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DISCUSSION PAPER SERIES

IZA DP No. 16784

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ABSTRACT

The Impact of the Level and Timing of Parental Resources on Child Development and Intergenerational Mobility*

This study explores relationships between parental resource trajectories and child development, and their implications for intergenerational mobility. By modifying the child skill formation technology to incorporate new skills during adolescence, we analyze the importance of the timing of family resources on life outcomes, educational attainment and participation in crime. Parental financial resources partially offset deficiencies in nonpecuniary inputs to children's human capital. Estimates of the intergenerational influence on child outcomes are strongly influenced by the choice of lifetime versus snapshot parental income measures. The most predictive ages of children when family resources are measured vary by the outcome analyzed.

JEL Classification: I24, D31, I30

Keywords: intergenerational elasticity, lifecycle measures, child development, compensating for family disadvantage

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1 Introduction

Becker and Tomes (1979, 1986) link the study of intergenerational mobility with the study of child development. In their overlapping generations model under perfect certainty, persons live three periods: as a child; as an altruistic adult investing in children; and as a retiree. Resources in adulthood determine the possibilities for investing in children. The welfare of each generation and of entire dynasties are well defined, including parental returns to investment.

Recent research extends their original framework by incorporating multiple stages within each of the three periods in child and adult life cycles. It introduces the notions of critical and sensitive stages for the effectiveness of investments in children. Constraints in the early years of parental adulthood impact child investment. Given what is known about the technology of skill formation, and the presence of lifetime credit constraints, the timing of receipt of resources matters for shaping the skills of the next generation.[1] Hai and Heckman (2017) show that more able and educated people with rising but not easily verifiable wage profiles face age-dependent credit constraints that weaken as parental income and information are realized. Caucutt and Lochner (2020) develop a model that incorporates this feature and explore its consequences for child investment.

Early childhood is often characterized as the most sensitive life cycle period for skill formation and as a period in which there is a potentially strong role for parental credit constraints.[2] However, there is considerable evidence on the emergence of skills in adolescence.[3] Carneiro et al. (2021) present evidence that parental income received in later years of childhood has a more substantial impact on child investment than income received in middle childhood.

This paper contributes to the literature on the importance of timing and measurement of family resources on child development. We analyze the impacts of different measures

[1]See Caucutt and Lochner (2020); Cunha et al. (2010); Heckman and Mosso (2014).
[2]See e.g., Knudsen et al. (2006); Shonkoff and Phillips (2000).
[3]See Belsky et al., 2020; Crone, 2016; Steinberg, 2014.

of family resources at different ages that are most predictive of important child outcomes. The predictive power of parental resources on child outcomes varies greatly across different measures of resources. Those based on anticipated lifetime measures are the best predictors. The parental age at which they are constructed is far less important. There is no best age at which to pair parent and child in the study of social mobility.

We interpret our estimates using the technology of skill formation modified to account for the emergence of new skills in adolescence.[4] Our estimates suggest that resource-sensitive ages for investment vary greatly across child outcomes. Children's language and mathematics test scores are most sensitive to differences in parental resources during early childhood, while completed education and criminal activity depend more strongly on parental resources in early school years and early adolescence, respectively. These findings are consistent with a large body of literature on child skill development that documents the importance of lifetime credit constraints, the evolution of information about the lifetime income flows, and skills that emerge post-puberty when the adolescent brain forms and consolidates new pathways that affect decision making and behavior (see, e.g., Steinberg, 2014 and Moffitt, 2018).

This paper builds on and complements Eshaghnia et al. (2022) who use full population register data from Denmark to develop and estimate measures of age-dependent expected lifetime resources. They show that long-run measures of anticipated income are far more predictive of important child outcomes than conventional measures of income traditionally used in the study of intergenerational mobility.[5] We extend their finding by linking it — both empirically and theoretically — to the literature on childhood investments. We show that the predictive power of expected parental resources depends on the child age ranges used to measure them. This is consistent with the emergence of skills during childhood and

[4] See Cunha and Heckman (2007).

[5] Eshaghnia et al. (2022) also show that expected lifetime resources are not more predictive just due to reduced measurement error arising from life cycle averaging. They are more strongly linked to child outcomes than realized measures of family resources (even using very long-run averages). They show that expected lifetime resources account for non-stationarity across generations while traditional income measures do not. In addition, they establish that estimates of both relative and absolute intergenerational mobility differ greatly. They further show nonlinearities in intergenerational dependence measures. Their lifetime wealth measures account for life cycle evolution in credit constraints and the resolution of uncertainty.

adolescence in combination with credit constraints and the absence of complete markets.

This paper builds on and extends Carneiro et al. (2021) who study the impacts of parental resources across childhood and draw on a large literature on early childhood skill formation (Heckman and Mosso, 2014). They analyze the relationship between measures of *realized* parental resources and child outcomes measured over a range of childhood ages from birth to 18. Our paper extends their analysis by computing the age-dependent parental *expected* present value of resources (accounting for differences in parental expectations about future resources as impacted by credit constraints and uncertainty that are updated over the life cycle) at each stage of childhood and relating it to later child outcomes in a model with multiple skills and multiple possible sensitive periods.

This paper also contributes to the literature on intergenerational income mobility. The focus in much of that literature is on measurement error and alignment of ages of parents and children, and their impact on estimates of social mobility (see, e.g., Haider and Solon, 2006; Mazumder, 2005; Solon, 1992). Our results emphasize that there is no single age or range of ages at which conventional measures closely proxy individual lifetime income measures, contrary to practice in the literature (Nybom and Stuhler, 2017; Stuhler and Nybom, 2023).[6] Intergenerational associations of parental value functions on child outcomes depend on the ages at which they are measured. There is a potential continuum (by age) of intergenerational parameters linking parental incomes and child outcomes. Nonstationarity in life cycle timing across generations further complicates matters.[7] We illuminate these issues by computing social mobility using **maximally predictive measures and ages**. There is no "best" age or set of ages for computing intergenerational mobility when its myriad facets are investigated.

The rest of the paper is organized as follows. Section 2 characterizes the intergenerational associations we study using an amended version of the technology of skill formation, and

[6]This age is sometimes motivated by Mincer (1974)'s "overtaking age," which is proposed as a summary of lifetime resources. See Willis (1986). We contribute to the literature by studying the heterogeneity in the Intergenerational Elasticity (IGE) by gender of the child, and educational and cohabitional stability of parents.

[7]See Eshaghnia et al. (2022) and Stuhler and Nybom (2023).

presents our measures of expected lifetime resources. Section 3 describes our data and measures of parental resources and child outcomes. Section 4 presents estimates of the best ages and measures of parental resources for predicting child outcomes. There is no most predictive age for all outcomes. Section 5 presents estimates of intergenerational mobility for the most predictive measures and ages. Section 6 isolates the role of parental background characteristics such as education and stability of cohabitation in shaping income expectations and in direct investment. Section 7 presents estimates of our model of the technology of skill formation. Section 8 concludes.

2 Anticipated Resources Across Childhood and Skill Formation

We first present our framework of analysis. We review the technology of skill formation (Cunha and Heckman, 2007), and amend it by recognizing the emergence of new skills in adolescence as documented in Steinberg (2014) and Belsky et al. (2020). We relate our approach to that of Carneiro et al. (2021) and Eshaghnia et al. (2022).

2.1 Measuring Lifetime Welfare

A large body of literature studies the association between parental resources and child outcomes.[8] Yet, much of the previous literature almost exclusively focuses on snapshot measures of realized income at a given point in time or over limited ranges of ages.[9] This approach does not accurately capture the age-by-age updating of anticipated resources based on the information parents use to make decisions.

To address this issue, Eshaghnia et al. (2022) introduce a theory-based measure of lifetime wealth. Focusing on expected lifetime wealth, we make two main innovations com-

[8]See Corak (2013).

[9]For an exception see, Deutscher and Mazumder (2023).

pared to the traditional measures of family resources. First, we explicitly distinguish *ex-ante* (expected) and *ex-post* (realized) measures.[10] *Ex-ante* lifetime measures better predict child outcomes because they better proxy the resources parents act on when they make investment decisions. Averages of lifetime income measures also reduce measurement error. *Ex-ante* measures better predict child outcomes compared to measures of realized parental income averaged over 40 years.[11] Previous studies such as Solon (1999) and Deutscher and Mazumder (2023) show that long run averages of realized income or related IV strategies minimize measurement error and are better predictors of child outcomes. This paper's findings are not just a consequence of reductions in measurement error, but also because we approximate anticipated resources available to families at the time child investment decisions are made. To estimate them, we approximate the *information set*, $\mathcal{I}_{i,t}$ available to individual i at each age t. Section 3.3 details how we estimate agent information sets.

Our second innovation is to measure wealth using the subjective valuation of future income. In the presence of credit constraints, uncertainty, and decreasing marginal utility of consumption and welfare, investment decisions not only depend on expected lifetime income, but also on uncertainty and access to future income.

We define an individual's expected lifetime wealth (LW) at period t ($LW_{i,t}$) as

$$\mathrm{LW}_{i,t} = \mathbb{E}_{i,t}\left[\sum_{\tau=1}^{T-t} s_{i,t+\tau} y_{i,t+\tau} \middle| \mathcal{I}_{i,t}\right], \tag{1}$$

where $s_{i,t+1}$ is individual i's stochastic discount factor (SDF) at age t when expectations are taken with respect to the information set of individual i at age t and T is the upper bound on life. The SDF is the expected marginal rate of time preference between future and current consumption:

$$s_{i,t+1} \equiv \mathbb{E}_{i,t}\left[\beta \frac{U_c(c_{i,t+1})}{U_c(c_{i,t})} \mid \mathcal{I}_{i,t}\right],$$

[10] We use the approach of Cunha and Heckman (2007, 2016).

[11] See Eshaghnia et al. (2022), who explicitly analyzes expected vs. realized outcomes and show that the former is a better predictor of child outcomes.

where $c_{i,t}$ and $c_{i,t+1}$ are individual i's consumption at age t and $t+1$, respectively, $U(c_{i,t})$ is utility at t, U_c is the marginal utility of consumption, and β is a fixed discount factor. Using measured consumption to form $s_{i,t+1}$ accounts for age-dependent liquidity constraints. In addition, we account for uncertainty and the insurance value of social programs such as social assistance and unemployment insurance.[12]

2.2 The Technology of Skill Formation

Equipped with a stage-dependent measure of the resources that parents use to determine investments in their children, we examine the impact of the timing of resources and investment across childhood and adolescence. We use the technology of skill formation introduced in Cunha and Heckman (2007) and Cunha et al. (2010) to interpret the impact of family resources at different life cycle stages on child outcomes. We assume that agents make investments using a policy function which we approximate.

Skills $\boldsymbol{K}(t)$ evolve via the technology of skill formation:

$$\boldsymbol{K}(t+1) = \boldsymbol{F}_t(\boldsymbol{K}(t), \boldsymbol{I}(t)) \tag{2}$$

where $\boldsymbol{I}(t)$ is investment at age t. A critical period t^* for investment is a period for which $\frac{\partial \boldsymbol{K}(t+1)}{\partial \boldsymbol{I}(t)} > 0$ for $t = t^*$ and $\frac{\partial \boldsymbol{K}(t+1)}{\partial \boldsymbol{I}(t)} = 0$ all $t \neq t^*$. A sensitive period t^{**} is a value of t that lies in a set Ψ, characterized by $\frac{\partial \boldsymbol{K}(t+1)}{\partial \boldsymbol{I}(t)}|_{t\in\Psi} > \frac{\partial \boldsymbol{K}(t+1)}{\partial \boldsymbol{I}(t)}|_{t\notin\Psi}$ for all admissible values of $\boldsymbol{K}(t)$ and t.

Child outcomes $\boldsymbol{Y}(t)$ at age t depend on $\boldsymbol{K}(t)$ and other determinants, such as effort, perseverance, preferences, and parental environments and community, $\boldsymbol{X}(t)$:

$$\boldsymbol{Y}(\boldsymbol{t}) = \boldsymbol{\Phi}_t(\boldsymbol{K}(\boldsymbol{t}), \boldsymbol{X}(\boldsymbol{t})). \tag{3}$$

[12]We follow Eshaghnia et al. (2022) and use a CRRA utility function: $U(c_{i,t}) = \frac{c_{i,t}^{1-\rho}-1}{1-\rho}$, where $c_{i,t}$ denotes the adult-equivalence consumption (to adjust for family size and composition) of individual i at time t. We set the risk aversion parameter at 0.67.

Lagging (2) one period, we obtain:

$$\boldsymbol{K}(t) = \boldsymbol{F}_{t-1}(\boldsymbol{K}(t-1), \boldsymbol{I}(t-1))$$

and by recursion, we obtain:

$$\boldsymbol{K}(t+1) = \boldsymbol{F}_t(\boldsymbol{F}_{t-1}(\boldsymbol{K}(t-1), \boldsymbol{I}(t-1)), \boldsymbol{I}(\boldsymbol{t})). \tag{4}$$

Making repeated substitutions:

$$\boldsymbol{K}(t+1) = \boldsymbol{Q}_t(\boldsymbol{I}(t), \boldsymbol{I}(t-1), \ldots, \boldsymbol{I}(0); \boldsymbol{K}(0)). \tag{5}$$

Agents are assumed to maximize life cycle programs as in Del Boca et al. (2014), Caucutt and Lochner (2020), and Agostinelli and Wiswall (2022), among others. Letting $V(t)$ be the value function of the program at age t, the policy function for investment is

$$\boldsymbol{I}(t) = \boldsymbol{G}_t(\boldsymbol{V}(t), \boldsymbol{X}(t)) \tag{6}$$

where $\boldsymbol{X}(t)$ includes other determinants of investment.

Substituting repeatedly,

$$\boldsymbol{Y}(\boldsymbol{t}) = \boldsymbol{\Phi}_t(\boldsymbol{Q}_{t-1}(\boldsymbol{G}_{t-1}(.,.), \boldsymbol{G}_{t-2}(.,.), \ldots, \boldsymbol{G}_0(.,.); \boldsymbol{K}(0)), \boldsymbol{X}(\boldsymbol{t}).) \tag{7}$$

2.3 Linking Expected Lifetime Resources to the Technology of Skill Formation

We use age-specific lifetime wealth to approximate value functions and obtain the state equation:

$$\boldsymbol{K}(t+1) \doteq \boldsymbol{Q}_t(LW_t, LW_{t-1}, \ldots, LW_0, K(0)).$$

This approach contrasts with that of Carneiro et al. (2021), who approximate Equation (7) using measures of *realized* family income in each period t to approximate LW, and control for the *realized* present value of future income over the life of the child evaluated at birth and do not account for information updating. They ignore other factors, $\boldsymbol{X}(t)$, and initial conditions $\boldsymbol{K}(0)$.

Define $\boldsymbol{Z_t} = [LW_t, LW_{t-1}, \ldots, LW_0, K(0)]$. Investment at each age produces the stock of skills that govern behavioral Equation (7). Expanding it in a Taylor series without remainder to second order, the outcome equation is:

$$\boldsymbol{Y}(t+1) \doteq \alpha_0(t) + \boldsymbol{\alpha_1'}(t)\boldsymbol{Z_t} + \boldsymbol{Z_t'}\Psi(t)\boldsymbol{Z_t} \tag{8}$$

where $\boldsymbol{\alpha}_1(t)$ is $t \times 1$ vector. $\boldsymbol{\Psi}(t)$ is $(t+1) \times (t+1)$ matrix. Like Carneiro et al. (2021), we use broad age intervals for our lifetime income measures to avoid problems with collinearity. Unlike them, we form intervals on the basis of the correlation patterns of the $\boldsymbol{Z}_t$ with outcomes and account for the updating of information sets. The coefficients $\boldsymbol{\alpha}_1(t)$ and $\boldsymbol{\Psi(t)}$ give information about critical and sensitive periods because we can form $\frac{\partial \boldsymbol{Y}(t+1)}{\partial \boldsymbol{Z}_t} = \boldsymbol{\alpha}_1' + \boldsymbol{\Psi}(t)\boldsymbol{Z}_t$ for each t.

2.4 Emergent Skills

There are at least two periods of rapid skill and preference development in the life of a child: early childhood and adolescence. Resources available to families in each period of life may play important roles in child development if markets are incomplete so full insurance against all contingencies is ruled out and borrowing constraints apply for some. Hai and Heckman (2017) document that even for able and highly educated people, the timing of income in these sensitive periods may matter.

This helps to explain the U-shaped relationship between child outcomes and parental income through adolescence documented by Carneiro et al. (2021) for which we show partial support. Sensitive periods with binding credit constraints can rationalize their evidence. We amend the Cunha et al. (2010) model to account for the emergence of skills as documented in Steinberg (2014), Crone (2016), and Belsky et al. (2020).

The framework of Section 2.2 follows the recent literature and assumes that the dimension and skill categories of $\boldsymbol{K}(t)$ remain the same over the life cycle. This ignores a large literature on the flourishing of lifetime skills. As children mature, new preferences and behaviors emerge. Steinberg (2014) and Crone (2016) document dual systems of adolescent behavior. The centers of the brain that respond to stimulation and pleasure mature early after the onset of puberty with its corresponding hormonal rush. Centers of the brain associated with self-control and executive functioning (the prefrontal cortex) become active later, creating patterns of behavior (and associated evolution of skills) unique to the adolescent years.

We allow the dimension of $\boldsymbol{K}(t)$ to change as new skills emerge. At age t_e, new skills and possibly new investment strategies, emerge. In a simplified model,

$$\begin{bmatrix} \boldsymbol{K}(t+1) \\ \tilde{\boldsymbol{K}}(t+1) \end{bmatrix} = \boldsymbol{J}_t(\boldsymbol{K}(t), \tilde{\boldsymbol{K}}(t), \boldsymbol{I}(t), \tilde{\boldsymbol{I}}(t))$$

where "$\sim$" denotes the new skills stocks and investment emerging at and after t_e. We define $\tilde{\boldsymbol{I}}(t) = 0$ and $\tilde{\boldsymbol{K}}(t) = 0$ for $t < t_e$.

The distinctions previously made apply here. New forms of complementarity emerge: $\frac{\partial^2 \boldsymbol{J}_t(\boldsymbol{K}(t),\tilde{\boldsymbol{K}}(t),\boldsymbol{I}(t),\tilde{\boldsymbol{I}}(t))}{\partial \boldsymbol{K}(t)\partial \tilde{\boldsymbol{K}}(t)} > 0; t \geq t_e$ and investments of different types may cross-fertilize. Outcomes may depend on $\boldsymbol{K}(t)$ (e.g., IQ) and on "soft skills" $\tilde{\boldsymbol{K}}(t)$. Thus, outcome j (e.g., management skills) may depend on both cognitive ability and personality traits: $\boldsymbol{Y}_j(\boldsymbol{K}(t), \tilde{\boldsymbol{K}}(t))$.

Mandelbrot (1962) characterizes occupations or tasks by bundles of traits.[13] Some skills may have negative marginal product in some occupations, e.g., gregariousness may reduce productivity for an abstract mathematician. Sensitive periods can arise when skills emerge (i.e., after t_e for $\tilde{\boldsymbol{K}}(t)$). Early investment may or may not enhance the productivity of later investment. Some skills may interfere with other skills. We extend the definition of $\boldsymbol{I}(t)$ to also account for investment in emergent skills $\tilde{\boldsymbol{I}}(t)$.

3 Data and Measures of Outcomes and Resources

This paper uses population administrative register data from Denmark for the years 1980 through 2019. The data have unique identifiers of individuals, which enable us to combine information on a wide range of measures across all ages. The data include unique identifiers of parents and spouses, allowing us to link families throughout the entire period. In addition to information on the income measures of children and their parents, we also add information on completed education, household structure and demographic characteristics, and crime.[14] Finally, we use information from the Danish Household Expenditure Survey, a diary-based survey of expenditures within the household, collected by Statistics Denmark (Browning et al., 2021; Danmarks Statistik, 1999). The survey provides detailed information on various categories of consumption expenditures. We link the survey data to the administrative register information using individual unique identifiers.[15]

[13]See Heckman and Sedlacek (1985) for an empirical application of his model.

[14]Using the individual identifiers, we link data from registers containing educational attainment (UDDA register), income, assets, transfers (IND register), marital status, and fertility (BEF register) for each individual and his or her spouse and parents. We also include information on criminal convictions from the sentencing register (KRAF).

[15]See Appendix A for details.

3.1 Main Samples and Definitions

We base our analysis on the sample of children born in 1981 and 1982 for whom we can establish a link to parents, whose parents did not migrate, and who did not themselves migrate. This results in a sample of around 100,000 children and their families. We observe the birth cohorts of 1981 and 1982 from birth to age 38 and 37, respectively (in 2019). We also have information on their parents in all years between 1980 and 2019.[16]

For our Intergenerational Elasticity (IGE) analysis, we measure child outcomes at ages 30–35, but we report results for alternative age ranges in Appendix C. We measure average years of education as the minimum years it takes to complete the highest obtained degree by age 35. We measure criminality by whether an individual appears in the crime registers by age 35 regardless of the type of offense, i.e., whether an individual ever committed any crime by age 35.[17]

As additional measures of child human capital, we also consider children's language tests at age 11 and math test scores at age 16. We standardize the student's test scores to mean zero and unit standard deviation. For the former, we use the Danish Longitudinal Survey of Children (DALSC), which is a representative survey of children born in 1995. For the latter, we focus on all children born between 1995 and 1997 in Denmark, and we measure math test scores at the 9th-grade national leaving exam. Precise definitions for the variables in the samples used are given in Appendix A.

3.2 Measures of Parental Resources

Register data on income, assets, and liabilities are based on information from Danish tax authorities. We pool resources of spouses or cohabitees when appropriate. We analyze three

[16] The results in the main text are based on the full sample irrespective of whether we can track the family across all years. The patterns and main conclusion remain the same for a balanced sample. Appendix H reports the results.

[17] Appendix Section D.2 presents the main results of the paper where we define the criminality of the child separately for each crime type. We consider three types of crimes: violent crimes, property crimes, and other crimes, i.e., the residual.

measures of parental resources:

1. **Wage income** includes (pre-tax) taxable wage earnings as the main component along with sources of income such as fringes and stock options. Wage income is the main source of personal income for the majority of the population.
2. **Disposable income** is total personal income,[18] which includes public transfers (such as social assistance, unemployment insurance benefits, disability insurance benefits) plus the rental value of own home (for owner-occupiers) minus taxes and interest expenses.
3. **Expected lifetime wealth** (as introduced in Section 2.1) is the subjective present value of lifetime income (measured by disposable income) discounted by SDF at each age t. It captures the expected resources available to a family across childhood. Lifetime wealth is updated at each age of the child through changes to parents' information set (e.g., income shocks) and subjective discounting of future resources (e.g., through changing uncertainty or liquidity constraints).

