1 Introduction

Human capital in various forms – cognitive skills, socioemotional skills and physical and mental health – is widely considered critical for many dimensions of individual fulfillment and for successful development in low- and middle-income countries (LMICs). Indeed, the extent and distribution of human capital is thought by many to be at the heart of the development process. Many proximal determinants of most children’s human capital are in their parental families and the investments that parents make in their children. The relation between parental and children’s characteristics, including human capital, is also closely tied to inequality in the children’s generation and to social mobility – the potential to move from a lower to a higher level of education, occupational status, social class, or income. Greater equality and greater social mobility for many are major hopes of economic development and the mantra of a good society. Social mobility may be intergenerational (children’s outcomes in comparison with their parents’) or intragenerational (within children’s lifecycles), and social mobility may be absolute (are children better off than their parents?) or relative (in comparison with other members of the same generation, in which case upward mobility for one individual must be accompanied by downward mobility for at least one other individual) (Deutscher and Mazumder, 2021; Behrman, 2022; Iversen et al., 2022). Concerns about rising inequality have engendered renewed interest not only in how human capital relates to inequality but also in social mobility, including in LMICs as well as in high-income countries (HICs).

This book assesses what we know – and do not know – about the role of parental investments in children’s human capital and how those investments relate to inequality and poverty in the children’s generation and to social mobility in LMICs, as well as how market imperfections such as information and credit constraints faced by low-income households may impede parental investments in their children’s human capital and thereby social mobility. The focus is on parental investments in children’s human capital, but these relations are clearly related to the nature of distribution in the children’s generation and to social mobility, so some limited attention is also paid to distribution and social mobility.

Section 2 presents definitions for human capital and parental endowments, simple frameworks for guiding the summary of what we know and do not know about the roles of parental human capital and parental endowments in children’s human capital in LMICs and what are the estimation challenges in learning about these relations. Section 3 discusses the determinants of children’s human capital in the form of cognitive skills, socioemotional skills, and physical and mental health.
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Mental health. Section 4 turns to the impacts of these forms of human capital on indicators of welfare such as incomes and earnings and thereby on inequality and poverty. Section 5 considers the implications of estimates such as summarized in the previous two sections for inequality and poverty in the children’s generation. Section 6 concludes with a summary of the material covered in this book and a discussion of gaps in the literature related to data, methodology, and topics.¹

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### 2 Definitions, Framework, and Estimation Issues

#### Definitions

Human capital is a vector of stock outcomes at any point in the lifecycle that reflects the accumulation of net investments in humans up to that point in their lifecycles that have longer-run returns/impacts over the rest of their lifecycles in terms of income, occupation, and other outcomes. Human capital is multi-dimensional: cognitive skills, socioemotional skills, physical, and mental well-being. Human capital is not the same as schooling attainment, though some literature implicitly or explicitly equates the two. Schooling attainment may be one important input/investment into the production of important forms of human capital, in particular cognitive development. But even for cognitive skills, schooling attainment is not likely the only important input. There are likely to be other important inputs, such as early-life nutrition and stimulation, the nature of the home environment throughout childhood and adolescence, and the characteristics (“qualities”) of schools. Moreover, in LMIC contexts, other forms of human capital may be critical, including physical and mental health and nutritional status. Recent estimates in *The Lancet*, for example, are that ~250 million children under 5 years of age in LMICs are at risk of not reaching their developmental potential (Lu et al., 2016; Black et al., 2017). The primary indicator used for these estimates, accounting for ~170 million children, is chronic undernourishment as reflected in stunting (defined as length/height less than two standard deviations below the medians for well-nourished populations).

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¹ A note about the sources used for this book is useful. There are huge literatures on some of the topics that are covered, for example, entire handbooks on one form of human capital, education. Relatedly, as background for this book, a systematic search was undertaken on one topic related to the coverage of this book, human capital and mobility in LMICs and 132 studies were identified in the last three years alone, and they do not include all of the relevant studies. It is not possible to review all the related literature in a study of this size, so of necessity the coverage is selective based in part on what studies arguably provide causal evidence on the impact of parental investments on children’s human capital and the impacts of children’s human capital on other outcomes of interest.
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Parental endowments are also a vector including elements such as economic resources, health, marital status, education, genetic factors, and social connections, not all of which are observed in most (any?) data sets.

