		Bolivia		Colombia		Georgia		Ghana		Kenya		Ukraine		Vietnam	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Wald test: Childhood circumstance variables	15.73**	9.77	100.13**	18.37**	82.16**	11.37	32.41**	14.0*	41.79**	7.42	172.0**	23.85**	2.51	2.06	131.6**	17.20**
Observations	889	889	864	864	908	908	929	929	593	593	1226	1226	842	842	1221	1221
R-squared	.049	.077	.223	.342	.226	.370	.060	.090	.149	.354	.180	.307	.012	.054	.208	.385

Source: Authors' analysis based on STEP data for ages 20–64.

Notes: Data are weighted to account for survey design effects. Standard errors in parentheses. Statistical significance: *p < 0.10; **p < 0.05. Controls include age and age squared.

statistically significant. In countries where there is statistical significance, we find evidence that large gains come from moving from the low socio-economic status (*parentses1*) to the middle socio-economic status (*parentses2*), but small or no gains emerge from moving from middle (*parentses2*) to high socio-economic status (*parentses3*). This suggests that growing up poor presents large disadvantages for adult reading proficiency, holding other observable factors constant.

Looking across the parental socio-economic status coefficients (*parentses2* and *parentses3*) for males in Table 5, we find that having medium parental socio-economic status (*parentses2*) is associated with 23.1 additional reading-proficiency score points in Vietnam, and that having high parental socio-economic status (*parentses3*) is associated with 18.9 additional proficiency points in Kenya. In contrast to these male results, Table 6 shows that parental socio-economic status is a stronger predictor of female reading skills. The Model 1 coefficients for parents' medium socio-economic status are positive and statistically significant for females in Colombia, Ghana, Kenya, and Vietnam; we also find statistically significant results at the 10 percent level in Armenia and Bolivia. The magnitudes of the associations typically range between 9.4 and 20.8 additional proficiency points; the 36.9 points observed in Ghana is an unusually large gain. Overall, we find that parental socio-economic status coefficients are larger and more likely to be statistically significant in countries with less social mobility.

The Model 2 results for males indicate that after controlling for years of schooling, parental socio-economic status is associated only with the adult reading skills of males in Vietnam, with the magnitude diminishing slightly to 17.4 additional proficiency score points. The unexpected 25.8-point negative association between socio-economic origin and reading skills in Ghanaian males may be attributable to the richest parents being owners of farms and businesses who divert their sons' interest away from academics to the family farm or business. The Model 2 results for females show that socio-economic status is statistically associated only at the 10 percent level in Kenya and Vietnam. We no longer observe patterns between parental socio-economic status and a country's income or social-mobility ranking.

Parental education and adult reading skills

According to the Model 1 results, parental education (*parentedu*) is the most consistent predictor of adult reading skills. Notably, we find statistically significant coefficients in all countries except Georgia (males only) and Ukraine (females only). Moreover, the coefficient sizes for an extra level of parental education are large, ranging from 10.0 to 32.0 additional reading-proficiency points for males and from 4.8 to 23.5 additional points for females. There are no patterns by the income level of the country for males, but for females there are larger associations in lower-income countries. But we do find that parental education is more likely to matter in countries with lower social mobility.

The Model 2 results show that after controlling for schooling, parental education is statistically associated with higher reading skills in Armenia (females only), Bolivia, Georgia (females only), Ghana (males only), Kenya (females only), and Ukraine (males only). In particular, an extra level of parental education is associated with 4.8 to 18.4 additional points in reading proficiency. Again, the magnitudes of the associations for females are larger in the lower-income countries. We no longer find a pattern between parental education coefficients and a country's social-mobility rankings.

Parental engagement and adult reading skills

The Model 1 results show that parental engagement (*parentengage*) is associated with adult reading skills in a few cases: Armenia (males only), Bolivia (females only), Colombia, Georgia (females only), Ghana (males only), and Kenya. The associations in the two African countries are especially large such that individuals with highly engaged parents rather than more weakly (low or medium) engaged parents scored an additional 25.5 to 44.9 points in reading proficiency.

The results from Model 2 provide some evidence of strong associations between parental engagement and adult reading skills, including in Armenia (males only), Bolivia, Georgia, Kenya, and Ghana (males only). These correlations range between 7.8 and 23.0 additional reading-proficiency points and are larger in the lower-income countries.