We define parental income as the sum of the mother's and father's resources, irrespective of their marital status, to proxy the total resources available for investment in the child at each age. Table 1 summarizes the three measures of resources we analyze. Eshaghnia et al. (2022) consider a wider range of measures, including pre-tax total personal income with and without transfers and the expected present discount value of future income (the risk-neutral equivalent of lifetime wealth).

[18] Total personal income is the sum of wage income, business and self-employment income, capital income, public transfer income, property income, and other non-classifiable income that can be attributed directly to the person.

Table 1: Definitions of the Measures of Parental Resources Analyzed

	Variable	Definition
(1)	Wage Income	Taxable family wage earnings and fringes, labor portion of business income, non-taxable earnings, severance pay, and stock options.
(2)	Disposable Income	Total family personal income (the sum of wage income, business and self-employment income, capital income, public transfer income, property income, and other non-classifiable income that can be attributed directly to the person) and rental value of own home (for owner-occupiers) minus taxes and interest expenses.
(3)	Expected Lifetime Wealth	The expected present discounted value of future total income (defined as disposable income in (2)) using a subjective stochastic discount factor. The lifetime wealth at time t for individual i is $$\mathrm{LW}_{i,t} \equiv \mathbb{E}_{i,t}\left[\sum_{\tau=1}^{T-t} s_{i,t+\tau} y_{i,t+\tau} \mid \mathcal{I}_{i,t}\right], \text{ where } s_{i,t+1} \equiv \mathbb{E}_{i,t}\left[\beta \frac{U'(c_{i,t+1})}{U'(c_{i,t})} \mid \mathcal{I}_{i,t}\right]$$ where $y_{i,t+\tau}$ is the future total income (where income is defined as in (2)) at age $t+\tau$. β is a common discount factor, and $\mathcal{I}_{i,t}$ is agent i's information set. We set β to 0.96, following Ogaki and Reinhart (1998). The information set is being updated over ages (see Section 3.3). See Eshaghnia et al. (2022) for details on the estimation procedure.

3.3 Information Set $\mathcal{I}_{i,t}$

We estimate agent information for parents and children using the procedure of Cunha and Heckman (2016). For each age, we estimate a vector $\mathcal{Z}_{i,t}$ that forecasts agent future income where the forecast error is uncorrelated with choices that depend on these forecasts. For example, consumption at age 30 should not be associated with the difference between actual income at age 50 and the expected income at age 50 (measured at age 30).

Our choice of information set is based on variables that approximate future income levels and uncertainty, such as education, gender, relationship status, and homeownership. However, information sets based on these characteristics alone do not pass our tests. Eshaghnia et al. (2022) show that a much richer set of variables is required. Our preferred set is gender of the individual,[19] their education level (primary school, high school, college, and university), employment status, cohabitation status, number of children, quartiles for mean income

[19] Family incomes are the sum of the mother's and father's forecast incomes.

level, quartiles for mean consumption level, quartiles for mean consumption growth, quartiles for standard deviation of consumption, and homeownership status, and interactions among these factors.[20] This estimated information set satisfies the condition that components of income not in the information set do not predict future outcomes (Cunha and Heckman, 2016).

Note that forecast income is disposable income adjusted for unrealized capital gains from housing stocks (i.e., the total income including interest on assets, public transfers, the estimated rental value of own home for owner-occupied individuals, and unrealized capital gains from housing stock for individuals who are homeowners, minus taxes and interest expenses).

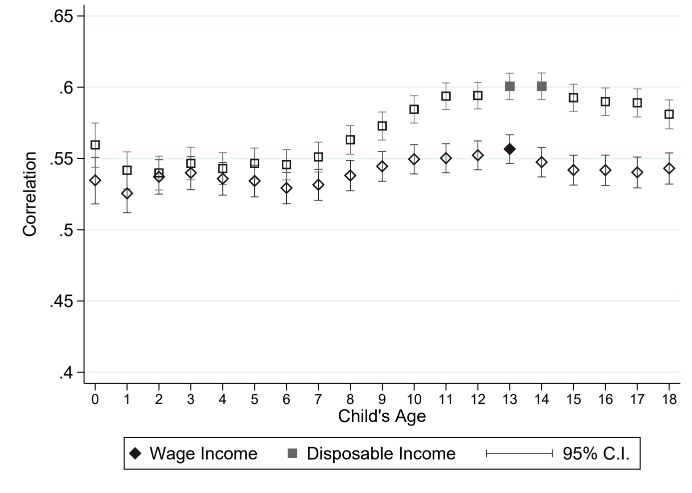
A separate question is whether child outcomes depend on key parental characteristics such as education operating through other channels besides expected future wealth. We explore this in Sections 6.1 and 6.2.

3.4 Relationships Among Different Resource Measures

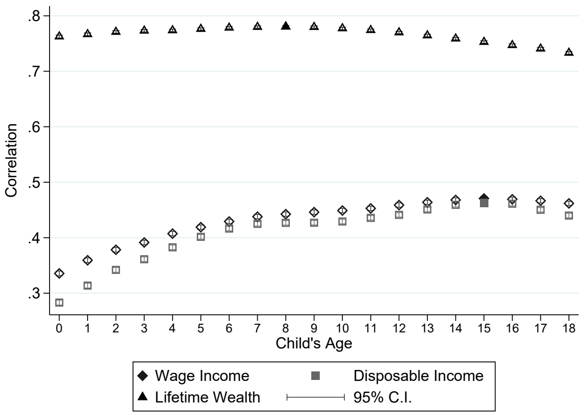
Figure 1 shows the correlation between our measures of parental resources and parental background characteristics at different ages of the child. Panel (a) of Figure 1 shows that the association between parents' expected lifetime wealth and disposable income is stronger at all ages of the child compared to the association between parents' expected lifetime wealth and their wage income. Moreover, the figure also shows that the correlations between expected lifetime wealth and the two other measures of resources differ across child age, particularly for disposable income. Here, the weakest association with parents' expected lifetime is in the preschool years (correlation of 0.54 at around age 4), while the strongest association is in adolescence (correlation of 0.60 at age 14).

[20] Quartiles are based on the average over the past two years (computed across parents' distribution).

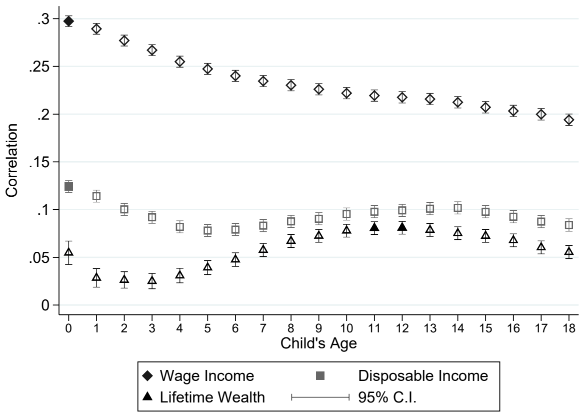
Figure 1: Correlations between Measures of Parental Resources and Parental Background Characteristics by Child's Age



(a) Correlations of expected lifetime wealth with wage income and disposable income



(b) Correlation Between Parental Resources and Parents' Average Years of Education



(c) Correlation Between Parental Resources and Parents' Cohabitation Status

Notes: Panel (a) shows the correlations of parents' expected lifetime wealth with parents' wage income and disposable income, separately, at each age of the child. Panels (b) and (c) show the correlation between the three measures of parental resources and parents' years of completed education and cohabitation status, respectively. For each measure of resources, we use a t-test to evaluate whether the correlation at each age is significantly different from the maximum correlation (at the 5% level). We depict the estimate with solid (filled) symbols if it is not significantly different from the max.

Panel (b) of Figure 1 shows the correlation between the three measures of parental resources and their average years of education. The figure shows a strong correlation between parents' expected lifetime wealth and education. In contrast, the correlations between parents' years of education, and wage income and disposable income, respectively, are more modest; correlation coefficients are initially around 0.35 and increase in child age to around 0.45 at age 18. Panel (c) shows that, compared to disposable income, the expected lifetime wealth is slightly less correlated with parents' cohabitation status at childbirth.

4 Child Outcomes and Parental Resources over the Life Cycle

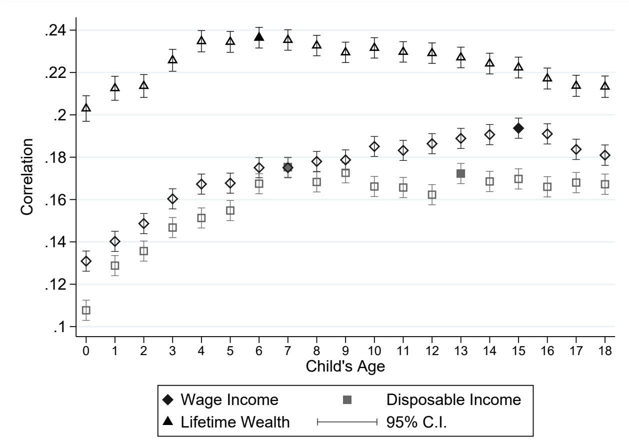
The following sections present evidence on parental transmission of influence. In this section, we present the associations between child outcomes and parental resources measured at different ages of the child. Section 5 shows how estimated intergenerational income elasticities vary according to when parental resources are measured. Section 6 explores heterogeneity across family types along with the role of parental background characteristics such as education for child outcomes. Section 7 connects the different findings by estimating the skill formation model previously introduced.

Figure 2 presents correlations between parental income measures at different child ages from zero to 18 and child outcomes. Each panel of Figure 2 focuses on a specific outcome measure and plots the correlations by age between parental resources (wage income, disposable income, and the expected lifetime wealth) and the child's outcome of interest.[21] For each measure of resources, we use t-tests to evaluate whether the correlation at each age is significantly different from the maximum correlation.[22] We report estimates with solid (filled) symbols if they are not significantly different from the maximum value (given the income measure).

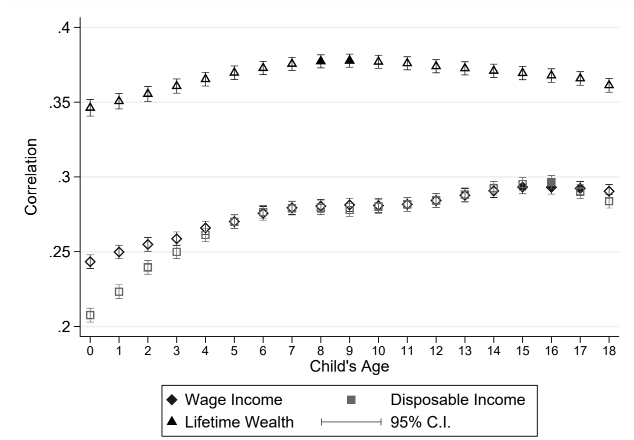
[21] To reduce the impact of measurement errors when measuring parental resources, we use a 5-year rolling average of parental resources centered around the corresponding child's age.

[22] See Appendix B.

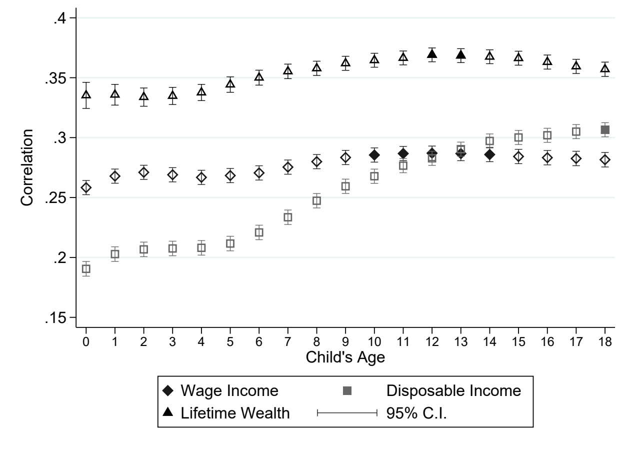
Figure 2: Correlations between Measures of Parental Resources and Various Child Human Capital Outcomes- by Child's Age



(a) Child's Language Test Score at age 11



(b) Math. National Leaving Exam Grade at age 16



(c) Years of Education by age 35

(d) Participation in Crime by age 35

Notes: Panels (a), (b), and (c) plot the correlations between the different parental income measures measured at the different child ages and the child's language test score at age 11, the child's national math test score at age 16, and the child's years of completed schooling by age 35, respectively. Figure (d) plots the inverted correlation between the child's participation in crime by age 35 and their parental resources. For each measure of resources, we use a t-test to evaluate whether the correlation at each age is significantly different from the maximum correlation (at the 5% level). We depict the estimate with solid (filled) symbols if it is not significantly different from the max.

Panel (a) shows correlations between the child's language test score at age 11 and parental measures of resources at child ages between zero and 18. Panels (b), (c), and (d) present the relationship between parental resources in childhood and the child's national math test score at age 16 (panel (b)), the child's years of completed formal schooling by age 35 (panel (c)), and the child's participation in crime by age 35 (panel (d)). The patterns are, in general, similar when we disaggregate the sample by family structure. However, the levels of the correlations change as we note below in Section 6.[23]

In accord with Eshaghnia et al. (2022), Figure 2 shows that across all ages of childhood, our lifetime measures of parental resources (expected lifetime wealth) outperform the traditional snapshot measures of parental resources in forecasting child outcomes. In addition, the figure presents three novel findings:

First, while the predictive power of traditional snapshot measures varies strongly across the age of measurement, the associations between expected lifetime wealth and child outcomes are much more stable.

Second, traditional snapshot measures of parental resources reach their highest predictive power in middle childhood and sometimes even after the realization of the child's outcome of interest. For example, while the correlation between the child's language test score at age 11 and the expected lifetime wealth of parents peaks in early childhood (at around age 6), the correlation with parental wage income or disposable income peaks much later in childhood (around ages 13–15), several years after the realization of the outcome in question. The only exception is the child's participation in crime, where all measures of parental resources manifest very similar patterns over the child's age and the correlations peak at around ages 10–18 for all measures of parental resources. The measures of parental resources differ significantly in their predictive power. Our lifetime measure outperforms other measures in predicting a child's participation in crime by age 35. Additional results for crime when measured by ages 20, 25 and 30 show the same pattern (see Appendix D.1). Moreover, the same pat-

[23] Appendix G shows that the child's outcome measures such as education and participation in crime are important in predicting child's earnings in adulthood.

tern emerges when we consider three different types of crimes, i.e., violent crimes, property crimes, and other crimes or the residual (see Appendix Section D.2).

Third, the most predictive ages vary across outcomes. Higher levels of parental expected lifetime wealth during early childhood (age 6) are associated with higher academic achievement and the development of language, while parental income during adolescent years (ages 10–18) is more tightly linked to children's participation in crime. Again, the patterns are generally similar when we break down the samples by family structure or by the education of parents.[24]

Table 2 summarizes the main results from Figure 2. We list the combination of the child's age at measurement and the measure of parental resources with the highest correlation for each of the child outcomes presented in Figure 2. We refer to this combination of child's age at measurement and measure of parental resources as the "best predictor." Column (1) lists the child outcome. We report the corresponding "best predictor" in columns (2) and (3). The "best predictor" is a measure of parental resources (column 2) and child age at measurement (column 3), that has the highest correlation with the child outcome studied. Column (4) presents the corresponding R^2 resulting from a linear regression of the child outcome in column (1) on the measure of parental resources in column (2), i.e., its best predictor, where parental resources are measured at the child's ages listed in column (3). We discuss the results for IGEs in the last two columns (5–6) of Table 2 in Section 5.

Panel (a) of Table 2 presents the results when we compare all measures of parental resources. The lifetime measure of parental resources (age-dependent expected lifetime wealth) outperforms all other income measures. Panel (b) of Table 2 lists the "best predictor" among the traditional income measures, i.e., where we exclude our lifetime measure of parental resources from the analysis. The only measure of child outcome for which the most predictive ranges of the traditional income measures overlap with those of the lifetime measure is participation in crime.

We benchmark estimates at each age against the age with the max correlation, separately

[24] See Section 6.1.

for each income measure and child outcome measure. We run pairwise t-tests to see whether each estimate is significantly different from that of the age with the max correlation.[25]

The peak age ranges are very similar for crime, but they are different for test scores. The peak ages for years of schooling overlap across measures of parental resources for some ages. The estimated dependence of child outcomes on family income depends on the outcome measure of interest.

The results presented in this section have two important implications. First, a large literature focuses on the importance of aligning child and parental ages when estimating intergenerational persistence in income (Grawe, 2006; Mazumder, 2005; Nybom and Stuhler, 2017; Solon, 1992). Different ages of measurement not only potentially lead to life cycle and attenuation bias—it also changes the channels studied for the transmission from parental income to child's income, and therefore leads to different interpretations of the IGE. We find that when using lifetime measures *for many outcomes there is no unique range of child ages at which parental income is most predictive*.

Second, our correlational evidence that the channel through which parental resources affect child outcomes depends on the outcome in question and the age of the child at which parental resources are measured, suggests that there are differences in sensitive periods in child development (as documented in e.g., Belsky et al., 2020; Knudsen et al., 2006; Steinberg, 2014). A high level of family income during early childhood may support the development of language, while during adolescence, higher levels of family income may prevent children from committing crimes given development of the prefrontal cortex in adolescence (see, e.g., Crone, 2016; Steinberg, 2014). This finding is supported by long-standing evidence from the child development literature, showing that children develop different faculties at different stages of childhood (Belsky et al., 2020; Murasko, 2007; Nelson et al., 2014).

[25] See Appendix B for details. We account for joint dependence between the measures studied and the maximum correlation.

Table 2: Summary: 'Best Predictor' across Child Outcomes and Corresponding Explanatory Power and IGEs

	Best Predictor			IGE Estimates	
Child's Outcome Measure	**Measure**	**Child's Ages**	R^2	**Corresponding IGE**	**IGE-R^2**
(1)	(2)	(3)	(4)	(5)	(6)
Panel a: Among All Measures of Parental Resources					
Child's Language Test Score at age 11	Expected Lifetime Wealth	6	0.053	0.40 [0.392,0.409]	0.101
Math. Leaving Exam at Age 16	Expected Lifetime Wealth	8-9	0.140	0.39 [0.386,0.401]	0.109
Years of Education by Age 35	Expected Lifetime Wealth	12-13	0.136	0.38 [0.369,0.384]	0.115
Participation in Crime by Age 35	Expected Lifetime Wealth	11	0.020	0.38 [0.375,0.390]	0.111
Panel b: Among Traditional Measures of Parental Resources					
Child's Language Test Score at age 11	Wage Income	15	0.034	0.15 [0.142,0.161]	0.017
Math. Leaving Exam at Age 16	Disposable Income	16	0.089	0.30 [0.280,0.308]	0.042
Years of Education by Age 35	Disposable Income	18	0.094	0.29 [0.275,0.308]	0.044
Participation in Crime by Age 35	Wage Income	10-13	0.014	0.15 [0.142,0.161]	0.017

Notes: This table presents the parental measure (column 2) and age of measurement (column 3), resulting in the highest correlation ('best predictor') with each child outcome (column 1). Column (4) reports the R-squared of the linear regression of the child outcome in column (1) on the measure of parental resources in column (2). Panel (a) includes all measures of parental resources. Panel (b) restricts the analysis to the traditional snapshot measures of parental resources by excluding the expected lifetime wealth from the analysis. Column (5) presents the corresponding IGE estimate for each of the different 'best predictors', where individuals are measured over ages 30–35. The 95% confidence intervals are shown in brackets. To compute the IGE, we regress the child's lifetime well-being measure, listed in column (2) and measured at ages 30-35, on the parental lifetime well-being measured by the 'best predictor.' Column (6) reports the R-squared of the IGE regression. To compute the IGE in Panel (b), we regress the child's traditional well-being measure, listed in column (2) and measured at ages 30-35, on the parental traditional well-being measured by the 'best traditional predictor.'

5 Estimates of Intergenerational Mobility

We now turn to the relationship between child's lifetime resources and parental lifetime resources, which is the predominant focus in the literature on intergenerational mobility. Here, the most common measure is the intergenerational elasticity (IGE): a measure of the dependence of well-being across generations. Estimates of the IGE, β, are obtained by estimating the following regression:

$$\log(LW_{i,c}) = \alpha + \beta_k \log(LW_{i,k}) + \epsilon_i, \quad (9)$$

where $LW_{i,c}$ denotes a measure of child expected lifetime resources in adulthood for family i, and $LW_{i,k}$ denotes the expected resources of the family (the father and mother) when the child was k years old, and ϵ_i is the error term.[26] Estimating Equation (9) separately for different values of k (children age when parental resources are measured), we obtain a range of IGE estimates, β_k (where $k \in \{0, \ldots, 18\}$), for a given measure of individual's resources.[27]

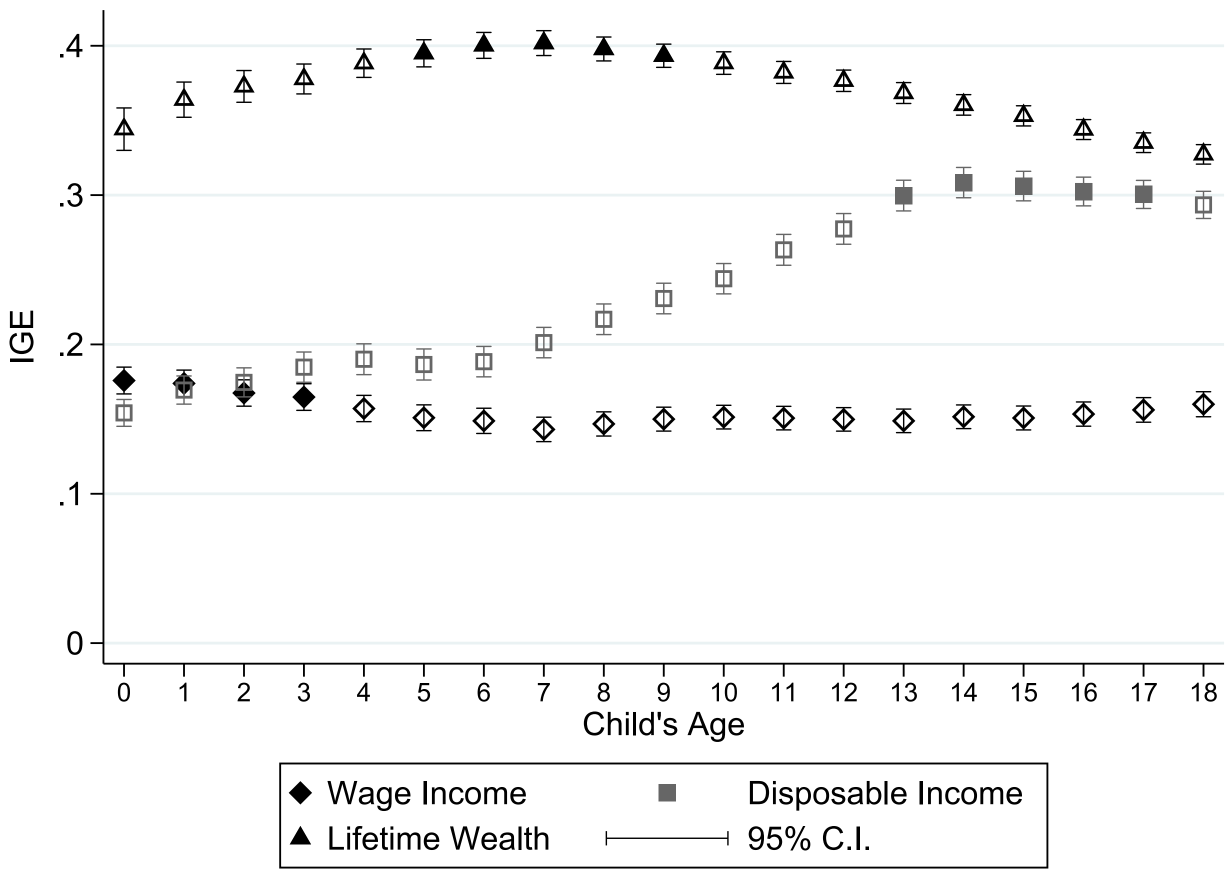
We report the IGE estimates for our traditional measures and lifetime measure in Figure 3. Notably, the IGE for the expected lifetime wealth is at least 0.34, while the IGE in wage income does not exceed 0.18 and the IGE using disposable income peaks at around 0.3.[28] The figure shows that the IGE estimate at a given age increases by at least 0.16 when using expected lifetime wealth to measure the IGE, rather than wage income. Appendix C presents the results using alternative age ranges to measure children's resources.