Framework

Figure 1 gives a very simple framework of optimal investments in and resulting human capital stocks of children over their lifecycles with five lifecycle stages: (1) Early Life, (2) Preschool Ages, (3) Childhood and Adolescence, (4) Young Adulthood, and 5) Mature Adulthood. The designation of these particular lifecycle stages is somewhat arbitrary, but captures fairly well essential elements of the current literatures that are discussed below, including the possibilities of critical windows of opportunities particularly in early life. These stages focus on the “children’s” generation to contrast with the previous parental or familial generation. For each lifecycle stage children start with the accumulated human capital vector from the previous stage, which influences the rate of return to investments in the current stage through dynamic complementarities across stages, with possibilities of critical windows of opportunities usually emphasized most for the early stages and in some cases for adolescence (Cunha et al., 2006; Cunha and Heckman, 2008; Cunha et al., 2010; Black et al., 2021). There are also static complementarities among different components of children’s human capital within stages, so that, e.g., better nutrition may improve concurrent learning. Within each stage there are

Figure 1 Parental investments in children’s human capital within lifecycle framework
also family inputs/investments (shaded box on left) and public investments (box on lower left), among the elements of which there also may be complementarities. These investments occur within a lifecycle framework with demand-side (parental family) and supply-side (health clinics, preschools, schools, training programs, credit markets, information markets) determinants, the returns to which depend on policy environments and markets over the lifecycle. Parental human capital and endowments may affect children’s development over the children’s lifecycles. Even though the direct effects of parental human capital and endowments are likely to be focused in the earlier lifecycle stages, the indirect effects are likely to percolate from the earlier to the later stages though the accumulated child human capital from stage to stage (Black et al., 2021; Black et al., Forthcoming). Similarly, policies may have direct effects on any particular lifecycle stage and indirect effects on subsequent stages. Thus human capital of the parents and their endowments play major roles as determinants of developments over the lifecycles of their children, and human capital of the children play major roles as an outcome of interest in itself and of transferring effects across lifecycle stages. The motives for parental investments in their children’s human capital may in part be altruism (which may be inversely associated with parental socioeconomic status (Das, 2007)), but they may also be to increase the probabilities of reverse transfers when the parents become elderly. The latter motive is likely to be more important in LMICs than in HICs because of less-developed social security and old-age pension systems (Lillard and Willis, 1997).

Parental investments in children’s human capital are likely to be associated with the distribution of income and other outcomes in the children’s generation, including social mobility. Intergenerational social mobility typically refers to how correlated are elements of parental characteristics (e.g., schooling, occupation, income) with the same elements of children’s characteristics preferably, but not always, at the same lifecycle stage or, better yet, age within lifecycle stages (Deutscher and Mazumder, 2021; Iversen et al., 2022). Intragenerational mobility refers to how correlated are children’s characteristics across different stages (or ages) of the children’s lifecycle. The less such correlations ceteris paribus, the greater is said to be mobility, whether absolute or relative (though for relative mobility the ceteris paribus may include the absolute mobility of all other children).