In terms of statistical significance, the Model 2 results are largely consistent with the Model 1 results. However, the coefficient sizes for parental engagement in Model 2 are substantially smaller, approximately one-half the size of those in Model 1. In terms of the level of adult reading skills, this suggests that schooling does not compensate for lower parental engagement. Both the Model 1 and Model 2 results provide evidence that parental engagement matters more for adult reading in countries with less social mobility.

Sibling composition and adult reading skills

In the conceptual framework, we observed that sibling composition had both positive and negative implications on adult skills. Our results are consistent with that observation. The results from Model 1 show that having an additional younger sister (*youngsisters*) is associated with slightly higher adult reading skills in Bolivia (males only). But having younger brothers (*youngbrothers*) is associated with lower reading skills in Ghana (females only) and Vietnam (females only); similarly, having an additional younger sister (*youngsisters*) is negatively associated with reading skills in Vietnam (females only). The positive and negative coefficients are small, with magnitudes between 1.3 and 3.8 additional (or fewer) reading-proficiency points for each additional sibling.

The Model 2 results show fewer instances of statistical association between sibling composition and adult reading skills, after controlling for schooling. Having younger brothers (*youngbrothers*) is associated with lower reading skills in Ghana (females only) but with higher reading skills in Armenia (females only). Growing up with younger sisters (*youngsisters*) is associated with higher reading skills in Vietnam (males only) and with lower skills in Bolivia (females only). The Model 1 and Model 2 results show no clear patterns between sibling composition and the country's income level or social-mobility ranking.

Schooling and adult reading skills

It is informative to assess the association between schooling and adult reading skills. According to the Model 2 results, schooling is positively and statistically associated with reading skills in all cases except among Ukrainian males. Holding other observable factors constant, males and females with an additional year of schooling have 2.2 to 14.7 additional reading-proficiency points as adults. The largest magnitudes are observed in Ghana and Kenya, followed by Vietnam and Bolivia. Thus, an extra year of schooling contributes more to skills in the countries with lower incomes and lower social mobility.

It is also informative to compare the coefficients of an additional year of schooling on learning to the widely reported coefficients of an additional year of schooling on earnings. Using the mean scores as anchors, an additional year of schooling increases adult reading scores by about 1–9 percent range, compared to the 6–11 percent range observed for earnings (Psacharopoulos and Patrinos 2018). (We thank an anonymous referee for suggesting that we compare the effects of schooling on literacy to the effect of schooling on earnings.)

Comparing the effects of schooling and childhood-circumstances variables on adult reading skills

The R-squared values provide insight into the extent to which schooling explains reading skills. We find that R-square values in Model 2 are between 30 and 220 percent larger than the R-squared values in Model 1, suggesting that the schooling variable is almost as important—and in some cases, far more important—than the childhood-circumstances variables in explaining adult reading skills. The differences between the Model 1 and Model 2 R-square values are largest in the lower-income countries, notably in Ghana, Kenya, and Vietnam. This suggests that schooling explains a relatively large share of adult reading proficiency in lower-income countries. It could also be argued that childhood circumstances provide a stronger explanation of adult reading scores in countries with less social mobility.

Wald test of joint significance of childhood-circumstances variables on adult reading skills

We wish to acknowledge the limitations of tests of joint significance (Loeys, Moerkerke, and Vansteelandt 2014) and therefore proceed cautiously with a series of Wald tests after each regression to explore the direct effects of childhood circumstances, the indirect effects of childhood circumstances (via schooling), and whether schooling can help overcome disadvantaged childhood circumstances. In Wald tests from Model 1, we find that childhood-circumstances variables are jointly significant for males and females in all countries except Ukraine.

To assess whether the associations are attributable to the direct or indirect effect of childhood circumstances, we consider the Wald test results from Model 1 with test results from Model 2. The fact that the Wald tests in Armenia, Colombia, Georgia, and Ghana (females only) are statistically significant in Model 1 but not in Model 2 suggests that childhood circumstances affect adult skills indirectly, through schooling, but not directly.