[26]To mitigate concerns about measurement errors, we use a five-year moving average centered around k, i.e., we use the average of family resources over the child's ages $k-2, k-1, k, k+1, k+2$.

[27]To measure a child's resources in adulthood, we always use the average of child's resources over ages 30–35. Appendix Section C presents the robustness of our results with respect to different age ranges for measuring child outcomes.

[28]The corresponding IGE estimates in Eshaghnia et al. (2022), when both parents and children are measured at ages 30-35, are 0.48, 0.28, and 0.24 for the expected lifetime wealth, wage income, and disposable income, respectively.

Figure 3: IGE Estimates over Age of Child When Parental Resources Measured: Estimates with Solid (Filled) Symbol Are Not Significantly Different from the Maximum IGE Estimate



Notes: This figure plots the IGE for selected income variables. The child's income is measured at ages 30-35, and the parental income is measured at the household level at different child ages. We include children from the 1981-1982 cohorts in Denmark and their parents. The vertical lines around the point estimates represent the 95% confidence intervals. For each income measure, we use a t-test to evaluate whether the estimate at each age is significantly different from the maximum IGE estimate (at the 5% level) where we account for dependence across the estimates.

Table 3: IGE Estimates when Measuring Parental Resources over Different Childhood Ages

Measure of Resources (1)	**Maximum IGE** (2)	**Max-IGE Age** (3)	**Minimum IGE** (4)	**Min-IGE Age** (5)
Disposable Income	0.30 [0.30,0.31]	13-17	0.18 [0.15,0.19]	0-6
Expected Lifetime Wealth	0.40 [0.39,0.41]	5-9	0.34 [0.33,0.35]	18
Wage Income	0.18 [0.17,0.19]	0–3	0.14 [0.13,0.15]	5-17

Notes: For each measure of resources (Column 1), this table presents the maximum (column 2) and minimum IGE (column 4) when we measure parental resources at different ages of children between 0 and 18 (five-year moving average), along ages of children corresponding to the maximum (column 3) and minimum (column 5) IGEs. We measure the child's resources between ages 30-35. The 95% confidence intervals for the IGE estimates are shown in brackets.

We summarize our findings in Table 3. Comparing IGEs for our lifetime measures with those for disposable income, we find that the choice of measure has much larger effects on the estimated IGE than the choice of age intervals.

Section 4 established that our lifetime measure, especially when taken during early childhood and adolescent years, has a much stronger connection to the outcomes of children. In this section, we compute IGEs using measures of parental resources and ages of child that are most relevant to the transmission of family influence. Columns (5)-(6) of Table 2 in display the estimated IGEs using the age ranges with the strongest association between children's human capital outcomes and parental resources.

We reach the following conclusions: First, the IGE measured at the most predictive ages is high, ranging from 0.38–0.40 (see Panel (a) of Table 2). Second, there is no clear, consistent "correct age" or "correct measure." The measures and ages leading to the maximum correlation vary across child outcomes. That said, among measures of family resources, the "best predictor" is always the lifetime measure of expected parental income. Large differences are driven by the choice of income measure, rather than the age range used to measure parental resources. See Panel (b) of Table 2, which shows that the "best predictors" of IGEs using traditional income measures vary from 0.15 to 0.30.

Moreover, choosing the correct age range to measure the IGE based on its predictive power for a specific child outcome can be interpreted as an approximation to the channel of transmission of income from parents to children. Note, however, this is only suggestive of causality. In the presence of imperfect capital markets and the revelation of life cycle information, the timing of parental income can matter. Our correlations and age-by-age IGEs do not necessarily speak to the causal impact of the timing of income as presented by Carneiro et al. (2021), since we don't hold income at other ages constant. A model of skill formation linked to expected lifetime resources addresses this concern. We present such estimates in Section 7. Before doing so, we examine other family influences beyond family income.

6 Family Influence Beyond Financial Resources

The intergenerational transmission of family influence arises not only through financial resources but also through family environments, such as the education of parents and the stability of the family unit (Cunha and Heckman, 2007). A large literature documents such associations (McLanahan and Sandefur, 1994). Establishing their importance is helpful in devising policies to promote intergenerational mobility. Is pure income redistribution enough to equalize opportunities, or are there other aspects of family life besides income and wealth that shape mobility? The current emphasis on IGEs focuses attention on financial resources while other factors might also be important.

This section of the paper and the associated appendices explore these influences in several ways. First, we examine how the intergenerational correlations studied in the previous section differ depending on family characteristics apart from income. Second, we examine the extent to which family and environment variables weaken or eliminate the influence of parental financial resources on the child's financial resources.

6.1 Family Characteristics as Mediators

This subsection examines how the estimates reported in Section 5 vary with respect to parental education levels and marital status. Appendix Sections D.3 presents additional estimates of the impact of family income measures on child criminality. Appendix E presents IGE estimates by parental education, child gender, and parental marital status at birth.[29]

Panels (a) and (b) of Figure 4 plot correlations between the child's mathematics test scores at age 16 and parental resources at different ages of children for two different groups of families: college parents where both parents are college or university graduates (Panel a) and parents where none of the parents are college or university graduates (Panel b).[30]

Panels (c) and (d) of Figure 4 plot the correlations between the child's years of education by age 35 and parental resources at different child's ages, separately for the same parental types. Finally, panels (e) and (f) of Figure 4 plot the correlation between the child's participation in crime by age 35 and parental resources at different child's ages, separately for different educational attainments of parents.[31]

The intergenerational correlation patterns are, in general, similar across different groups of parental educational backgrounds. However, intergenerational correlations tend to be significantly *lower* for the sample of highly educated parents compared to the sample of no-college parents. For example, the correlations between children's math test scores and parental wage income and the expected lifetime wealth are about 0.15 and 0.22, respectively, for the sample of college parents in Panel (a), lower than 0.23 and 0.27 for the sample of less educated parents shown in Panel (b). Parental resources play a more important role in predicting child outcomes for less-educated parents, compared to educated parents.

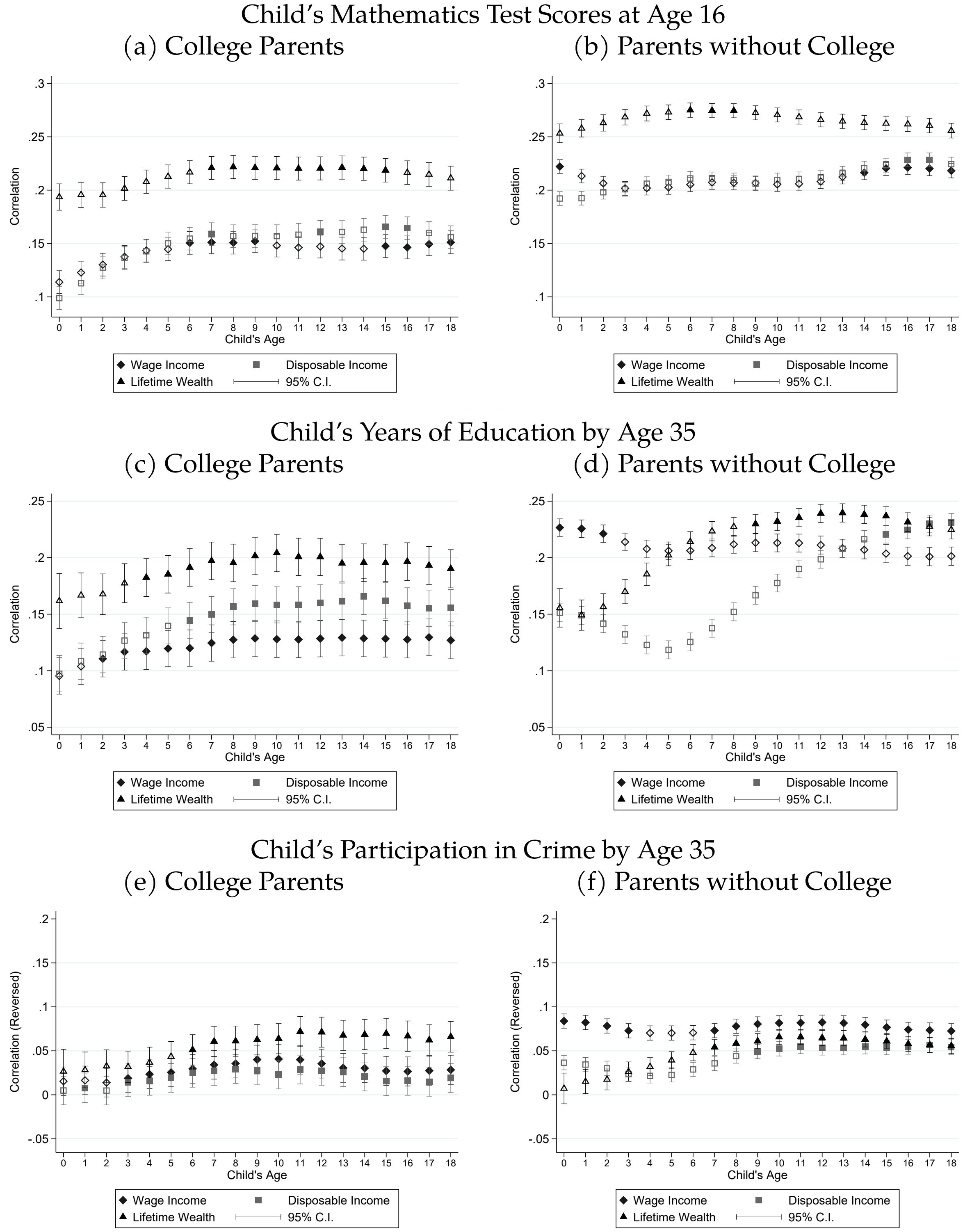
Figure 5 plots the correlation between the child outcomes — mathematics test scores at

[29] Unlike our other child outcome measures, the language development at age 11 is obtained from a survey. The intergenerational estimates are less precisely estimated than other outcome measures due to the small sample size, especially when we break down the sample by family types. Hence, we do not present the results for language test scores here.

[30] Appendix E.1 presents the results for other groups, e.g., for parents where only the father or the mother is a college or university graduate

[31] Appendix Figure E.4 presents the corresponding IGE estimate by parental education background when we measure parental resources at different child profile ages from zero to 18.

Figure 4: Correlations of Parental Resources with Child Outcomes by Parental Education Level



Notes: This figure plots the correlation between various child outcomes and parental income variables measured at the household level at different child's ages, separately by parents' education levels. Panels (a) and (b) present the results for the child's mathematics test score (at around age 16) in national leaving examinations (for cohorts born in 1995-1997). Panels (c) and (d) present the results for the child's years of education (for cohorts born in 1981-1982). Panels (e) and (f) present the results for the child's participation in crime (for cohorts born in 1981-1982). For each outcome (mathematics test score, years of education, and participation in crime), we present the results separately for the sample of college parents (where both parents are college –or university– graduates) and for the sample of parents where none of the parents are college –or university– graduates.

age 16, years of education, and criminality — and parental resources measured at the household level at different child's ages, separately for married and non-married parents. For each child, we consider the family as married if the mother and the father were registered as married when the child was born.[32]

Three findings emerge. First, the ranking of predictive power across measures of parental resources remains as previously discussed. The most predictive measure, by far, is expected lifetime wealth. Second, except for child criminality, accounting for differences in parental education substantially affects correlations by age with family resources. Third, the associations between parental resources and child outcomes are stronger for non-married parents than for married parents. The disadvantages of a single parent family (Kearney, 2023) are at least partially compensated for family resources.

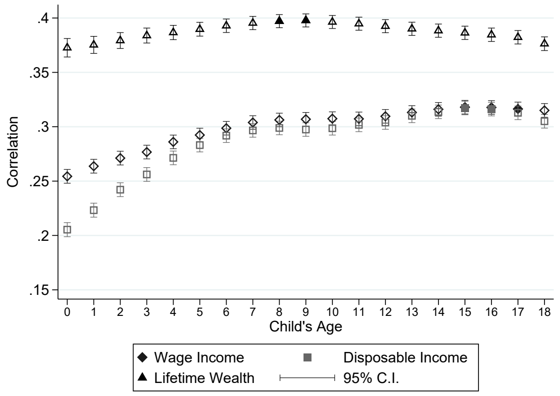
A general pattern found in background Appendix E is that family adversity has a stronger impact on the estimated relationships between family wealth and child outcomes for boys than for girls. Money appears to be a more powerful offset for adversity for males.

[32] Appendix Section E.3 shows the corresponding results by gender. Appendix Section E.4 presents the results when we estimate heterogeneity by the intactness of the family where we consider a family as intact if the mother and the father were living together over the whole childhood stage (from age zero to 18 of the child). The patterns are very similar to those presented below based on the marital status of parents at the birth of children.

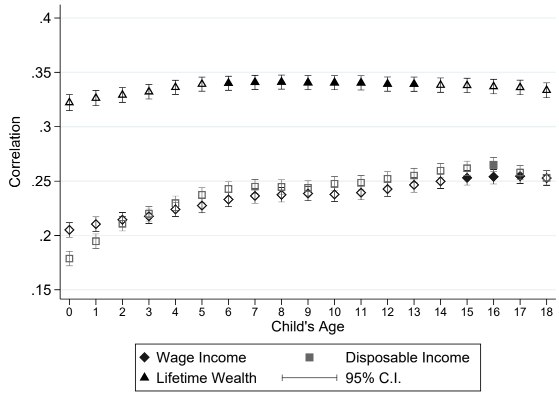
Figure 5: Correlations of Parental Resources with Child Outcomes by Parental Marital Status at Birth of the Child

Child's Mathematics Test Scores at Age 16

(a) Parents Not Married When Child Was Born

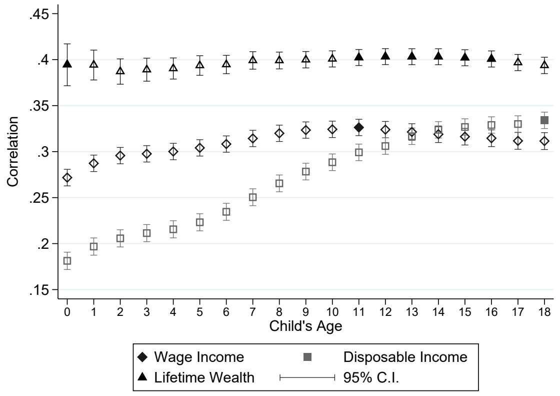


(b) Parents Married When Child Was Born

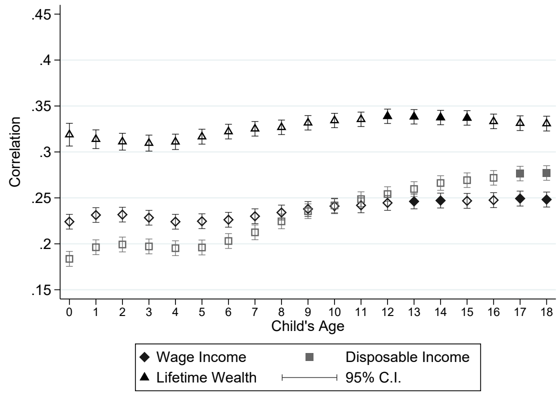


Child's Years of Education by Age 35

(c) Parents Not Married When Child Was Born

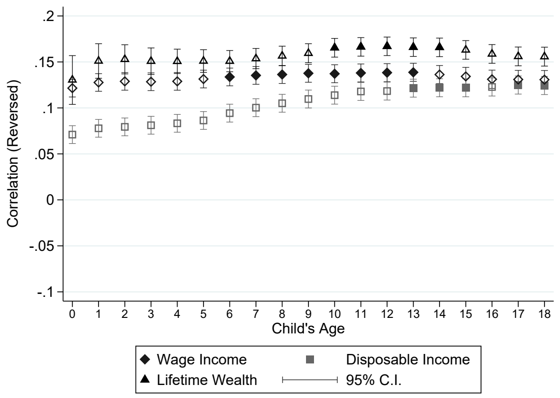


(d) Parents Married When Child Was Born

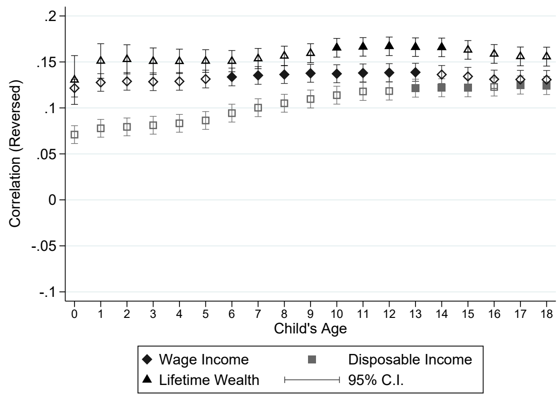


Child's Participation in Crime by Age 35

(e) Parents Not Married When Child Was Born



(f) Parents Married When Child Was Born



Notes: This figure plots the correlation between various child outcomes and parental income variables measured at the household level at different child's ages, separately by whether parents were married at the time of the child's birth. Panels (a) and (b) present the results for the child's mathematics test score (at around age 16) in national leaving examinations (for cohorts born in 1995-1997). Panels (c) and (d) present the results for child's years of education (for cohorts born in 1981-1982). Panels (e) and (f) present the results for the child's participation in crime (for cohorts born in 1981-1982). For each outcome (mathematics test score, years of education, and participation in crime), we present the results separately for married and non-married parents. For each child, we consider the family as married if the mother and the father were registered as married when the child was born.

6.2 The Direct Role of Parental Characteristics on Child Outcomes

The weaker correlations between child outcomes and parental resources obtained after conditioning on parents' education and marital status, displayed in Figure 5, suggest that parental characteristics predict unconditional child outcomes through other channels besides family financial resources. Cunha et al. (2007) amend the Becker-Tomes model to account for this influence.[33]

Figure 6 plots estimated regression coefficients of parents' education (average of mother's and father's years of education) and marital status at childbirth, on child outcomes (mathematics test scores, years of education, and criminality).[34] The circles show unadjusted estimates, and the diamonds show estimates controlling for parental resources (either wage income, disposable income, or expected lifetime wealth) from age 0-18 of the child. The squares show estimates when, in addition to parental resources from age 0-18 of the child, we also control for other parental background characteristics such as the average age of parents at arrival of the child.[35]

Expected lifetime wealth explains a larger fraction of the association between parents' characteristics and child outcomes compared to the two traditional income measures. For child mathematics test scores and years of education (Figures 6a and c), the estimates for parents' education drop by 50-60% once we control for the expected lifetime wealth of parents. For children's criminality (Figure 6e), there is a 35% reduction in the association between parents' characteristics and the child's participation in crime once we control for the lifetime wealth of parents. Turning to the estimates for parents' marital status, estimates drop to almost zero once we control for parents' lifetime wealth when we consider children's mathematics test scores and years of education as outcomes (Figures 6b and d), while the estimated association between children's criminality and parents' marital status drops by more than 50% when we condition on parents' lifetime resources (Figure 6f).

[33] Becker et al. (2018) use the Cunha et al. (2007) insight to explain the Gatsby curve.

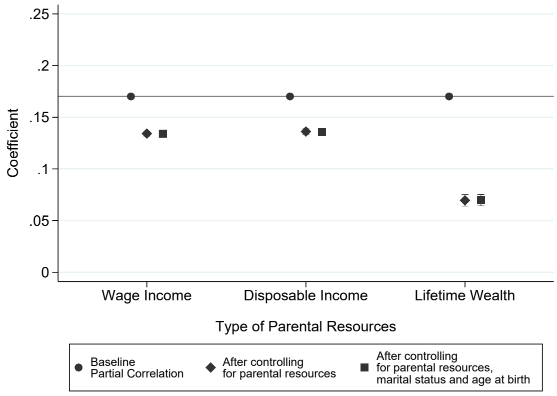
[34] We conduct a similar analysis for parental age at the arrival of children. We report the results in Appendix F.

[35] See Eshaghnia (2023) for the role of parents' ages at childbirth on the development of their children.