Economic models of what determine parental investments in their children focus on perceived marginal costs and marginal returns to such investments given parental human capital and endowments and market and policy contexts. At one extreme with perfect markets including those for information and for capital, the equilibrium human capital of the child is determined as in the Becker Woytinsky Lecture (Becker, 1967) (Figure 2a) and the Becker and
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Tomes “wealth model” (Becker and Tomes, 1976; Becker and Tomes, 1986; Becker, 1991; Behrman et al., 1995). With all markets perfect, this equilibrium human capital stock $H_0$ is where the expected rate of return (the solid downward-sloping line – downward-sloping because of diminishing returns due to fixed child endowments such as innate abilities and health) on human capital equals the market rate of interest for credit (the horizontal solid line, indicating that the marginal cost to the family does not change in this case with the investment level given perfect capital markets). Note that in this case, two children who are identical including in their endowments but from very different families in terms of parental human capital and parental endowments have the same equilibrium human capital stocks. But the assumption of perfect markets is extremely strong and requires not only perfect capital and information markets but also perfect markets for other inputs such as parental endowments including genetic endowments and all the inputs into early life nurturing care (Black et al., 2017; Britto et al., 2017; Richter et al., 2017; Black et al., 2021). Given that there are not markets for parental genetic endowments and there is considerable evidence that genetic endowments are intergenerationally correlated, for example, even if all other markets were perfect, children with higher parental genetic endowments all else equal on average would have higher expected rates of return to every human capital level if, as is widely believed, genetic ability endowments are complementary with human capital, such as in the dashed line in Figure 2a – and thus a higher level of equilibrium human capital $H_a$.

![Figure 2](image-url)

Figure 2 Becker’s Woytinsky Lecture: Intersection of marginal rate of return and marginal costs determine equilibrium interest rate ($r$) and equilibrium human capital ($H$). (a) Downward-sloping marginal rate of return and constant marginal costs, with dashed line giving higher marginal rate of return for each $H$. (b) Downward-sloping marginal rate of return and upward-sloping marginal costs, with dashed line giving higher marginal costs for each $H$. (c) Downward-sloping marginal rate of return and upward-sloping marginal costs, with dashed line giving lower marginal rate or return for each $H$

Source: Author’s drawings.
If capital markets are not perfect, all else equal, the marginal costs of capital are likely to be upward-sloping for any given child/family as in Figure 2b, with cheaper access for families with more resources (solid line) in comparison with households with less resources (dashed line), resulting in higher child human capital in the former \( (H_B) \) than the latter \( (H_C) \) ceteris paribus. Also, if capital markets are not perfect, parents may maximize their utilities by investing less in some or all of their children than would be required to equate the expected marginal rates of return on their children’s human capital to equal the marginal costs of human capital (Behrman et al., 1995). For such reasons parental resources are likely to determine child human capital if capital markets are not perfect. If the only imperfection is in information markets and better-informed households have higher expected returns to every level of human capital as in the solid line in Figure 2c than less-well-informed households (dashed line in Figure 2c), the equilibrium human capital is higher for the better-informed households \( (H_D) \) than for the less-well-informed households \( (H_E) \). The general perception, reinforced by some empirical studies (Jensen, 2010; Dizon-Ross, 2019), is that parental families with more resources have higher expectations about the returns to human capital than do poorer households.

Further, note that parents may have other objectives than simply maximizing the expected wealth of the next generation. For example, the Separable-Earnings-Transfers (SET) model posits that parents also care about the distribution of potential earnings among their children when they invest in their children’s human capital (Behrman et al., 1982b). Figure 3a illustrates parental preferences defined over human-capital-dependent earnings of two children if the parents have no concern about distribution among their children (straight line), extreme Rawlsian concern about distribution among their children (L-shaped or Leontieff), or an intermediate case with productivity-equity trade-offs (curved line). Figure 3b shows the determination of the equilibrium human capital of the two children for an intermediate case of parental preferences regarding inequality among their children’s human-capital-dependent expected earnings with a earnings-possibility production function (solid line) elongated in the direction of child 2 to reflect that child 2 has greater innate earnings endowments than child 1 or the expected labor market rates of return for equal human capital are greater for child 2 than for child 1 (e.g., labor-market discrimination that favors males and child 2 is male and child 1 is female) (Rosenzweig and Schultz, 1982). If the parents have equal concern so that the preference curves are symmetrical around the 45° ray from the origin, the equilibrium human capital is greater in child 2 than in child 1 \( (H_2 > H_1) \) except in the extreme case of Rawlsian preferences, but parental investments compensate at least some for endowment differences among their children except in the
extreme case of linear preferences. If parents have unequal concern (e.g., favoring boys or lower-order births), the preference curves are not symmetrical around the 45° ray but shifted in the direction of the types favored by parents, which results in higher human capital for the favored child all else equal. Empirical estimates of this model suggest that parental preferences are significantly different from what would be required for simple wealth maximization for the next generation, with considerable concern about distribution among children in families in a range of societies including Chile, India, and the United States and with unequal concern tending to favor sons and lower birth orders (Behrman et al., 1982a; Behrman et al., 1986; Behrman and Taubman, 1986; Taubman and Behrman, 1986; Behrman, 1988b; Behrman, 1988a; Abufhele et al., 2017). If parents are concerned about the expected distribution of human-capital-dependent earnings among their children, in general they will not invest in all children so that the marginal rates of return on human capital are equal to the marginal costs for each child.