In contrast, the statistically significant Wald test results from both models in Bolivia, Kenya, and Vietnam suggest that childhood circumstances have both direct and indirect effects on adult reading skills in those countries. This suggests that schooling is necessary but not insufficient for overcoming disadvantaged circumstances in these relatively lower-income countries.

Summary and conclusion

In this study, we examined the roles of childhood circumstances and schooling on adult reading skills by using data on urban male and female labor-force participants in Armenia, Bolivia, Colombia, Georgia, Ghana, Kenya, Ukraine, and Vietnam. We reach several conclusions on childhood circumstances, schooling, and adult reading skills. In nearly all countries, several childhood-circumstances variables are strongly associated with adult reading skills, particularly parental socio-economic status and parental education. In the models that include schooling, the results suggest that childhood circumstances influence skills mainly through schooling. In comparisons across the eight countries, we find that childhood circumstances and schooling variables have larger and statistically significant associations with adult reading skills in countries with relatively lower income and lower social mobility. For example, an additional year of schooling is associated with the largest gains in adult reading skills scores in Ghana, Kenya, and Vietnam.

In conclusion, in all eight countries, we showed that childhood economic and social circumstances are associated with cognitive skills decades later. In terms of policy lessons, the study suggests that past global and national efforts to increase educational attainment have led to increased adult reading skills in at least two ways: (1) past generations of educated adults ensured that their children grew up to be adults with better reading skills; and (2) children with more years of schooling went on to possess greater reading skills during adulthood.

References

Almond, D., Currie, J., & Duque, V. (2018). Childhood circumstances and adult outcomes: Act II. *Journal of Economic Literature, 56*(4), 1360–1446.

Asadullah, M. N., & Yalonetzky, G. (2012). Inequality of educational opportunity in India: Changes over time and across states. *World Development, 40*(6), 1151–1163.

Aydemir, A., & Yazici, H. (2019). Intergenerational education mobility and the level of development. *European Economic Review, 116*(C), 160–185.

Azam, M., & Bhatt, V. (2015). Like father, like son: Intergenerational educational mobility in India. *Demography, 52*(6), 1929–1959.

Barro, R., & Lee, J.-W. (2015). *Education matters*. New York, NY: Oxford University Press.

Becker, G., & Tomes, N. (1986). Family capital and the rise and fall of families. *Journal of Labour Economics*, *4*(S), 1–39.

Blanden, J. (2013). Cross-national rankings in intergenerational mobility: A comparison of approaches from economics and sociology. *Journal of Economic Surveys, 27*(1), 38–73.

Chetty, R., Hendren, N., Lin, F., Majerovitz, J., & Scuderi, B. (2016). *Childhood environment and gender gaps in adulthood*. NBER working paper 21936. Cambridge, MA: National Bureau of Economic Research.

Chiswick, B., & Miller, P. (2007). *The economics of language: International analyses*. London and New York: Routledge.

Chudgar, A., & Shafiq, M. N. (2010). Family, community, and educational outcomes in South Asia. *Prospects, 40*(4), 517–534.

Coleman, J. (1988). Social capital and the creation of human capital. *American Journal of Sociology, 94,* S95–S120.

Comings, J. P. (2019). The next step for literacy. *Prospects, 47,* 167–174.

Commission, E. (2013). *The survey of adult skills (PIAAC): Implications for education and training policies in Europe*. Brussels: European Commission.

Farrell, J., & Schiefelbein, E. (1985). Education and status attainment in Chile: A comparative challenge to the Wisconsin model of status attainment. *Comparative Education Review, 29*(4), 490–560.

Glewwe, P. (2013). *Education policy in developing countries*. Chicago, IL: University of Chicago Press.

Goldthorpe, J. (2014). The role of education in intergenerational social mobility: Problems from empirical research in sociology and some theoretical pointers from economics. *Rationality and Society, 26*(3), 265–289.

Grawe, N. (2010). Primary and secondary school quality and intergenerational earnings mobility. *Journal of Human Capital, 4*(4), 331–364.

Green, A., Green, F., & Pensiero, N. (2015). Cross-country variation in adult skills inequality: Why are skill levels and opportunities so unequal in anglophone countries? *Comparative Education Review, 59*(4), 595–618.