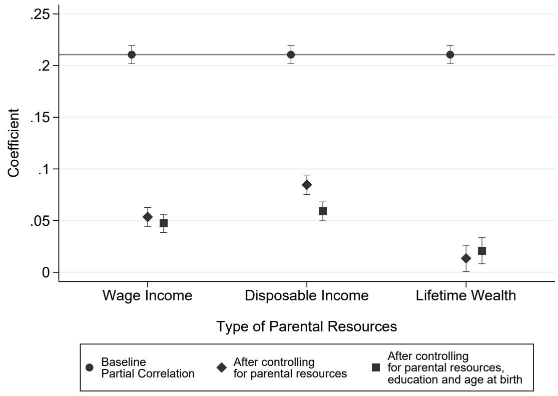
Figure 6: Associations of Parental Education (Marital Status) with Child Outcomes before and after Adjusting for Parental Resources

Child's Mathematics Test Scores at Age 16

(a) Parents' Average Education

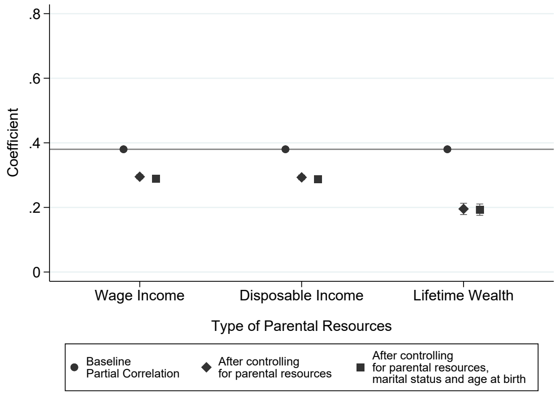


(b) Parents' Marital Status at Birth

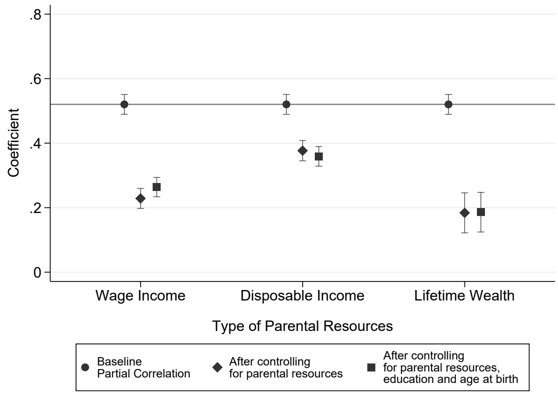


Child's Years of Education by Age 35

(c) Parents' Average Education

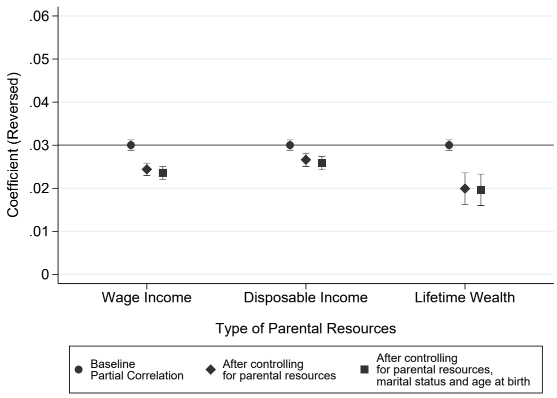


(d) Parents' Marital Status at Birth

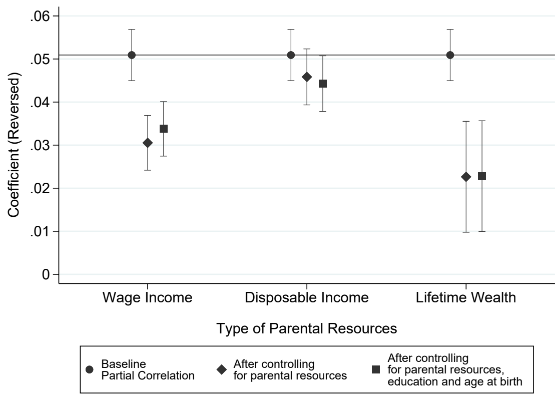


Child's Participation in Crime by Age 35

(e) Parents' Average Education



(f) Parents' Marital Status at Birth



Notes: This figure plots the association between various child outcomes and parental characteristics (years of education of parents and marital status of parents at the time of the child's birth) both before and after adjusting for the impact of parental resources during childhood stage between ages of zero and 18 of the child and other characteristics of parents. Unadjusted coefficients are obtained by regressing the corresponding child's outcome on parental characteristics (years of schooling of parents or their marital status). Adjusted coefficients report the estimate of the effect of parental characteristics of interest (in the caption of each panel) after we add regressors to control for parental resources in different childhood ages from zero to 18 and other parental characteristics. Panels (a) and (b) present the results for child's mathematics test score (for cohorts born in 1995-1997). Panels (c) and (d) present the results for child's years of education (for cohorts born in 1981-1982). Panels (e) and (f) consider the child's participation in crime (for cohorts born in 1981-1982).

Thus, while parents' education and expected lifetime resources are highly correlated (see Figure 1b), Figure 6 shows that parents' education likely plays a role in explaining child outcomes through channels other than just pecuniary resources. In contrast, parental expected lifetime resources appear to fully capture the link between family structure and child outcomes such as test scores and years of education, even though the correlation between parents' marital status and expected lifetime wealth is lower than for wage income and disposable income (see Figure 1c).[36] We next evaluate the role of parental lifetime wealth at different childhood stages while holding parental education, marital status, and age constant.

7 Estimating the Technology of Skill Formation

This section reports estimates of a quadratic approximation to the technology of skill formation (Equation (8)) for three different child outcomes realized at different ages. Table 4 documents how we define the periods used for each outcome and at what age each child outcome is realized. $\boldsymbol{Z}_t$ values are very similar within the selected intervals. Table I.1 of Appendix I shows the correlations between parents' expected lifetime wealth across different age intervals. Table I.2 shows that the correlations of these variables within these intervals are very high. Finer partitions of resources by age lead to severe problems with multicollinearity. Hence, we use the coarse approximations reported here.[37,38]

[36] We also conduct a simple decomposition exercise (Hertz, 2008) where we decompose the correlation between parental lifetime wealth and child outcomes (such as test scores and years of education) to the within-group vs. between-group components where we use parental education levels to define the groups (i.e., four groups of parents: both parents are college or university graduates, none of them is a college or university graduate, only the father is a college or university graduate, and only the mother is a college or university graduate). Our results suggest that the between-group effect accounts for about 50% of the overall correlations between parental lifetime wealth and the child's test scores. The between-group share is about 30% (40%) of the overall correlations between parental wage income (disposable income) and the child's test scores. The between-group shares are slightly higher when analyzing the correlations between parental resources and the child's years of education by age 35.

[37] Appendix Table I.2 presents the correlations across all children's ages from zero to 18.

[38] Also, Appendix Figure I.1 presents the eigenvalues from principal components analyses of parents' expected lifetime wealth over the child's age intervals of $[0, 5]$, $[6, 11]$, $[12, 17]$, $[18, 23]$, and $[24, 29]$. Except for the first eigenvalue, other eigenvalues are close to zero.

Table 4: Age Ranges Studied for Indicated Child Outcomes

Outcome	Child's age intervals	Num. of periods
Math Problem Solving at Age 16	[0,5], [6,11], [12,17]	3
Participated in Crime by 35	[0,5], [6,11], [12,17],[18,23], [24,29]	5
Years of Education by Age 35	[0,5], [6,11], [12,17],[18,23], [24,29]	5

Notes: This table presents the specific periods used for each outcome as well as the number of periods (until the realization of the outcome) to run the model in Equation (8).

We regress child outcomes on parental expected lifetime wealth in each interval as well as interactions among the expected lifetime wealth measures across different periods while controlling for parental characteristics (average years of schooling, marital status at childbirth, the average age at childbirth) and their interactions with parental lifetime wealth in different intervals.[39] We use two different specifications of the ranges of periods studied:

1. Birth until realization of the outcome: All periods starting at birth up to and including the period during which the outcome studied is realized.
2. Birth until age 17: All periods starting at birth up to and including the terminal period of childhood (at age 17).

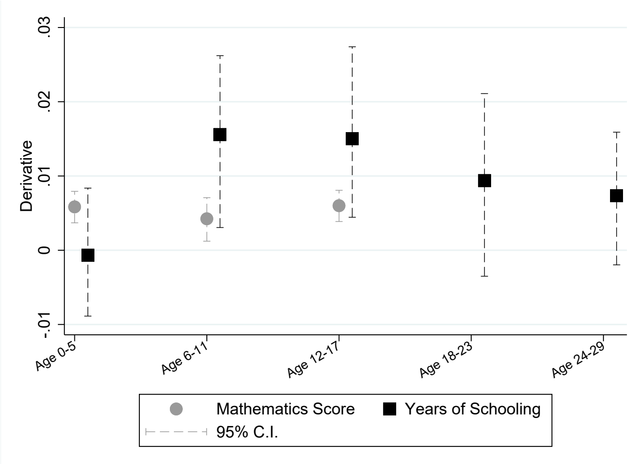
Controlling for the expected lifetime wealth at different ages when investments are made, accounts for updating of family resources and constraints at different ages. This extends the approach of Carneiro et al. (2021) by introducing sequential updating of expected family resources.

Tables I.5–I.8 of Appendix I report the coefficients obtained from these two specifications of the model. In what follows, we focus on the estimates for the first specification. The results for the second specification, presented in Appendix I, show similar patterns.

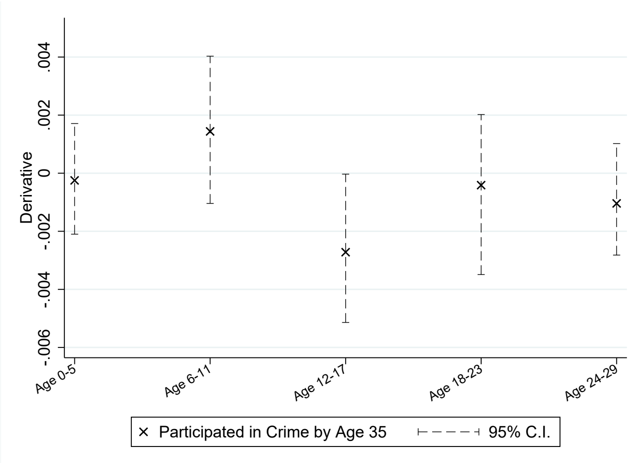
[39] Appendix I discusses the details.

Figure 7: Derivative of Child Outcomes with respect to Parental Lifetime Wealth at Different Childhood Age Intervals, Evaluated at the Mean (First Specification)

(a) Mathematics Test Scores (Age 16) and Years of Education (Age 35)



(b) Participation in Crime by Age 35



Notes: This figure depicts the value of the derivative of each of the child outcomes (mathematics test scores at age 16, years of education by age 35, and crime measured by committed any types of crimes by age 35) with respect to the parental lifetime wealth in each interval (in 10,000 USD in 2010 values), evaluated at the mean. Table I.4 reports the values. We estimate Equation (8), assuming that the coefficients $\alpha_0(t)$, $\boldsymbol{\alpha}'_{1,i}(t)$, and $\boldsymbol{\Psi}_{i,j}(t)$ are constant within the selected intervals. The full set of estimation results, including the constant and the coefficients on the interaction terms, are reported in Tables I.5-I.8 of Appendix I.

Figure 7 plots the derivatives of child outcomes with respect to our lifetime wealth proxies for child investment in different childhood intervals.[40] A consistent regularity across the outcomes studied is that we *do not* reproduce the U-shaped profile reported by Carneiro et al. (2021). The results presented in Figure 7 suggest that a 10,000 (in 2010 USD) increase in parental lifetime wealth at ages 0-5 of the child[41] is associated with around 0.006 standard deviation increase in children's mathematics test scores at age 16. Moreover, a 10,000 (in 2010 USD) increase in parental lifetime wealth at ages 12-17 of the child is associated with around 0.7 percent lower likelihood of participation in crime by age 35 of the child.

Our measures of investment show stronger effects on education in the elementary school years than in the preschool years, tapering off later. For mathematics skills, the early years are sensitive periods. For participation in crime, the adolescent-young adult years are more potent–consistent with the research of Steinberg (2014) and Crone (2016) on the onset of puberty, the maturation of the prefrontal cortex and emergence of self-control. The derivatives of child outcomes with respect to parental lifetime wealth in different childhood stages are up to 50% lower compared to the specification where we do not take into account the direct impacts of parental characteristics (years of schooling, marital status at childbirth, age at childbirth) on child outcomes, apart from their impacts through the lifetime wealth of parents.[42]

From Equation (6), $\frac{\partial^2 \boldsymbol{G}_t}{\partial \boldsymbol{Z}_t \partial \boldsymbol{Z}'_{t+j}}$ is a measure of complementarity or substitutability because $\boldsymbol{Z}_t$ proxies $\boldsymbol{I}_t$. The concept of dynamic complementarity is extended for skills not in play at early ages. It is meaningful only for ages where emergent skills are relevant (have non-zero partials). Table 5 shows that dynamic complementarity operates across many stages of investment in producing adult education. Yet not all cross-partials are statistically significant,

[40] Table I.4 presents the point estimates.

[41] This amounts to around 1% of average parental lifetime wealth in the sample.

[42] The derivatives of child's years of schooling and participation in crime with respect to parental lifetime wealth in adolescence is about 50% lower when we account for parental characteristics in our specification. For mathematics test scores, the derivative with respect to parental lifetime wealth in early childhood (ages 0–5) drops by about 40%, but the derivatives with respect to parental lifetime wealth in later childhood stages (ages 6–11 and 12–17) remain unchanged. Appendix I.3 presents the full set of results for both specifications.

and some are negative.[43] The evidence for dynamic complementarity for other outcomes is more mixed. See Tables I.5-I.8 in the appendix for additional evidence.

Table 5: Dynamic Complementarity for Educational Attainment by Age 35 (First Specification of Income: Measured from Birth to the Realization of the Outcome)

Child's Age	$[0, 5]$	$[6, 11]$	$[12, 17]$	$[18, 23]$
$[6, 11]$	0.00138 (0.00327)			
$[12, 17]$	-0.00340 (0.00337)	0.00761* (0.00413)		
$[18, 23]$	0.00265 (0.00336)	-0.00814* (0.00428)	0.0114*** (0.00427)	
$[24, 29]$	-0.00139 (0.00236)	0.00367 (0.00305)	-0.00439 (0.00309)	0.000652 (0.00304)

Standard errors in parentheses.

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

Notes: This table presents the dynamic complementarity for educational attainment by age 35. We estimate Equation (8), taking coefficients $\alpha_0(t)$, $\boldsymbol{\alpha}'_{1,i}(t)$, and $\boldsymbol{\Psi}_{i,j}(t)$ to be constant within the selected intervals. The full set of estimation results are reported in Table I.8 of Appendix I.

8 Conclusion

This paper connects the literature on intergenerational mobility to the recent literature on child development and develops and applies a methodology for examining the impact of family resources by age on the development of children. We present estimates of the impacts of age-specific intergenerational expected life cycle resources instead of measures of current income over narrow intervals as used in many studies of social mobility.

We introduce a new approach for selecting measures of expected lifetime income, and the age ranges for measuring it, when computing IGEs. Instead of choosing income mea-

[43] Cross effects may be negative. Thus, for example, extraversion may well be a negative aspect of the productivity of a professional mathematician but not for a salesperson.

sures to align ages across generations or to eliminate measurement errors, we estimate IGEs on the basis of how well they predict child academic achievement, criminal behavior, and educational attainment.

This approach provides an interpretative guide for linking measures of family influence across generations. The predictive power of parental income on measures of child outcomes guides our choice of ages of measurement. We select the combination of measures and age ranges that best predict important human capital outcomes of children: academic performance, educational attainment, and participation in crime. This approach accounts for non-stationarity across cohorts documented in Stuhler and Nybom (2023) and Eshaghnia et al. (2022).

The predictive power of parental resources on child human capital measures crucially depends not only on when parental resources are measured (over the life cycles of children), but also on which measures of parental resources are considered. The choice of a resource measure makes more of a difference to estimated IGEs than the choice of age intervals for measuring parental income. The traditional approach, based on income flows in narrow intervals, substantially overestimates intergenerational mobility and underestimates the persistence of advantage across generations.

Our analyses suggest that parental resources are significantly more important in predicting child outcomes for disadvantaged families, compared to more educated and stable families. Financial resources compensate in part for disadvantages in terms of parental characteristics. We extend Carneiro et al. (2021) by allowing for sequential updating of agent information sets in estimating relevant lifetime resources. We do not reproduce their U-shaped impact of income timing patterns by age. For math and language skills, early investment has the biggest impact. For years of schooling, impacts are greatest in the middle school years of children. For crime, investment in the adolescent and young adult years is more impactful. This is consistent with the analysis of Cunha et al. (2010) who show that noncognitive skills become more important later in life and the studies of Steinberg (2014), Crone (2016), and Belsky et al. (2020) about the emergence of these skills in adolescence. We present evidence of both dynamic complementarity and dynamic substitutability of investment over the life cycle, especially for educational outcomes. The evidence for other outcomes is more mixed. We amend the technology of skill formation to account for new skills emerging in adolescence. This enables us to account for evidence of sensitive periods in adolescence.

Our analysis is a beginning for a research program that uses economics to interpret the statistics on social mobility. We challenge many of the conventions that have become standard in the literature. There is no "best" age for comparing the status of parents and children. Measures of permanent income do not approximate theory-derived measures of lifetime wealth that account for credit constraints and uncertainty.

Much remains to be done. The causal status of our estimates remain to be determined. Our use of long-run averages attenuates classical measurement error, and forecasting future incomes using data on others introduces exogeneity into the construction of lifetime wealth. Nonetheless, there may remain individual components of heterogeneity transmitted across generations. In a companion paper, Eshaghnia et al. (2022), we use policy variation in income to surmount these difficulties.

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The Impact of the Level and Timing of Parental Resources on Child Development and Intergenerational Mobility

APPENDIX*

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January 19, 2024

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Contents

A Data

This appendix presents the data sources of the study and describes different analysis samples used in this paper.

A.1 Data Sources

Danish Administrative Registers. For the empirical analysis in this paper, we use Danish data.[1] The register data include unique individual identifiers allowing us to link individuals across years from 1980 to 2019 (the last year of data availability). In addition, the data also include unique individual identifiers of spouses and parents allowing us to link families across generations.

In addition to information on income measures of children and their parents, we also add information on completed education, household structure, demographic characteristics, and crime. Using the individual identifiers, we link data from registers containing educational attainment (UDDA register), income, assets, transfers, marital status, and fertility (BEF register) for each individual and his or her spouse and parents. We also include information on 9th grade national leaving exams (UDFK), and criminal convictions from the sentencing register (KRAF) and incarceration spells from the incarceration register (KRIN).

Danish Household Expenditure Survey: To construct a consumption measure, we also make use of the Danish Household Expenditure Survey, which is a conventional diary-based survey of expenditures within the household, collected by Statistics Denmark (Browning et al., 2021), which provides detailed information on various categories of consumption expenditures for a rotating sample of individuals between 1995 and 2012. We link the survey data to the administrative register information using individual unique identifiers. We use households' disposable income and detailed information on assets and liabilities in periods t and $t-1$ from the register data to predict household consumption as reported in the expenditure survey (1997+). We follow Eshaghnia et al. (2022) to impute consumption measures.

[1] For details, see http://www.dst.dk/en.

The imputation is conducted using a random forest estimator, which is a nonparametric prediction algorithm originally proposed by Ho et al. (1995). We select the number of trees using a 5-fold cross-validation approach (Kohavi et al., 1995). Among participants in the Danish Expenditure Survey, the correlation between predicted consumption and observed consumption using a training set was 0.95. To obtain the adult-equivalence consumption, we use the standard OECD equivalence scale to adjust for household size and composition (Browning et al., 2014).

Danish Longitudinal Survey of Children (DALSC): We also make use of the Danish Longitudinal Survey of Children born in 1995 (DALSC), which includes a representative group of over 6,000 children among all children born in Denmark in 1995 (around 70,000).[2] These children and their parents were interviewed during five waves, from 1996 (6 months), 1999 (3 years), 2003 (7 years), 2007 (11 years) and 2011 (15 years), and 2014 (18 years old). We use information on children's cognitive tests completed in different waves of the survey.[3] From the survey, we obtain a measure of language development at age 11. We link the survey data to the administrative register information using individuals' unique identifiers.

A.2 Analysis Samples

1981–1982 Cohort. We base our analysis on the sample of children born in 1981 and 1982 for whom we can establish a link to parents, whose parents did not migrate, and who did not themselves migrate. We observe the birth cohorts of 1981 and 1982 from birth to age 38 and 37, respectively (in 2019). We have information on their parents in all years between 1980 and 2019, which covers the years between the arrival of the children in our sample all through age 38 (37) for the birth cohort 1981 (1982). For our IGE analysis, we use these samples of 1981–1982 birth cohorts and measure children's resources at ages 30—35. For the IGE analysis in the paper, our log-log specification excludes individuals with zero or negative

[2] The children in the survey were born between September 15 and October 31, 1995.

[3] For details, see https://www.vive.dk/da/projektforloeb/aargang-95-forloebsundersoegelsen-af-boern-foedt-i-1995.

average income for the age range over which we measure their income and individuals with average income more than four standard deviations above or below the mean. We start with a sample of 105,953 individuals who did not migrate and whose parents did not migrate for whom we can establish links with their parents. This reduces to 100,344 when dropping negative values and zeroes, and this reduces further down to 98,686 when we drop those children with fewer than three observations.

1995–1997 Cohort. We use the population of individuals born between 1995 and 1997 in Denmark. We use this sample when we study the 9th-grade national leaving exam as our measure of child human capital. We observe the birth cohorts of 1995–1997 from birth to age 22–24 in 2019. It follows that we observe their parental resources during the whole childhood period and beyond (from age 0 to 22 for the 1997 cohort and from age 0 to 24 for the 1995 cohort).

B Tests for Equality of Correlations across Child Ages

This appendix explains how we test different hypotheses regarding the equality of the by-age correlations of parental income and child outcomes, pairwise and jointly. The notation is borrowed from Meng et al. (1992).

B.1 T-Test

Note that the Fisher transformation of correlation r is $z_r = \frac{1}{2}ln(\frac{1+r}{1-r})$. To test for the equality of two age-specific correlations between parental income (X) and child outcome (Y), we use the Fisher transformation as follows. Let X_i denote parental income at the child's age i. Let r_{Y,X_i} and $r_{Y,X_{i'}}$ denote correlation coefficients between the child's outcome (Y) and parental resources at ages i and i', respectively. Now, define:

$$Z = (z_{r_i} - z_{r_{i'}})\sqrt{\frac{N-3}{2(1-r_x)h}},$$

where N is the sample size (child-family pairs), z_{r_i} is the Fisher z-transformed of $r_i \equiv r_{Y,X_i}$, and r_x is the correlation between the two predictor variables, parental income at the two ages, X_i and $X_{i'}$ (i.e., $r_{X_i,X_{i'}}$),

$$h = \frac{1 - f\overline{r^2}}{1 - \overline{r^2}} = 1 + (1 - f)\frac{\overline{r^2}}{1 - \overline{r^2}} \tag{1}$$

$$f = \frac{1 - r_x}{2(1 - \overline{r^2})}, \tag{2}$$

and $\overline{r^2}$ is the mean of the r_i^2, i.e., $(r_i^2 + r_{i'}^2)/2$, and f is set to 1 if $\frac{1-r_x}{2(1-\overline{r^2})} \geq 1$.