Finally, the parents may not have an unified preference function, in which case parental human capital embodied in and resources under the control of mothers are likely to have different (usually perceived to be stronger) effects than those for fathers or there may be stronger mother-daughter and father-son effects than cross-gender intergenerational effects (Rosenzweig and Schultz, 1982; Rosenzweig and Schultz, 1984; King and Lillard, 1987; Schultz, 1990; Thomas, 1990; Thomas et al., 1991; Thomas and Strauss,
Thus a number of dimensions of household composition may be important in determining the effects of parental human capital and endowments on child human capital and other outcomes. Moreover the family may be embedded in a larger kin network, so that human capital and endowments of other kin (e.g., grandparents, uncles, aunts) or ethnic group members may affect investments in children, perhaps resulting, for example, in lower social mobility than would appear to be the case were parents alone considered (Jones, 1998; Zeng and Xie, 2014; Reynolds et al., 2018; Chakraborty et al., 2019).

This framework directly applies to parental investments in children and to the resulting distribution in the children’s generation of income and other outcomes, as well as to absolute social mobility, whether inter- or intra-generational. Using the implied relations between parental characteristics and children’s outcomes, for example, one can estimate the impact of changing parental characteristics on the distribution of income and other outcomes of interest, as well as the extent of absolute mobility in terms of, say, income or schooling attainment, between parents and their children or between different lifecycle stages for the children. For relative social mobility the question, of course, is how do movements (again, whether inter- or intra-generational) for a particular child compare with movements for other children.

One final important point is that the empirical use of this general framework will always be within particular historical market, policy, and sociocultural contexts. For one illustration, the expected-earnings-productivity frontier in Figure 3b depends not only on family and child characteristics, but, as noted, on market, political and cultural factors that may relate to demographic characteristics of the children such as ethnicity, race, and gender. If child 1 is a female and child 2 a male, for example and new policies are introduced or norms change in ways that favor females more than previously, the expected-earnings-productivity frontier would increase in the vertical dimension as in the dashed line and generally increase the equilibrium human capital of child 1 ($H_1^*$) relative to child 2 ($H_2^*$). The various dimensions of the context are likely to vary substantially between LMICs and HICs, as well as among and within LIMICs because of different degrees of market development inter alia. That means that it would be naïve to assume without further empirical testing that the impact of parental human capital and parental endowments on children’s human capital and on social mobility from one context automatically carries over to other contexts. What happens in one context may be suggestive of what relations may be like in another context, but care need be taken with generalizations that are not tested.
in other contexts, the more so the more important are nonlinearities including interactions and the more different are the contexts.

**Estimation Issues in Investigating Impacts of Parental Human Capital and Endowments on Children’s Human Capital**

In all applied econometrics the nature and the quality of the available data are critical. First, many variables that are observed are measured with considerable error, which if random tends to bias the coefficient estimates of such variables toward zero when they are used as right-side variables, a bias that is exacerbated with fixed-effects estimates (e.g., siblings or within-family estimates). Instrumental variables can be used to control for these random measurement errors (e.g., reports on schooling from other sources for sibling fixed-effects estimates under assumption that the errors in such reports are not correlated with the errors in own reports (Ashenfelter and Krueger, 1994; Behrman et al., 1994) as are used in some of the studies summarized below (Behrman et al., 2015; Hu et al., 2021).