Hertz, T., Jayasundera, T., Piraino, P., Selcuk, S., Smith, N., & Verashchagina, A. (2007). The inheritance of educational inequality: International comparisons and fifty-year trends. *The B.E. Journal of Economic Analysis & Policy, 7*(2), 1–48.

Juhn, C., Rubinstein, Y., & Zuppann, C. A. (2015). *The quantity–quality trade-off and the formation of cognitive and non-cognitive skills*. NBER working paper 21824. Cambridge, MA: National Bureau of Economic Research.

Loeys, T., Moerkerke, B., & Vansteelandt, S. (2014). A cautionary note on the power of the test for the indirect effect in mediation analysis. *Frontiers in Psychology, 5,* 1549.

Macdonald, K. (2008). *PV: Stata module to perform estimation with plausible values*. Statistical Software Components, Boston College Department of Economics. https://ideas.repec.org/c/boc/bocode/s456951.html.

Milanovic, B. (2016). *Global inequality: A new approach for the age of globalization*. Cambridge, MA: Harvard University Press.

PIAAC Literacy Expert Group (2009). *PIAAC literacy: A conceptual framework*. OECD education working paper 34. Paris: OECD.

Pierre, G., Sanchez, M. L., Valerio, A., & Rajadel, T. (2014). *STEP skills measurement surveys: Innovative tools for assessing skills*. Social protection and labour discussion paper 1421. Washington, DC: World Bank.

Psacharopoulos, G., & Patrinos, H. (2018). Returns to investment in education: A decennial review of the global literature. *Education Economics, 26*(5), 445–458.

Putnam, R. (2015). *Our kids: The American dream in crisis*. New York, NY: Simon & Schuster.

Ravallion, M. (2014). Income inequality in the developing world. *Science, 344*(6186), 851–855.

Rock, D., & Pollack, J. (2002). *Early childhood longitudinal study: Kindergarten class of 1998–99 (ECLS-K), Psychometric report for kindergarten through first grade*. Washington, DC: US Department of Education, Office of Educational Research and Improvement, National Center for Education Statistics.

Roemer, J. (1998). *Equality of opportunity*. Cambridge, MA: Harvard University Press.

Schiefelbein, E., & Farrell, J. (1984). Education and occupational attainment in Chile: The effect of educational quality, attainment, and achievement. *American Journal of Education, 92*(2), 125–162.

Schultz, T. (1980). Nobel lecture: The economics of being poor. *Journal of Political Economy, 88*(4), 437–448.

Shafiq, M. N., Devercelli, A., & Valerio, A. (2018). Are there long-term benefits from early childhood education in low- and middle-income countries? *Education Policy Analysis Archives*, *26*(122), 1–43.

Shafiq, M. N., Toutkoushian, R., & Valerio, A. (2019). Who benefits most from higher education in low- and middle-income countries? *Journal of Development Studies, 55*(11), 2403–2423.

Taborda, S. (2014). *Using the literacy proficiency scores of the STEP Skills Measurement Survey: Primer*. Washington, DC: World Bank.

Torche, F. (2014). Social mobility in Latin America. *Annual Review of Sociology, 40,* 619–642.

UNESCO (2015). *Education for all, 2000–2015: Achievements and challenges*. EFA global monitoring report. Paris: UNESCO.

UNFPA [United Nations Population Fund] (2016). *The state of world population, 2016*. New York, NY: UNFPA.

von Davier, M., Gonzalez, E., & Mislevy, R. (2009). What are plausible values and why are they useful? In M. von Davier & D. Hastedt (Eds.), *Issues and methodologies in large-scale assessments* (pp. 9–36). Hamburg: IEA-ETS Research Institute.

Wagner, D. (2010). Quality of education, comparability, and assessment choice in developing countries. *Compare, 40*(6), 741–760.

World Bank (2016). *Poverty and shared prosperity, 2016: Taking on inequality*. Washington, DC: World Bank.

World Bank (2018). *World development report, 2018: Learning to realize education's promise*. Washington, DC: World Bank.

World Economic Forum (2020). *Global social mobility index 2020: Why economies benefit from fixing inequality*. Geneva: WEF.

Young, M. (1958). *The rise of the meritocracy, 1870–2033: An essay on education and society*. London: Thames & Hudson.

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