B.2 F-Test

To test for equality of the age-specific correlations jointly (for all ages from zero to 18 for example), we can use the following chi-squared test:

$$\chi^2(k-1) = \frac{(N-3)\Sigma_i(z_{r_i} - \overline{Z_r})^2}{(1 - r_x)h},$$

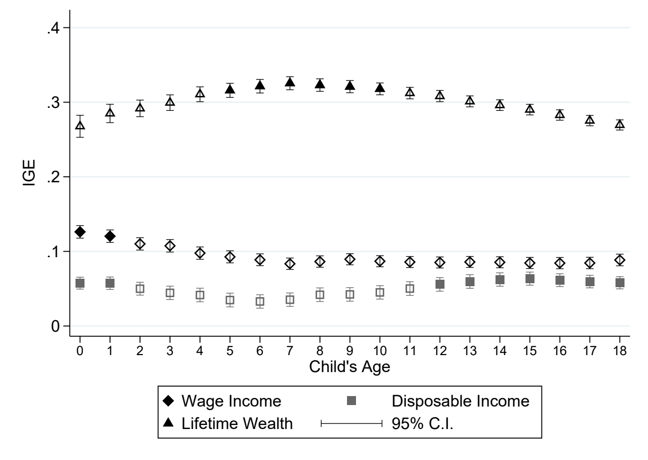
where $\overline{Z_r}$ is the mean of the z_{r_i}. The χ^2 statistic is distributed with $k-1$ degrees of freedom where k is the number of predictive correlations (19 in the example above where we test for all ages from zero to 18 simultaneously). In this equation, r_i takes on k values for different by-age correlations, so that in the definition of h given by Equation 1 and 2 above, r^2 is the average of all k values of r_i^2, and r_x is the median intercorrelation among all by-age predictors tested for equality (Meng et al. (1992)).

C IGE Estimates for Other Child's Ages

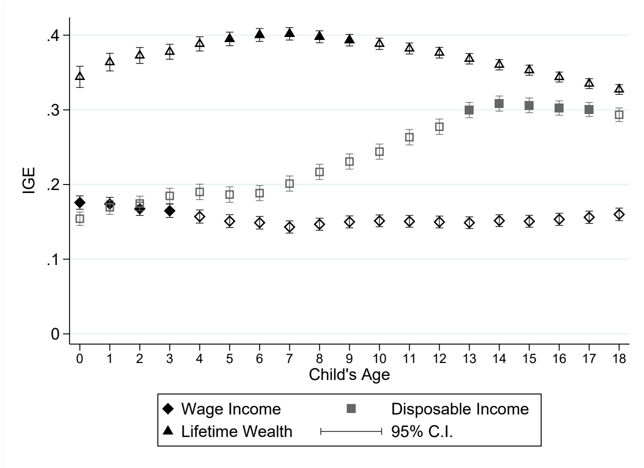
This section presents the sensitivity of our IGE estimates, presented in Section 5, to the age range we choose to measure the children's income. In addition to ages 30–35 used in Section 5, we also present the results when we use ages 25–30 and 25–37. Moreover, Section C.2 presents these results by parental education level. Section C.2.2 reports the results by intactness of families. Finally, Section C.2.3 shows the results by marital status of parents at the child's birth.

C.1 IGE Estimates for the Pooled Sample

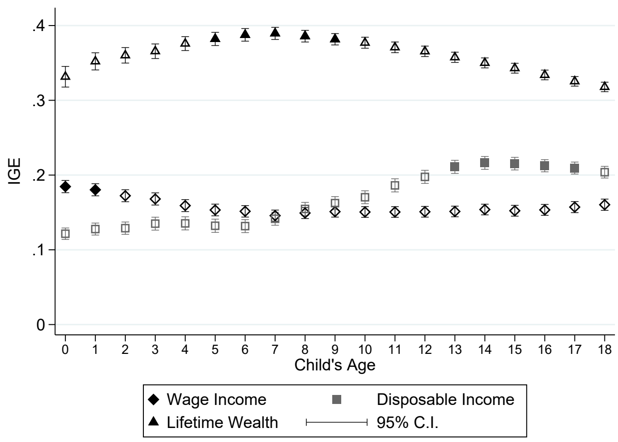
Figure C.1: IGE Estimates over Age of Child When Parental Resources Measured, by Age of Measurement of Child



(a) Children Measured over 25–30



(b) Children Measured over 30–35



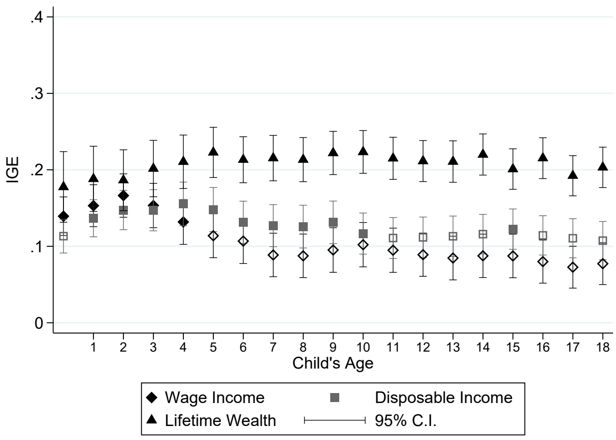
(c) Children Measured over 25–37

Notes: This figure plots the IGE for selected income variables. The parental income is measured at the household level at different child ages indicated in the X-axis. Panel (a) shows the results where children are measured at ages 25–30. Panel (b) shows the results where children are measured at ages 30–35. Panel (c) shows the results where children are measured at ages 25–37. We correlate the same measures for parents and child. We include children from the 1981-1982 cohorts in Denmark and their parents. The vertical lines around the point estimates represent the 95% confidence intervals. For each income measure, we use a t-test to evaluate whether the estimate at each age is significantly different from the maximum IGE estimate. We depict the estimate with solid (filled) symbol if it is not significantly different from the maximum IGE estimate.

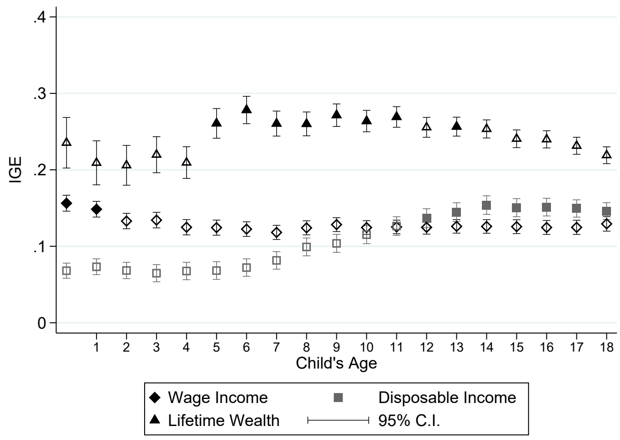
C.2 IGE Estimates By Parental Background

C.2.1 Parental Education

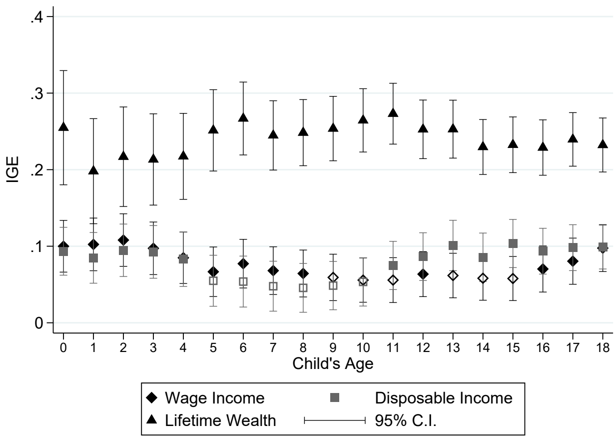
Figure C.2: Parents-Child IGE Estimates, Children Measured at Ages 25–30



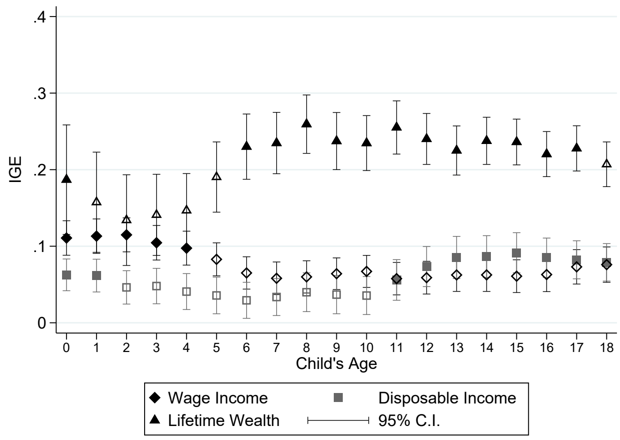
(a) College Parents



(b) No College Parents



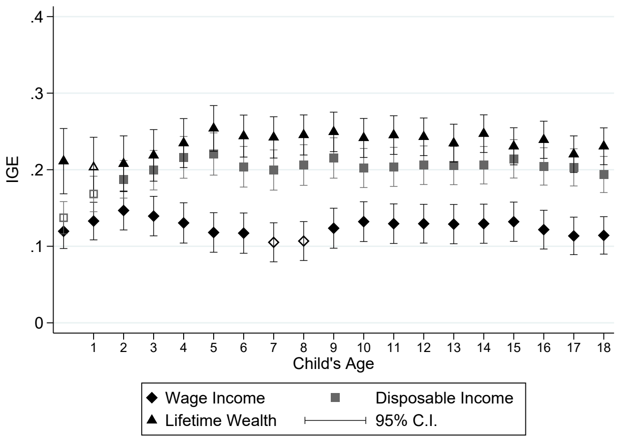
(c) College Fathers



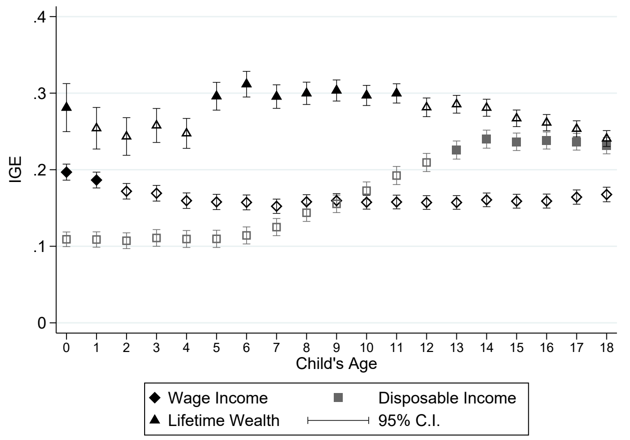
(d) College Mothers

Notes: This figure plots the IGE for selected income variables. The child's income is measured at ages 25-30 and the parental income is measured at the household level at different child's ages. We correlate the same measures for parents and child. We include children from the 1981-1982 cohorts in these exercises. Panel (a) presents by-age correlations for the sample of college parents where both parents are college (or university) graduates. Panel (b) presents correlations for the sample of parents where non of the parents are college (or university) graduates. Panel (c) restricts the sample to those families where only the father is a college (or university) graduate. Panel (d) restricts the sample to those families where only the mother is a college (or university) graduate.

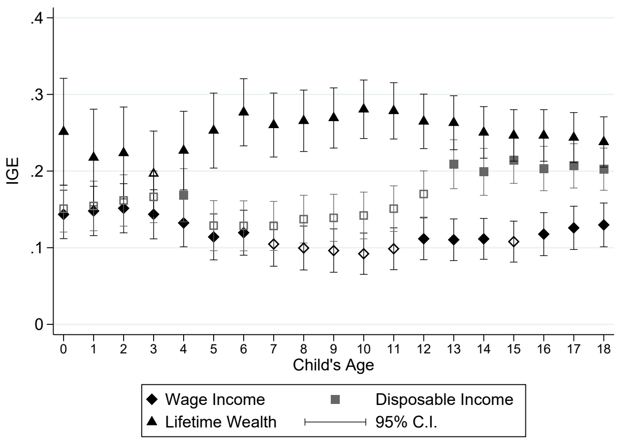
Figure C.3: Parents-Child IGE Estimates, Children Measured at Ages 25–37



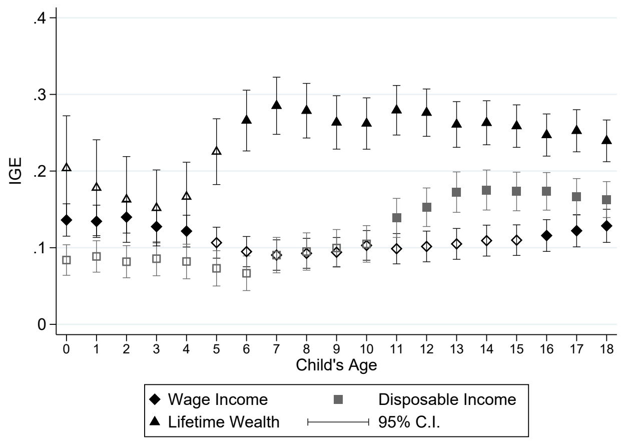
(a) College Parents



(b) No College Parents



(c) College Fathers

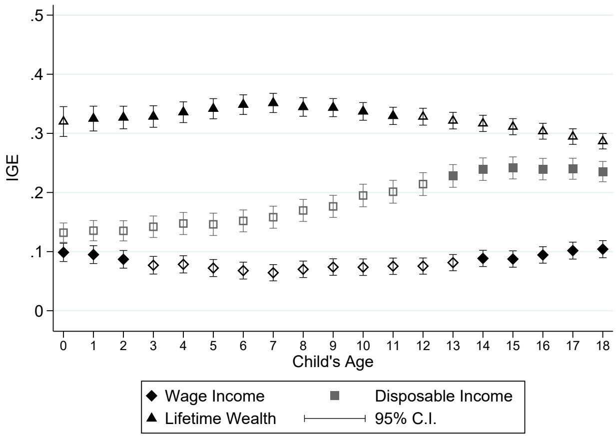


(d) College Mothers

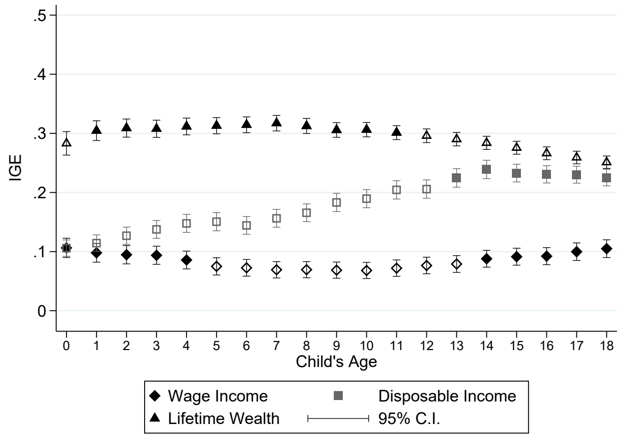
Notes: This figure plots the IGE for selected income variables. The child's income is measured at ages 25-37 and the parental income is measured at the household level at different child's ages. We correlate the same measures for parents and child. We include children from the 1981-1982 cohorts in these exercises. Panel (a) presents by-age correlations for the sample of college parents where both parents are college (or university) graduates. Panel (b) presents correlations for the sample of parents where non of the parents are college (or university) graduates. Panel (c) restricts the sample to those families where only the father is a college (or university) graduate. Panel (d) restricts the sample to those families where only the mother is a college (or university) graduate.

C.2.2 Intactness of Family

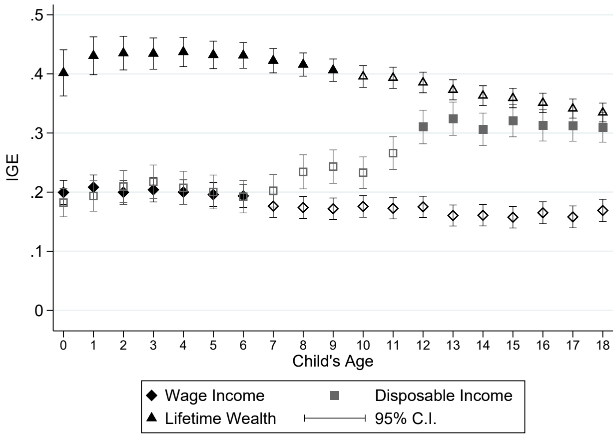
Figure C.4: Parents-Child IGE Estimates by Family Intactness, Children Measured at Ages 30–35



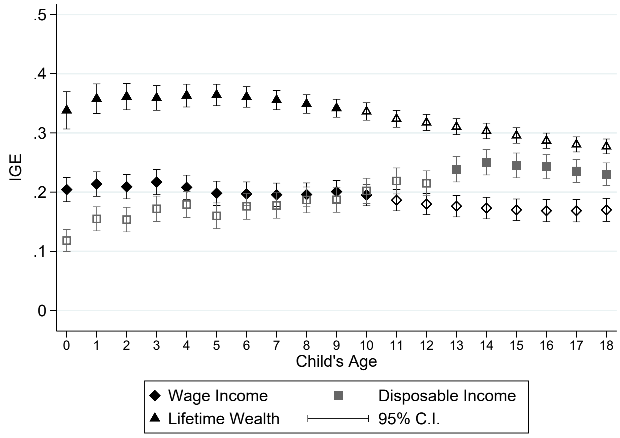
(a) Intact Family- Boys



(b) Intact Family- Girls



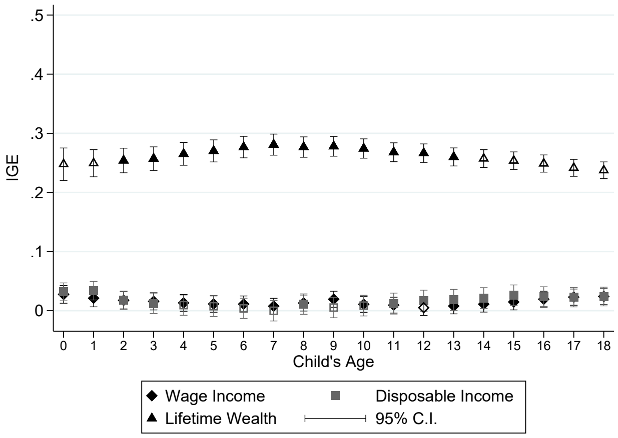
(c) Non-Intact Family- Boys



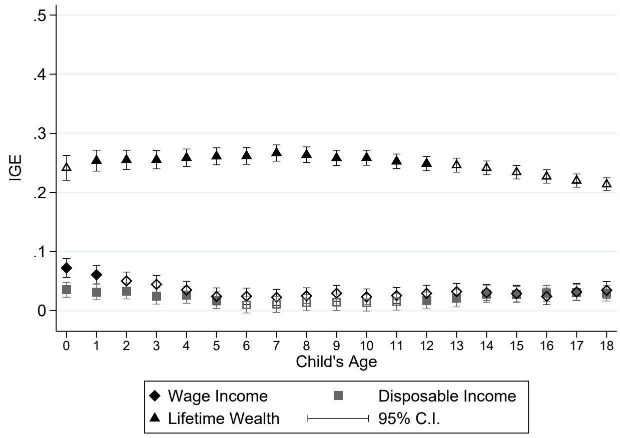
(d) Non-Intact Family- Girls

Notes: This figure plots the IGE for selected income variables. The child's income is measured at ages 30-35 and the parental income is measured at the household level at different child's ages. We correlate the same measures for parents and child. We include children from the 1981-1982 cohorts in these exercises. Panels (a) and (b) present the results for boys and girls growing up in intact families, respectively. Panel (c) and (d) present the results for boys and girls growing up in non-intact families, respectively. For each child, we consider a family as intact if the mother and the father were living together over the whole childhood stage (from age zero to 18 of the child).

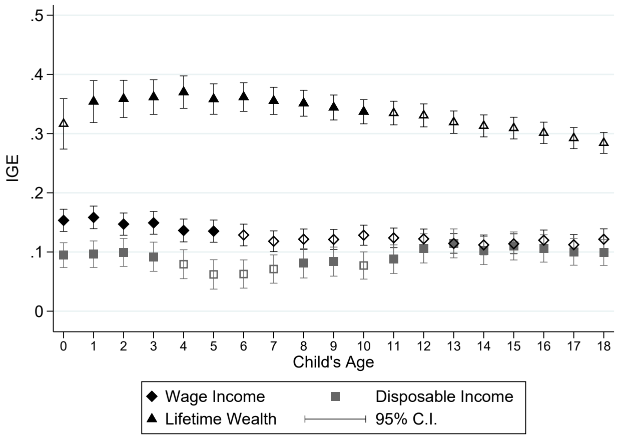
Figure C.5: Parents-Child IGE Estimates by Family Intactness, Children Measured at Ages 25–30



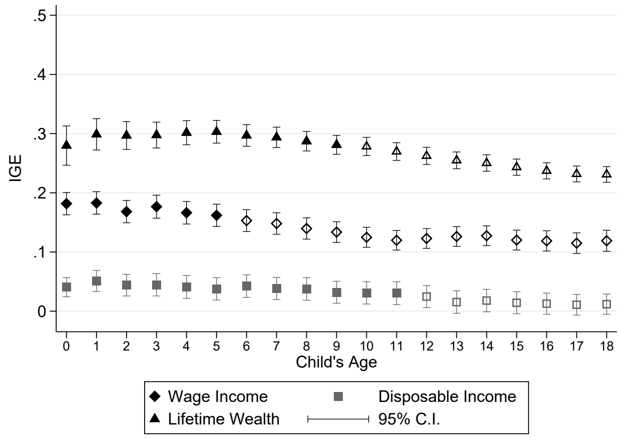
(a) Intact Family- Boys



(b) Intact Family- Girls



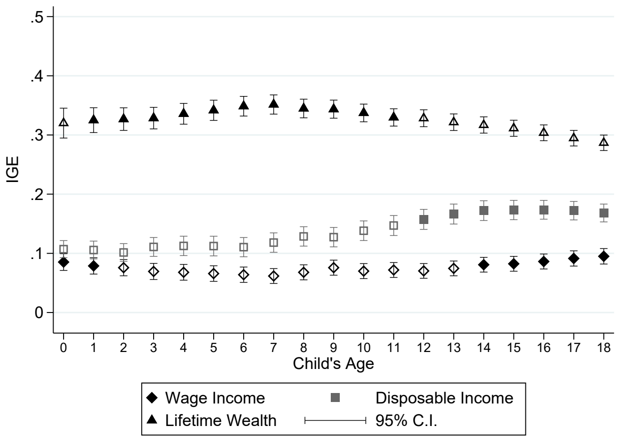
(c) Non-Intact Family- Boys



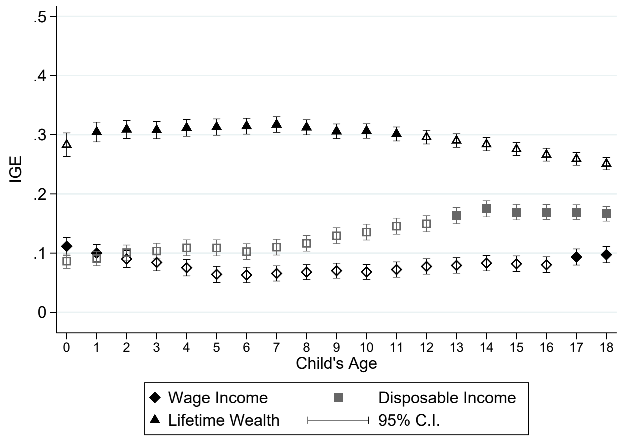
(d) Non-Intact Family- Girls

Notes: This figure plots the IGE for selected income variables. The child's income is measured at ages 25-30 and the parental income is measured at the household level at different child's ages. We correlate the same measures for parents and child. We include children from the 1981-1982 cohorts in these exercises. Panels (a) and (b) present the results for boys and girls growing up in intact families, respectively. Panel (c) and (d) present the results for boys and girls growing up in non-intact families, respectively. For each child, we consider a family as intact if the mother and the father were living together over the whole childhood stage (from age zero to 18 of the child).