Second, a number of important variables are not observed in the data used to investigate the relations between parental human capital and parental endowments and children’s human capital in LMICs. Leading examples are information on mental health and on components of intergenerationally correlated endowments, such as genetics and family culture and family connections. For example, consider the following relations between human capital and endowments of parents and human capital of children that are an extension of the model in Behrman and Taubman (1985). Assume as in relation (1) that $Z_c$ is an outcome for which intergenerational social mobility is being estimated (e.g., income, occupation, cognitive skills, schooling attainment for children ($c$)) that depends linearly on the same outcome for the children’s parents ($p$), child endowments $E_c$, and a stochastic term $u$ for random events and measurement error in $Z_c$:

$$Z_c = a_0 + a_p Z_p + a_c E_c + u_c$$  \(1\)

The endowments are included in this relation (though not in most two- or multi-generational studies) because there are likely to be unobserved multigenerationally correlated genetic, environmental, and preference factors that are likely to affect $Z_c$, as emphasized in the discussion of Figure 1 above. Assume that these endowments are correlated across generations and generated by:

$$E_c = b_0 + b_p E_p + v_c$$  \(2\)
To understand the implications of these endowments for the estimation of the causal parental effect $a_p$ in relation (1), assume that the parameters in (1) are stable across generations and that a one-generation-lagged version of relation (1) in which $g_p$ refers to grandparents determines $Z_p$:

$$Z_p = a_0 + a_p g_p + a_c E_p + u_p$$  \hspace{1cm} (1A)$$

The estimation problem due to unobserved multigenerationally correlated endowments is immediately obvious. The compound disturbance term in relation (1) is $a_c E_c + u_c$, which includes $E_c$ but $E_c$ depends on $E_p$ (relation 2) and $Z_p$ also depends on $E_p$ (relation 1A), so $Z_p$ is correlated with the compound disturbance term. As a result, the ordinary-least-squares (OLS) estimate of the $a_p$ is biased unless either $a_c$ or $b_p = 0$ because in addition to the impact of $Z_p$, the OLS estimate of $a_p$ includes the correlated impact of the unobserved multigenerationally correlated endowments. One way to deal with this estimation problem is to use good instruments for $Z_p$. Another way is to manipulate relations (1), (2) and (1A) to eliminate the endowments and obtain:

$$Z_c = (a_0 + a_p b_0 - b_p a_0) + (a_p + b_p) Z_p - (b_p a_p) g_p + (v_c + u_c - b_p u_p)$$  \hspace{1cm} (3)$$

Several aspects of this relation merit note:

(1) It is of the same general form as the relations typically used to estimate what are widely interpreted to be grandparental effects such as in a version of relation (1) without endowments.

(2) The coefficients of the right-side parental variable $Z_p$ are NOT the parental effects, but the sum of the true parental effects $a_p$ and the multigenerational coefficient on endowments $b_p$. The estimated coefficients of the right-side parental variable $Z_p$, therefore, are upward-biased estimates of the true parental effects $a_p$ if multigenerational endowments are positively correlated (in which case $b_p$ is positive).

(3) The coefficients of the right-side grandparental vector $Z_g$ are NOT the grandparental effects, but depend on the true parental effects $a_p$ and the multigenerational endowment-generating parameter $b_p$ and do not capture direct grandparental effects.

(4) The coefficients on the right-side parental vector $Z_p$ and the right-side grandparental vector $Z_g$ can be solved (or estimated directly with nonlinear estimators) to obtain estimates of the parental effects $a_p$ and the multigenerational coefficient on endowments $b_p$ that are not contaminated by biases due to unobserved multigenerationally correlated endowments that are generated by relation (2).