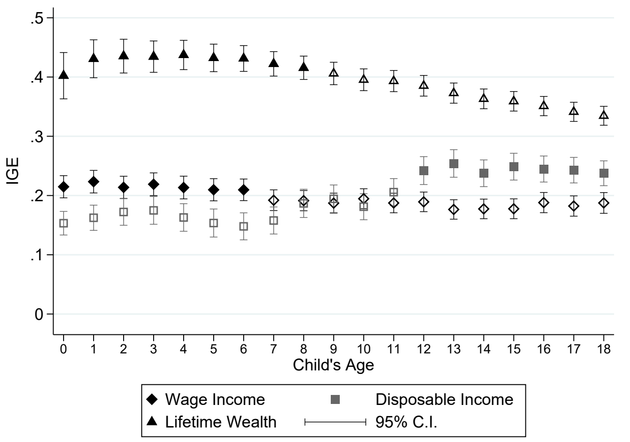
Figure C.6: Parents-Child IGE Estimates by Family Intactness, Children Measured at Ages 25–37



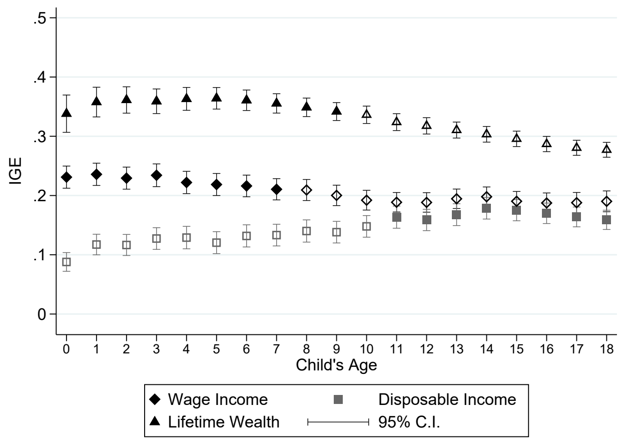
(a) Intact Family- Boys



(b) Intact Family- Girls



(c) Non-Intact Family- Boys

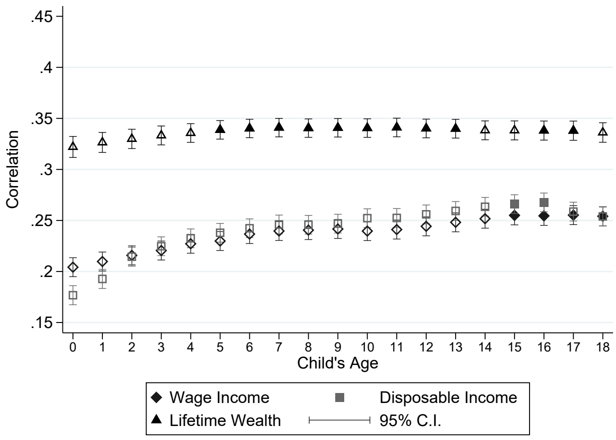


(d) Non-Intact Family- Girls

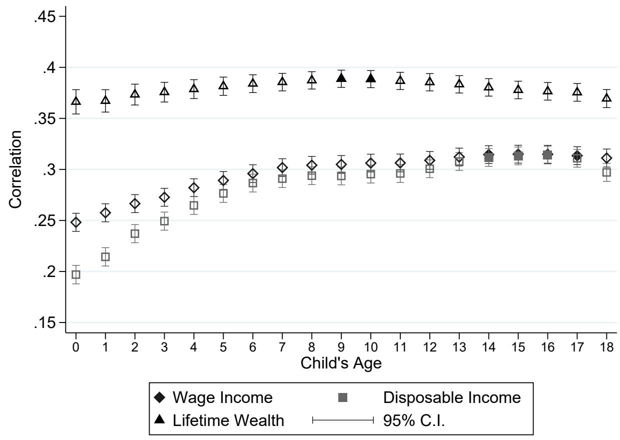
Notes: This figure plots the IGE for selected income variables. The child's income is measured at ages 25-37 and the parental income is measured at the household level at different child's ages. We correlate the same measures for parents and child. We include children from the 1981-1982 cohorts in these exercises. Panels (a) and (b) present the results for boys and girls growing up in intact families, respectively. Panel (c) and (d) present the results for boys and girls growing up in non-intact families, respectively. For each child, we consider a family as intact if the mother and the father were living together over the whole childhood stage (from age zero to 18 of the child).

C.2.3 Parental Marital Status at the Child's Birth

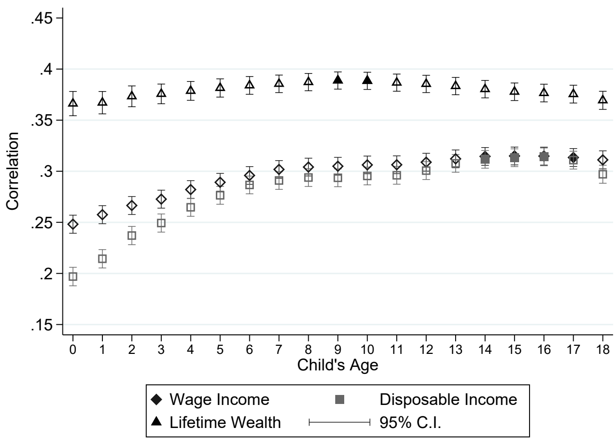
Figure C.7: Parents-Child IGE Estimates by Parents' Marital Status, Children Measured at Ages 25–30



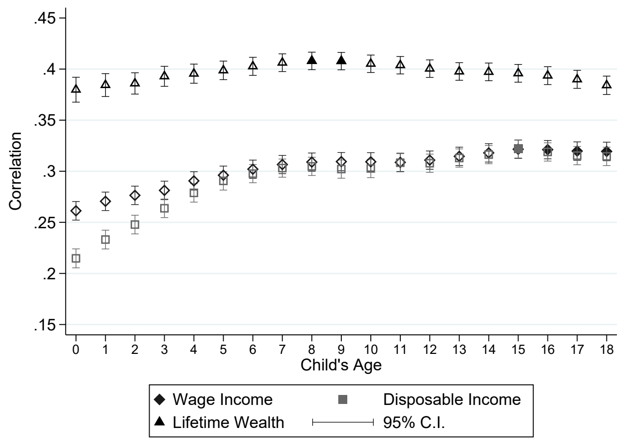
(a) Married- Boys



(b) Married- Girls



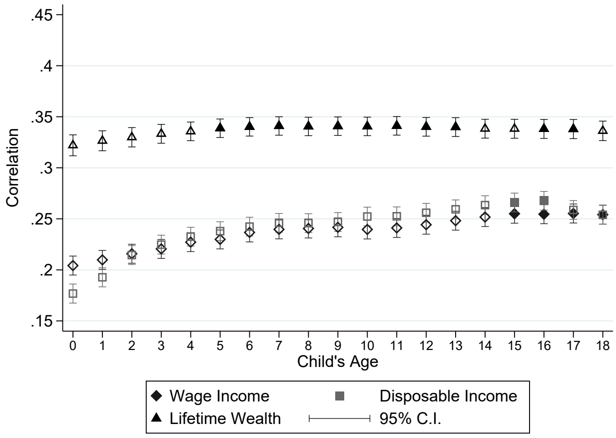
(c) Non-Married- Boys



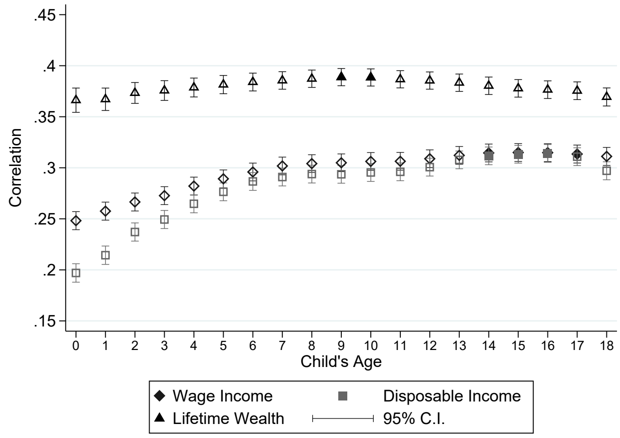
(d) Non-Married- Girls

Notes: This figure plots the IGE for selected income variables. The child's income is measured at ages 25-30 and the parental income is measured at the household level at different child's ages. We correlate the same measures for parents and child. We include children from the 1981-1982 cohorts in these exercises. Panels (a) and (b) present the results for boys and girls growing up in married families, respectively. Panel (c) and (d) present the results for boys and girls growing up in non-married families, respectively. For each child, we consider the family as married if the mother and the father were registered as married at the arrival of the child.

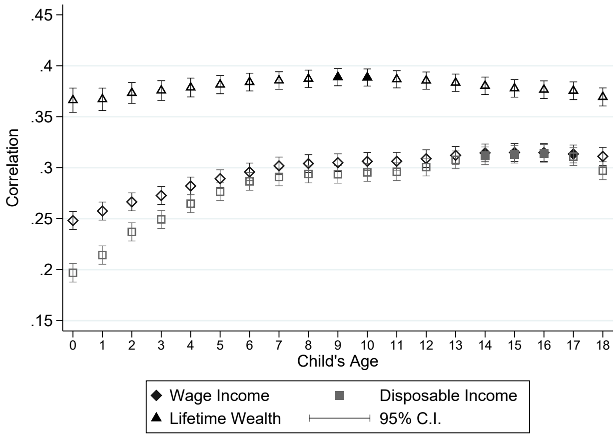
Figure C.8: Parents-Child IGE Estimates by Parents' Marital Status, Children Measured at Ages 25–37



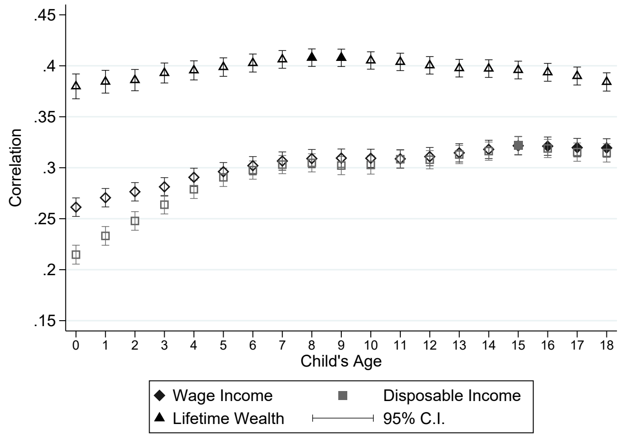
(a) Married- Boys



(b) Married- Girls



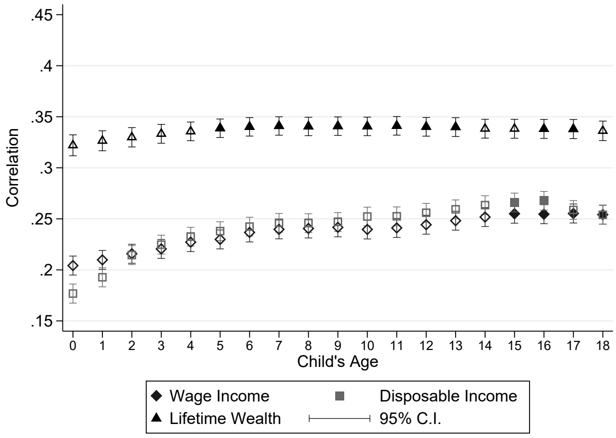
(c) Non-Married- Boys



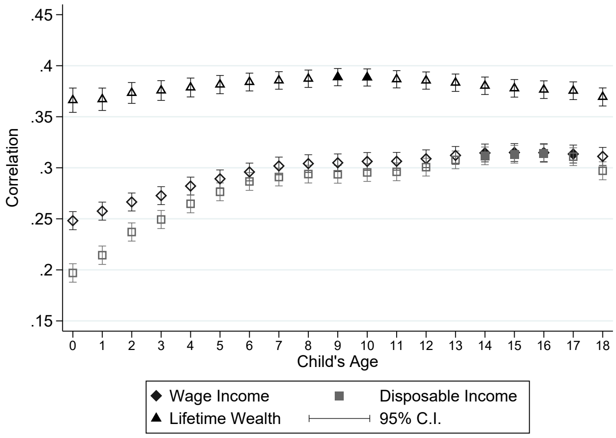
(d) Non-Married- Girls

Notes: This figure plots the IGE for selected income variables. The child's income is measured at ages 25-37 and the parental income is measured at the household level at different child's ages. We correlate the same measures for parents and child. We include children from the 1981-1982 cohorts in these exercises. Panels (a) and (b) present the results for boys and girls growing up in married families, respectively. Panel (c) and (d) present the results for boys and girls growing up in non-married families, respectively. For each child, we consider the family as married if the mother and the father were registered as married at the arrival of the child.

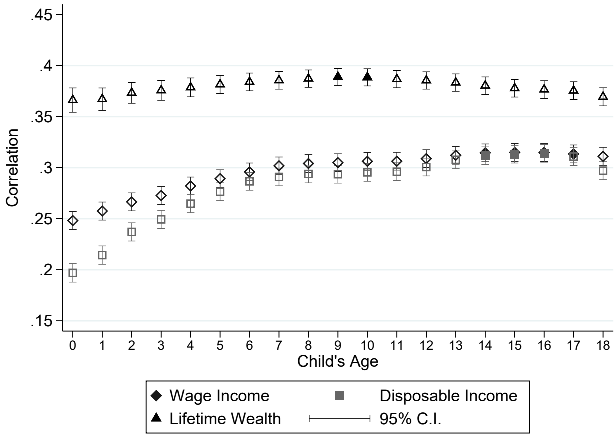
Figure C.9: Parents-Child IGE Estimates by Parents' Marital Status, Children Measured at Ages 30–35



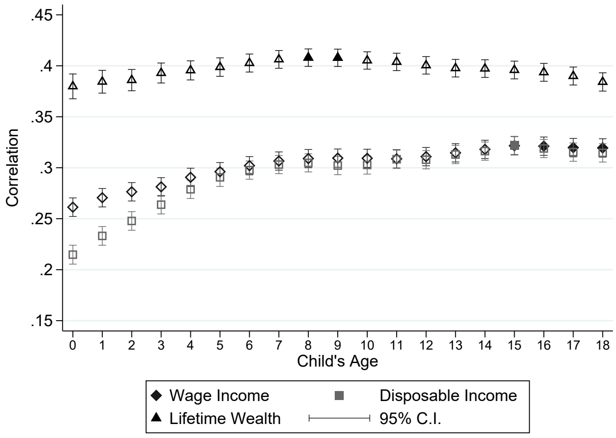
(a) Married- Boys



(b) Married- Girls



(c) Non-Married- Boys



(d) Non-Married- Girls

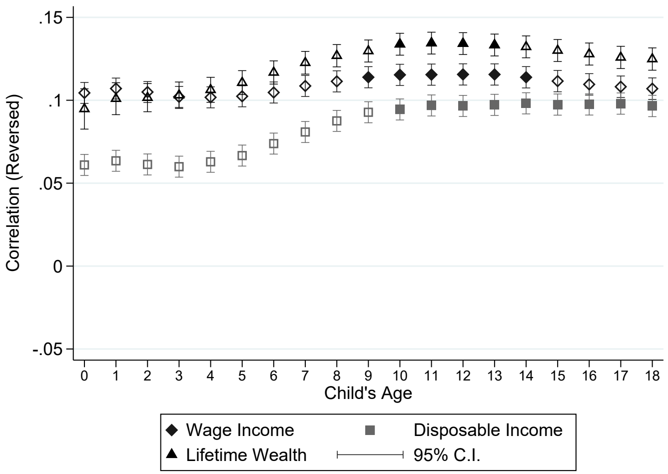
Notes: This figure plots the IGE for selected income variables. The child's income is measured at ages 30-35 and the parental income is measured at the household level at different child's ages. We correlate the same measures for parents and child. We include children from the 1981-1982 cohorts in these exercises. Panels (a) and (b) present the results for boys and girls growing up in married families, respectively. Panel (c) and (d) present the results for boys and girls growing up in non-married families, respectively. For each child, we consider the family as married if the mother and the father were registered as married at the arrival of the child.

D Intergenerational Correlations for the Child's Participation in Crime

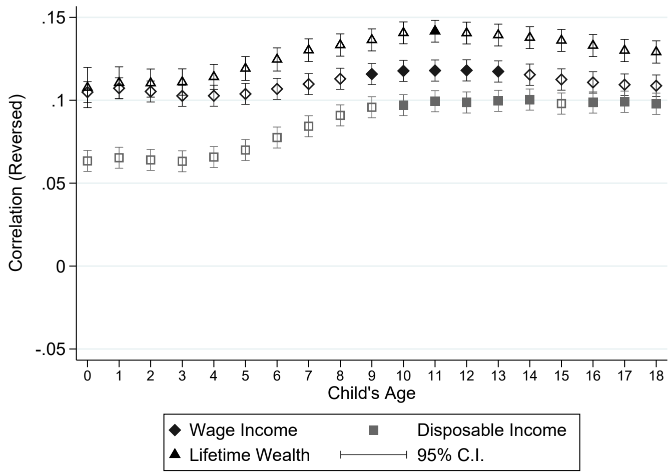
D.1 Intergenerational Correlations When Measuring Participation in Crime at Different Child's Ages

Panel (d) of Figure 2 shows the correlation between the child's participation in crime by age 35 and their parental resources. Figure D.1 shows that the patterns are similar when we vary the child's age we use to measure their participation in crime. Figures D.2-D.4 present the results for different crime types, separately when we define participation in crime by age 25, 30, and 35, respectively.

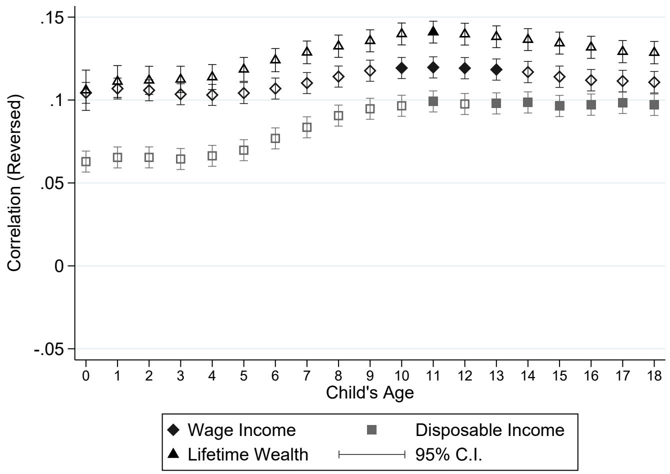
Figure D.1: Correlations between Parental Measures of Resources and Child's Participation in Crime- by Child's Age



(a) Ever Participated in Crime by age 25



(b) Ever Participated in Crime by age 30



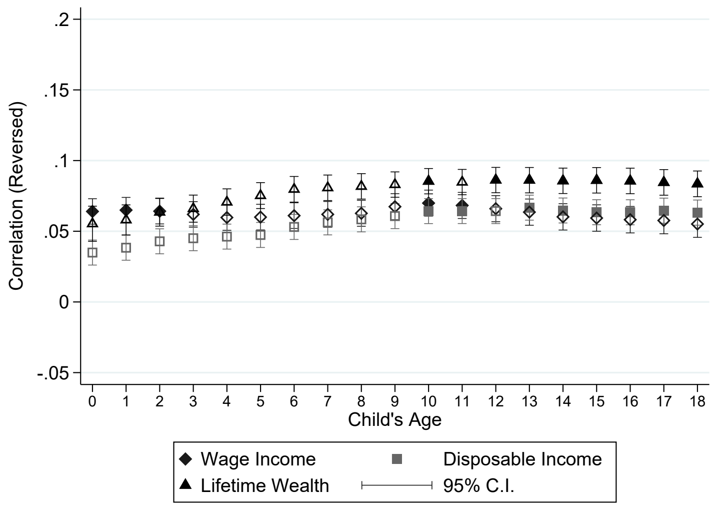
(c) Ever Participated in Crime by age 35

Notes: Panels (a), (b), and (c) plot the correlations between the different parental income measures measured at the different child ages and the child's participation in crime defined by whether the child has ever participated in crime by age 25, 30, and 35, respectively. All figures plot the inverted correlation between the child's participation in crime by the corresponding age (25, 30, or 35) and their parental resources. For each measure, we use a t-test to evaluate whether the correlation at each age is significantly different from the maximum correlation (at the 5% level). We depict the estimate with solid (filled) symbols if it is not significantly different from the max.

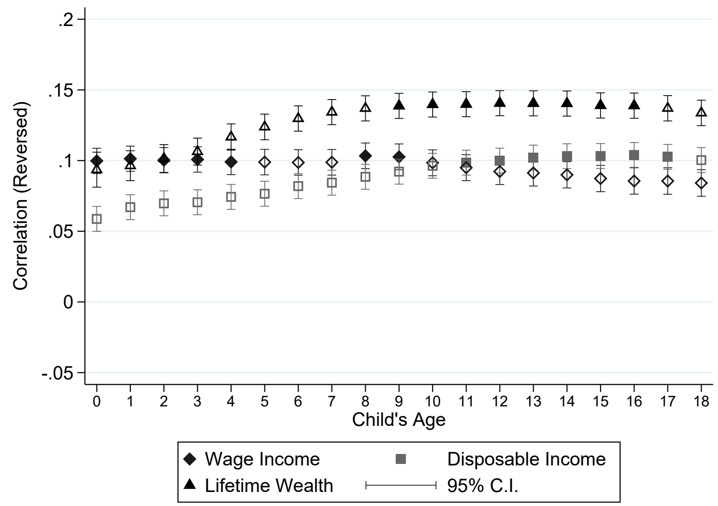
D.2 Intergenerational Correlations by Crime Type

This section presents the results for different crime types, separately when we define child's participation in crime by age 20, 25, and 30 (instead of age 35). We consider three types of crimes: violent crimes, property crimes, and other crimes, i.e., the residual. Property crimes include crimes such as document forgery, arson, burglary in banking, business, residences, and uninhabited buildings, theft from car, boat etc, shoplifting, and other thefts, illegal handling of lost property, embezzlement, fraud, extortion, debtor fraud, robbery, tax fraud, vandalism, and property damage. "Other crimes" include all crimes other than violent crimes, property crimes, and traffic crimes. It includes, for example, drug crimes, sex crimes, and all other types of crimes from practicing as doctor without license to treason.

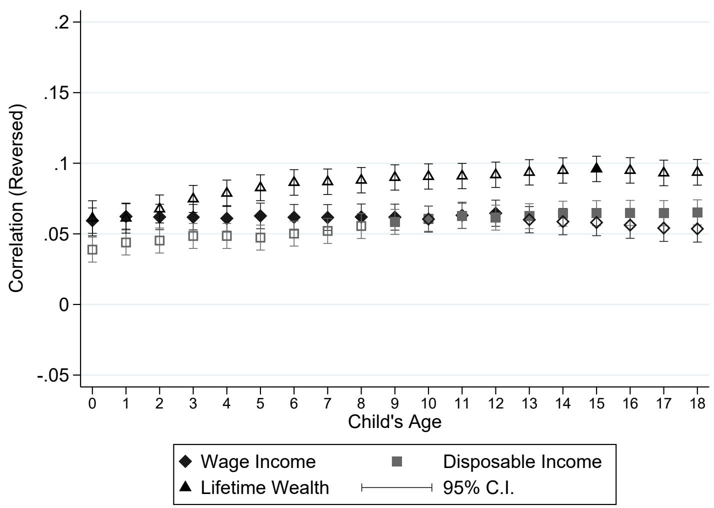
Figure D.2: Paternal Resources and Child's Participation in Crime By Age 20 for Different Crime Types- Sample of Male Children



(a) Violent Crimes



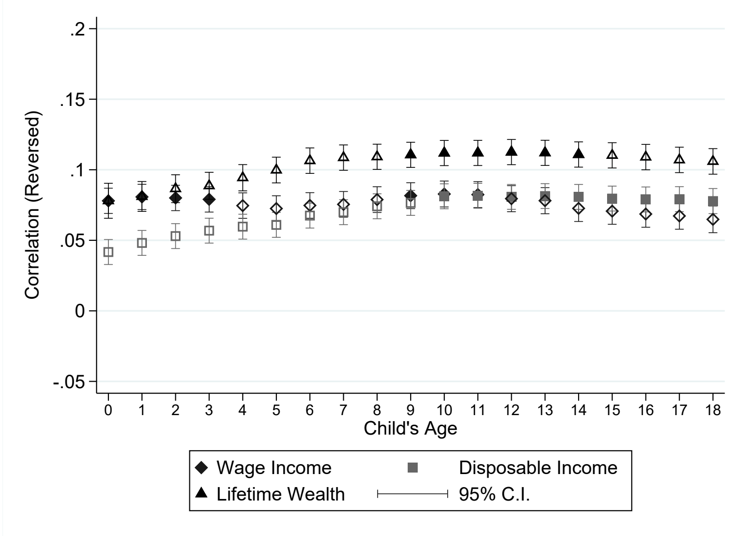
(b) Property Crimes



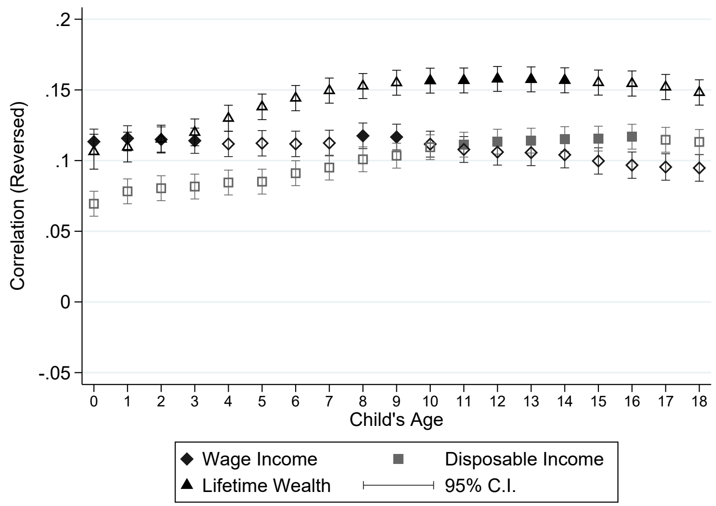
(c) Other Crimes

Notes: This figure plots the correlations between the different parental income measures measured at the different child ages and the child's participation in violent crimes (Panel (a)), property crimes, (Panel (b)), and all other types of crime (Panel (c)). We invert correlations in all figures.

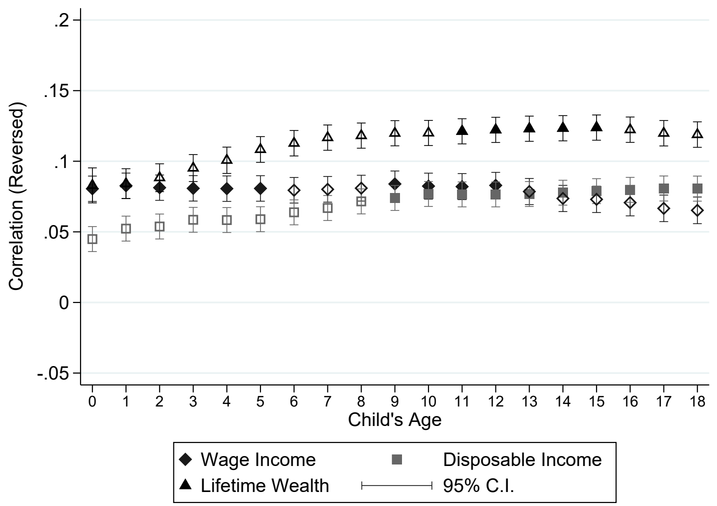
Figure D.3: Paternal Resources and Child's Participation in Crime By Age 25 for Different Crime Types- Sample of Male Children



(a) Violent Crimes



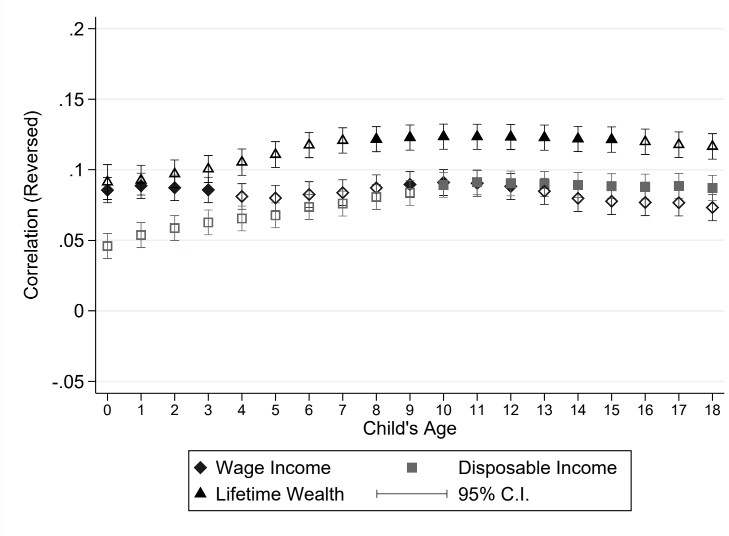
(b) Property Crimes



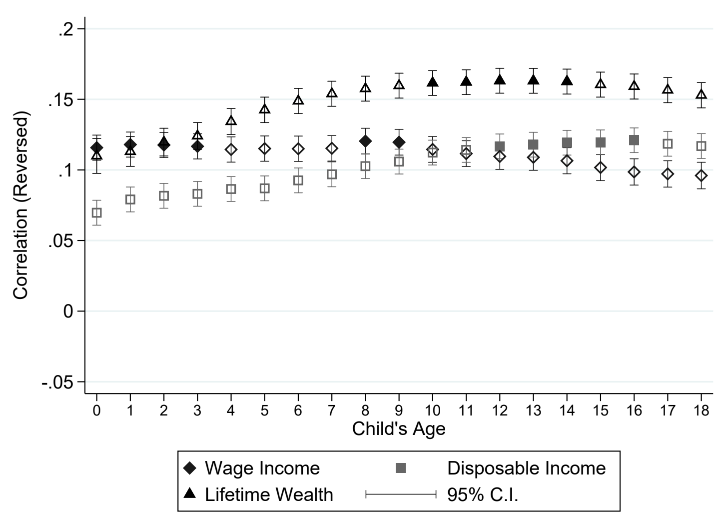
(c) Other Crimes

Notes: This figure plots the correlations between the different parental income measures measured at the different child ages and the child's participation in violent crimes (Panel (a)), property crimes, (Panel (b)), and all other types of crime (Panel (c)). We invert correlations in all figures.

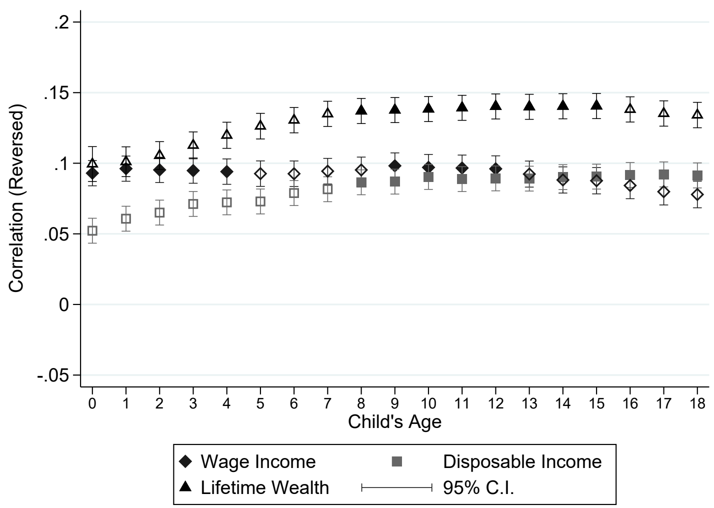
Figure D.4: Paternal Resources and Child's Participation in Crime By Age 30 for Different Crime Types- Sample of Male Children



(a) Violent Crimes



(b) Property Crimes



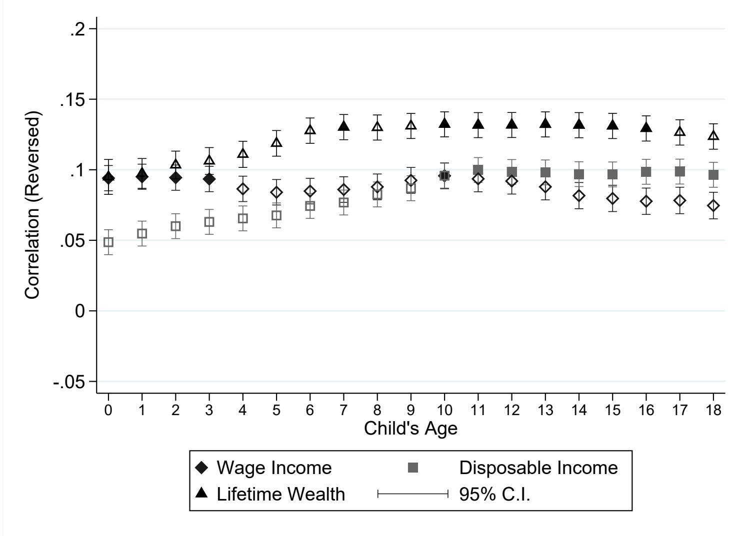
(c) Other Crimes

Notes: This figure plots the correlations between the different parental income measures measured at the different child ages and the child's participation in violent crimes (Panel (a)), property crimes, (Panel (b)), and all other types of crime (Panel (c)). We invert correlations in all figures.

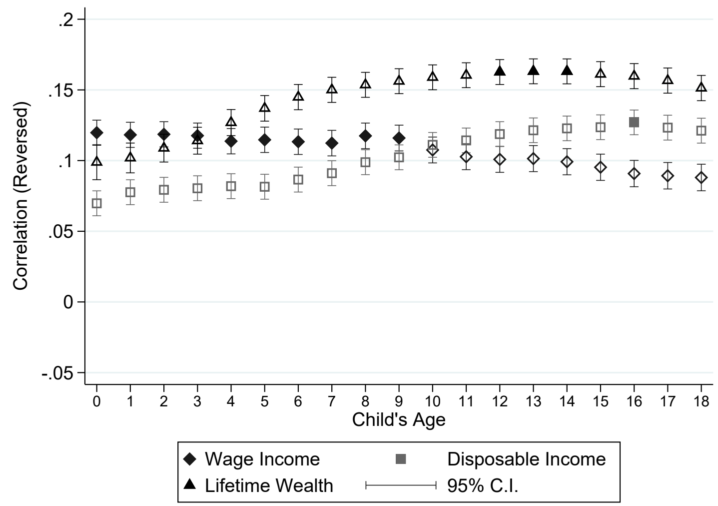
D.3 Intergenerational Correlations by Child's Gender and Parental Income

Figure D.5 presents the correlations between different measures of father's income at different children's ages from zero to 18 and the child's participation in various types of crime, i.e., violent crimes (Panel (a)), property crimes (Panel (b)), and other crimes, i.e., the residual (Panel (c)), for the sample of male children. Figure D.6 presents the correlations between measures of parental resources (the sum of father's and mother's) at different children's ages from zero to 18 and the child's participation in various types of crime, i.e., violent crimes (Panel (a)), property crimes (Panel (b)), and other crimes (Panel (c)) for the sample of male children. Figure D.7 depicts the same relationship for the sample of female children. Finally, Figure D.8 shows the relationship between the measures of father's income and the child's participation in various crimes for the sample of female children.

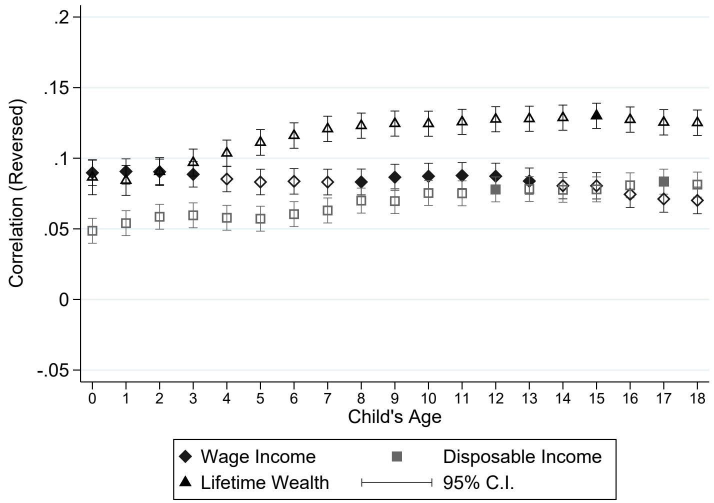
Figure D.5: Paternal Resources and Child's Participation in Crime By Age 35 for Different Crime Types- Sample of Male Children



(a) Violent Crimes



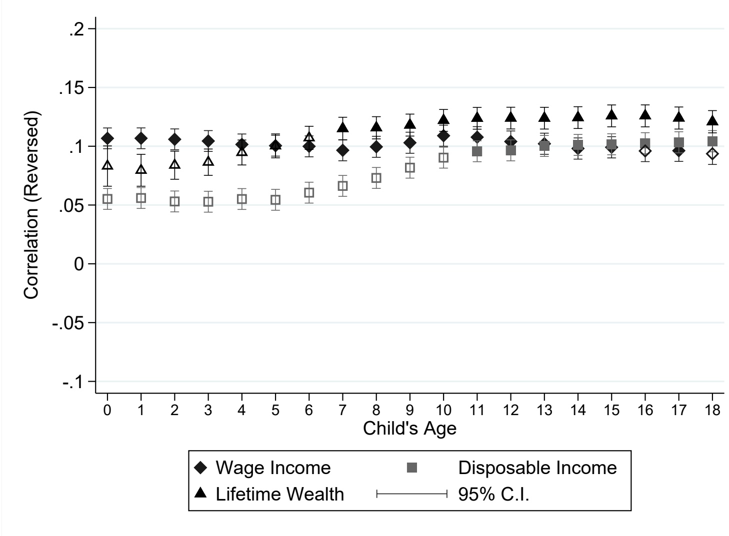
(b) Property Crimes



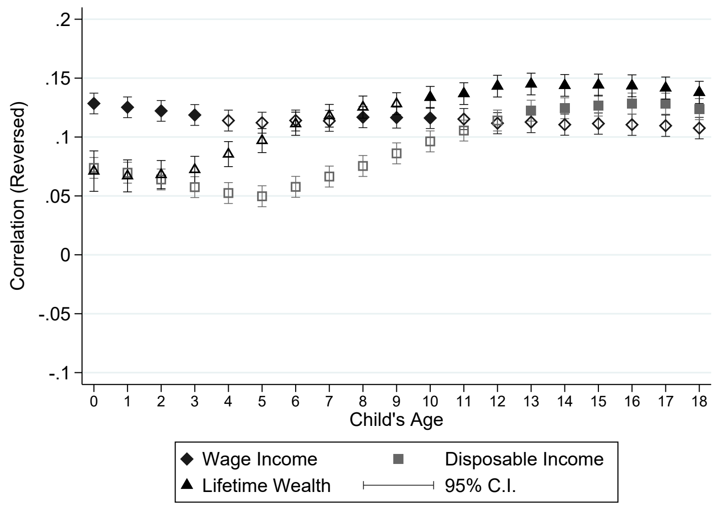
(c) Other Crimes

Notes: This figure plots the correlations between the different parental income measures measured at the different child ages and the child's participation in violent crimes (Panel (a)), property crimes, (Panel (b)), and all other types of crime (Panel (c)). We invert correlations in all figures.

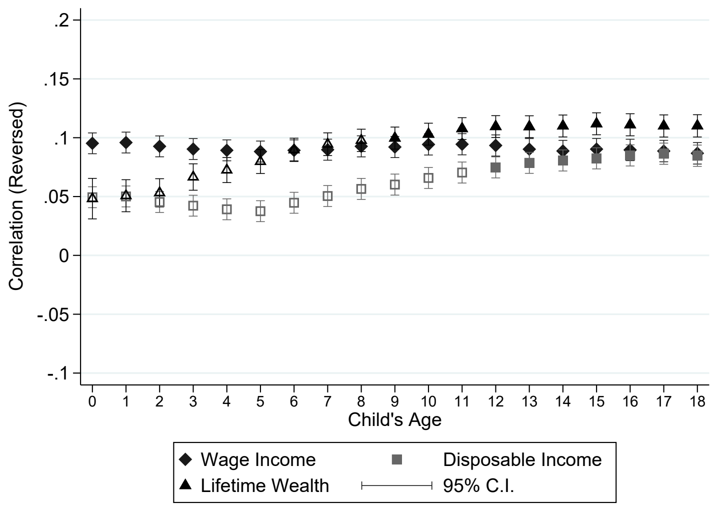
Figure D.6: Father's and Mother's Resources and Child's Participation in Crime By Age 35 for Different Crime Types- Male Children



(a) Violent Crimes



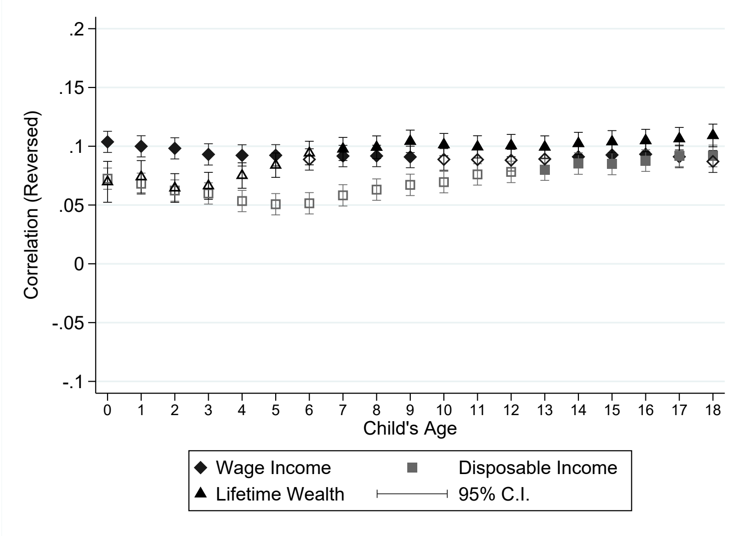
(b) Property Crimes



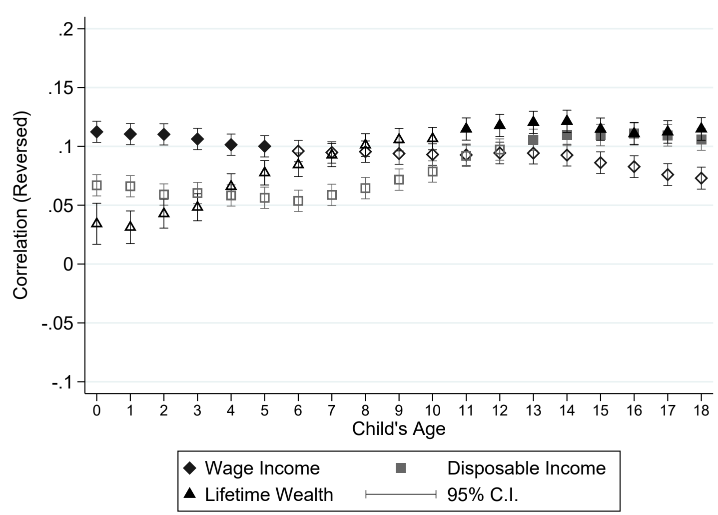
(c) Other Crimes

Notes: This figure plots the correlations between the different parental income measures measured at the different child ages and the child's participation in violent crimes (Panel (a)), property crimes (Panel (b)), and all other types of crime (Panel (c)). We invert correlations in all figures.

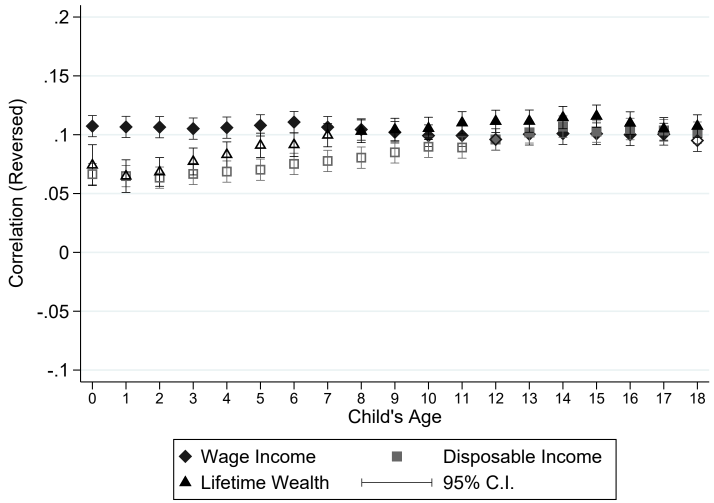
Figure D.7: Father's and Mother's Resources and Child's Participation in Crime By Age 35 for Different Crime Types- Female Children



(a) Violent Crimes



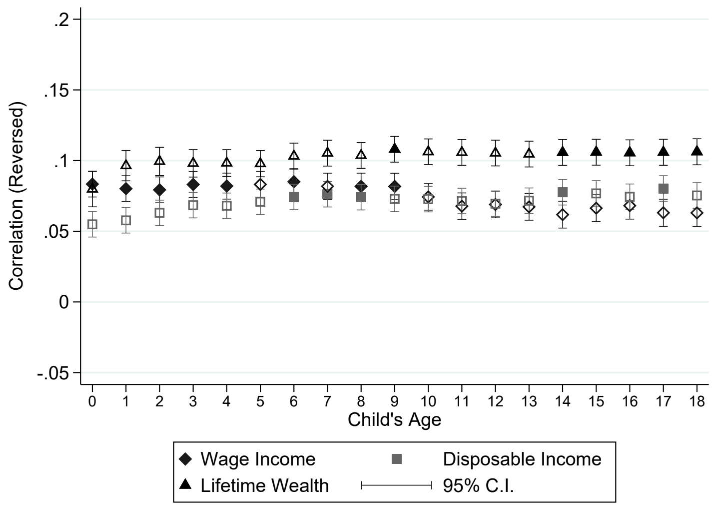
(b) Property Crimes



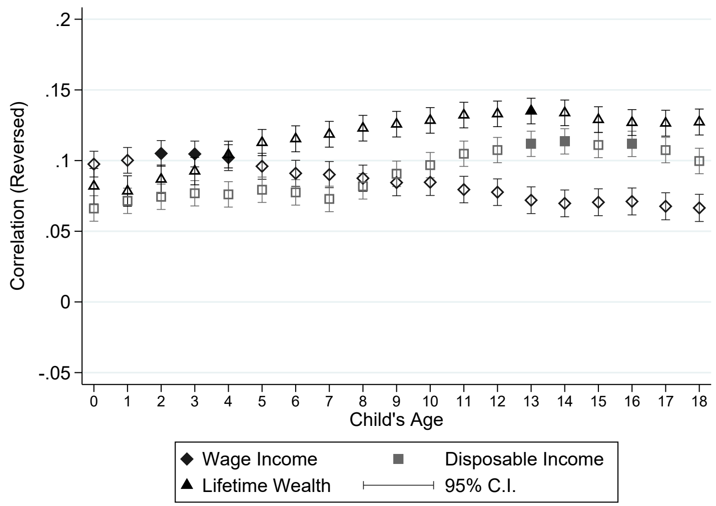
(c) Other Crimes

Notes: This figure plots the correlations between the different parental income measures measured at the different child ages and the child's participation in violent crimes (Panel (a)), property crimes (Panel (b)), and all other types of crime (Panel (c)). We invert correlations in all figures.

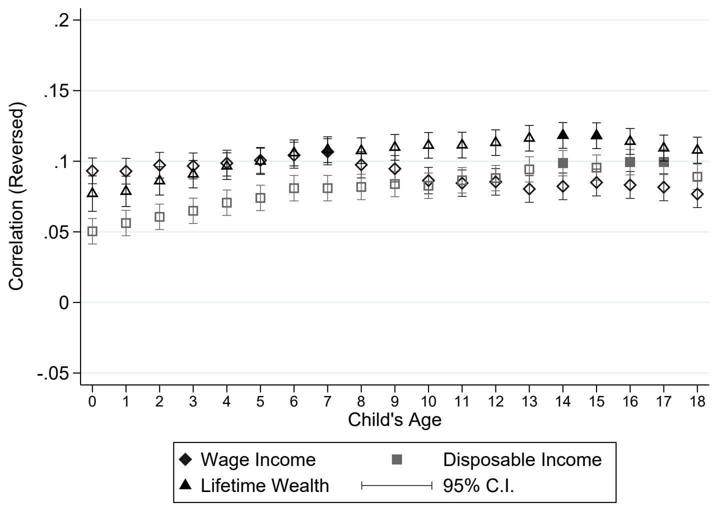
Figure D.8: Father's Resources and Child's Participation in Crime By Age 35 for Different Crime Types- Female Children



(a) Violent Crimes



(b) Property Crimes



(c) Other Crimes

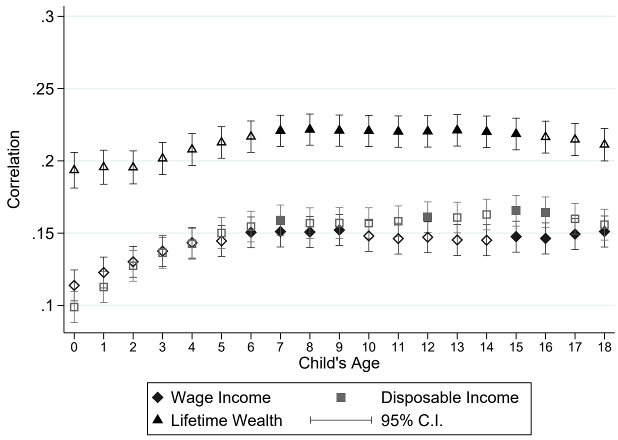
Notes: This figure plots the correlations between the different parental income measures measured at the different child ages and the child's participation in violent crimes (Panel (a)), property crimes (Panel (b)), and all other types of crime (Panel (c)). We invert correlations in all figures.

E Intergenerational Correlations and Income Elasticities by Family Background

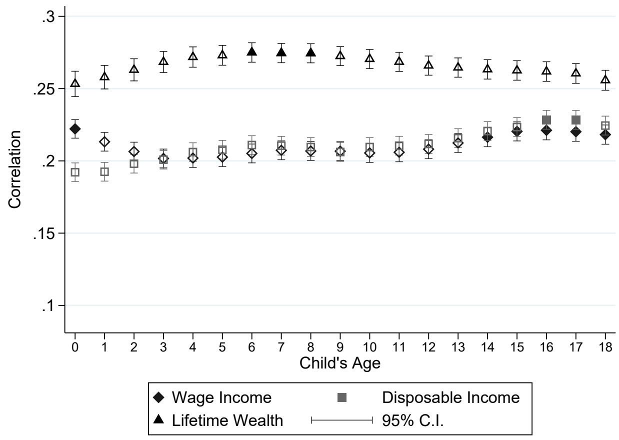
E.1 Intergenerational Correlations and Income Elasticities by Parental Education

Figure E.1 plots correlations between the child's mathematics test scores at age 16 and parental income variables measured at the household level at different ages of children for four different groups of families: college parents where both parents are college or university graduates (Panel a), parents where none of the parents are college or university graduates (Panel b), parents where only the father is a college or university graduate (Panel c), and parents where only the mother is a college or university graduate (Panel d). Figure E.2 plots the correlation between the child's years of formal schooling by age 35 and parental income variables measured at the household level at different child's ages, separately for the four different groups of parental educational background as described above. Finally, Figure E.3 plots the correlation between the child's participation in crime by age 35 and parental income variables measured at the household level at different child's ages, separately for the four different groups of parental educational background as in Figures E.2 and E.1. Figure E.4 presents the IGE estimate by parental education background when we measure parental resources at different child's ages from zero to 18. The child's income is measured at ages 30-35 and the parental income is measured at the household level at different child's ages shown in the X-axis.

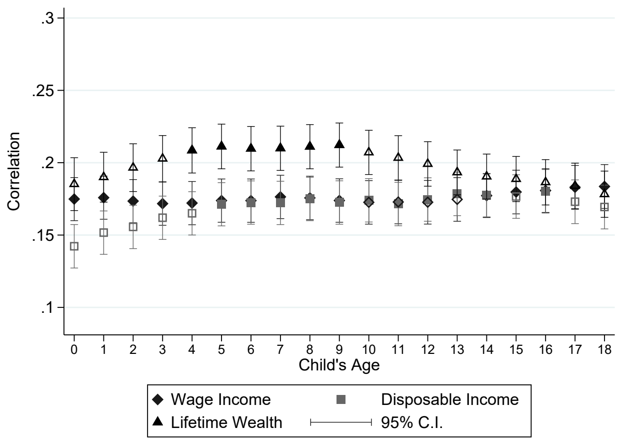
Figure E.1: Correlations with Child's Mathematics Test Scores by Parental Education Level



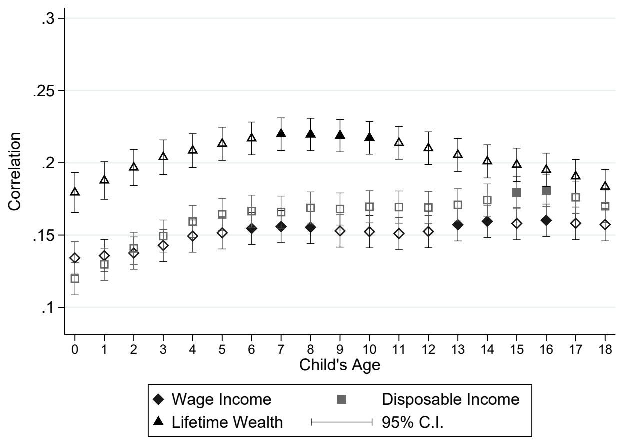
(a) College Parents



(b) Parents without College



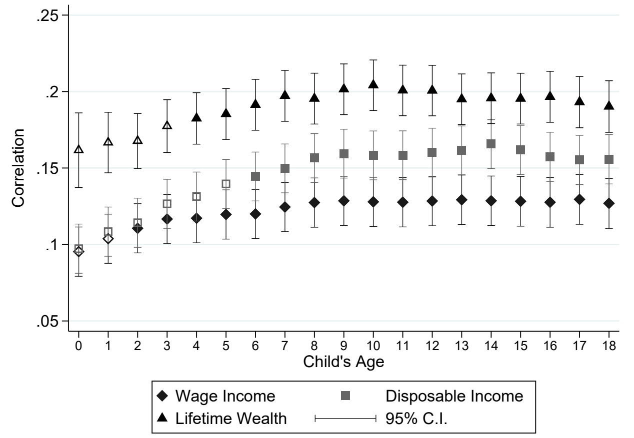
(c) College Fathers



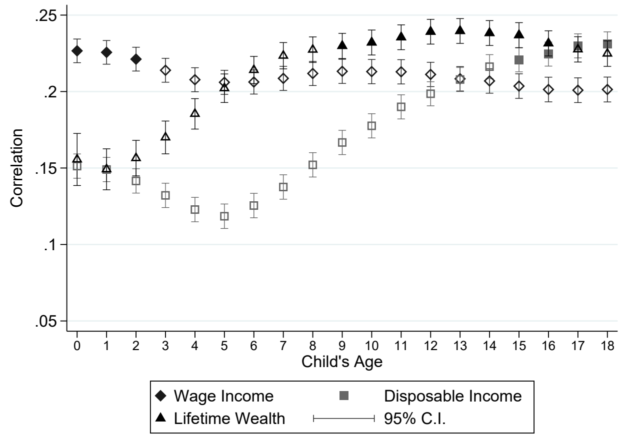
(d) College Mothers

Notes: This figure plots the correlation between Mathematics test scores measured at age 16 and parental income variables measured at the household level at different child's ages. These test scores were measured as part of national leaving examinations for cohorts born in 1995-1997. Panel (a) presents by-age correlations for the sample of college parents where both parents are college (or university) graduates. Panel (b) presents correlations for the sample of parents where none of the parents are college (or university) graduates. Panel (c) restricts the sample to those families where only the father is a college (or university) graduate. Panel (d) restricts the sample to those families where only the mother is a college (or university) graduate.

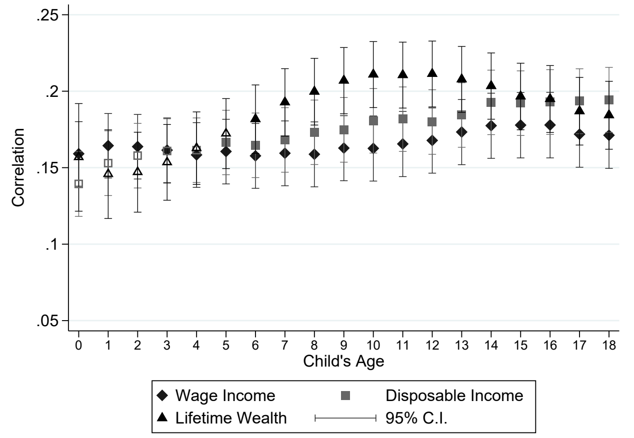
Figure E.2: Correlations with Child's Years of Education by Parental Education Level



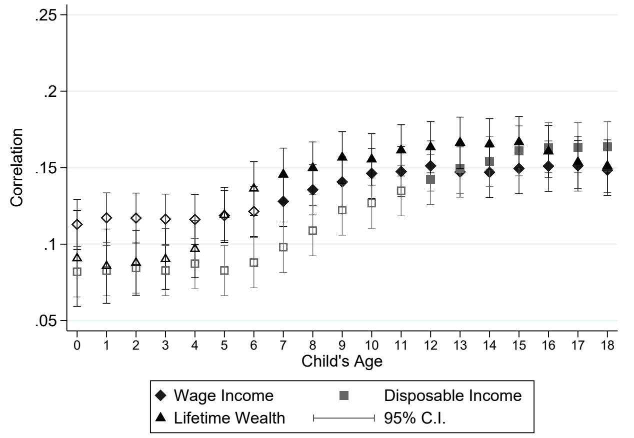
(a) College Parents



(b) Parents without College



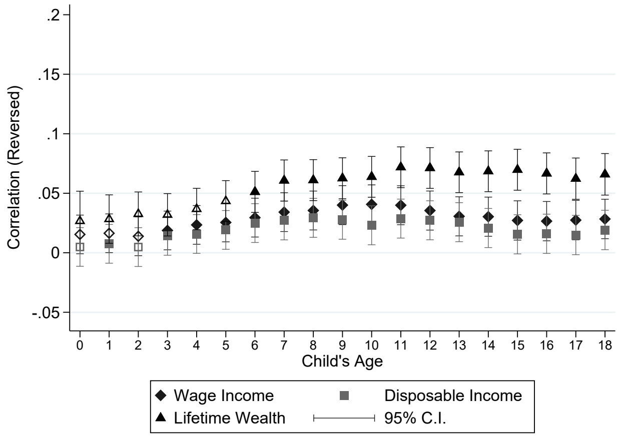
(c) College Fathers



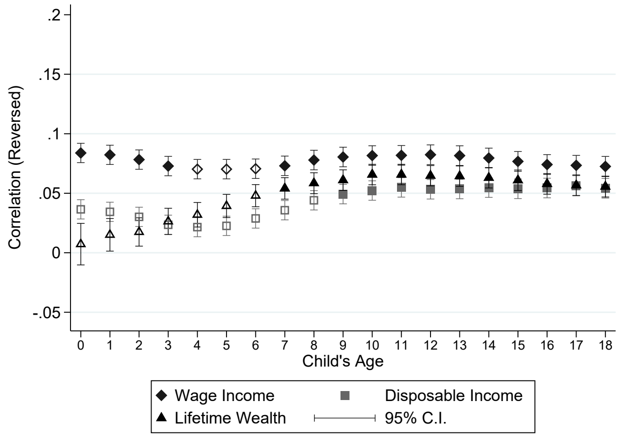
(d) College Mothers

Notes: This figure plots the correlation between years of education and parental income variables measured at the household level at different child's ages. We include children from the 1981-1982 cohorts in these exercises. Panel (a) presents by-age correlations for the sample of college parents where both parents are college (or university) graduates. Panel (b) presents correlations for the sample of parents where none of the parents are college (or university) graduates. Panel (c) restricts the sample to those families where only the father is a college (or university) graduate. Panel (d) restricts the sample to those families where only the mother is a college (or university) graduate.

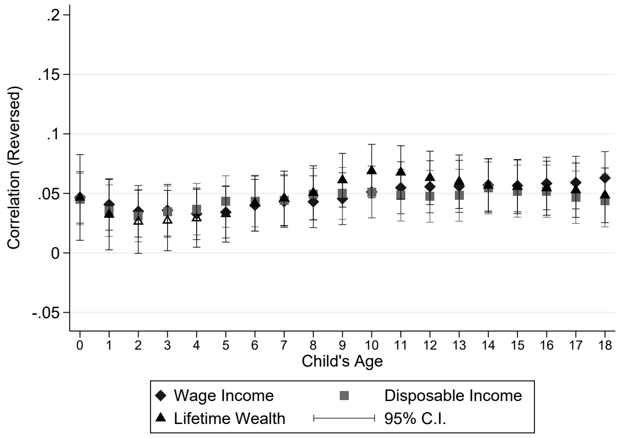
Figure E.3: Correlations with Child's Participation in Crime (Never Committed Any Crime) by Parental Education Level



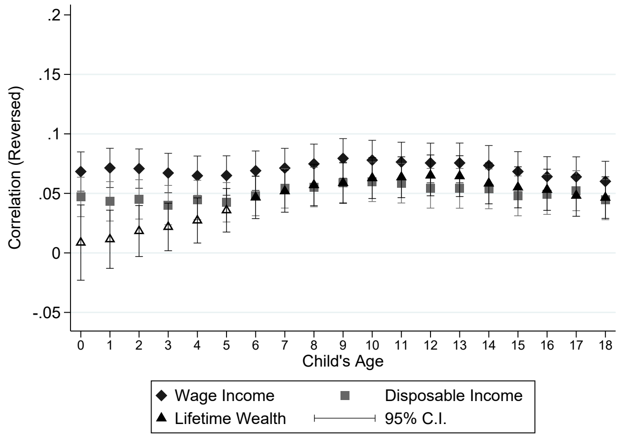
(a) College Parents



(b) Parents without College



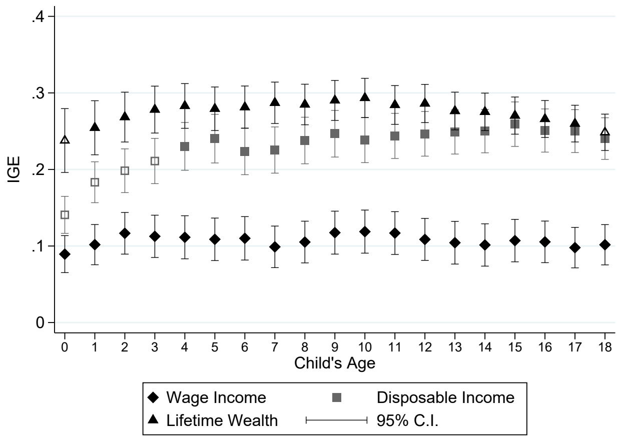
(c) College Fathers



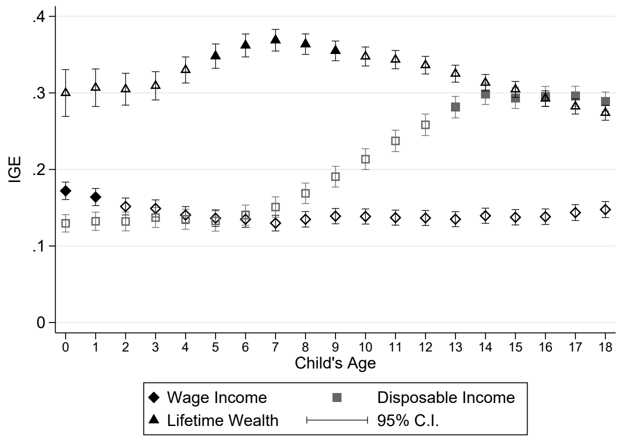
(d) College Mothers

Notes: This figure plots the correlation between participation in crime and parental income variables measured at the household level at different child's ages. We rely on conviction information from criminal records for children from the 1981-1982 cohorts. Panel (a) presents by-age correlations for the sample of college parents where both parents are college (or university) graduates. Panel (b) presents correlations for the sample of parents where none of the parents are college (or university) graduates. Panel (c) restricts the sample to those families where only the father is a college (or university) graduate. Panel (d) restricts the sample to those families where only the mother is a college (or university) graduate.

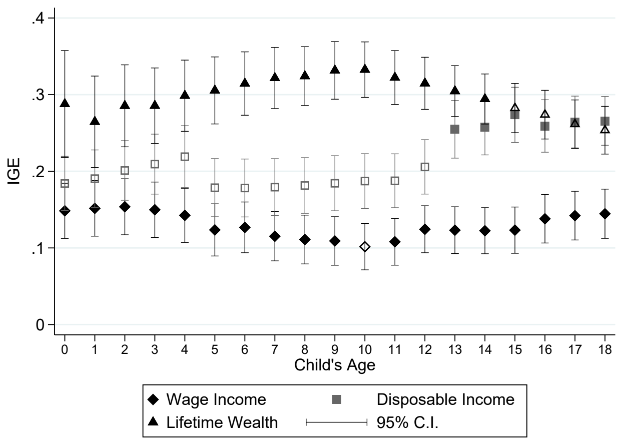
Figure E.4: Parents-Child IGE Estimates



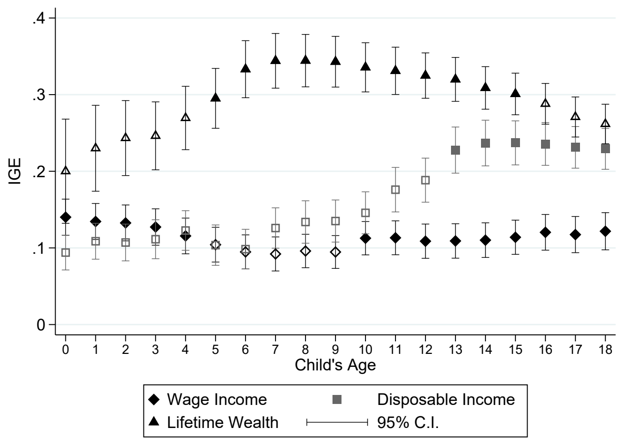
(a) College Parents



(b) No College Parents



(c) College Fathers



(d) College Mothers

Notes: This figure plots the IGE for selected income variables. The child's income is measured at ages 30-35 and the parental income is measured at the household level at different child's ages. We include children from the 1981-1982 cohorts in these exercises. Panel (a) presents by-age correlations for the sample of college parents where both parents are college (or university) graduates. Panel (b) presents correlations for the sample of parents where none of the parents are college (or university) graduates. Panel (c) restricts the sample to those families where only the father is a college (or university) graduate. Panel (d) restricts the sample to those families where only the mother is a college (or university) graduate.

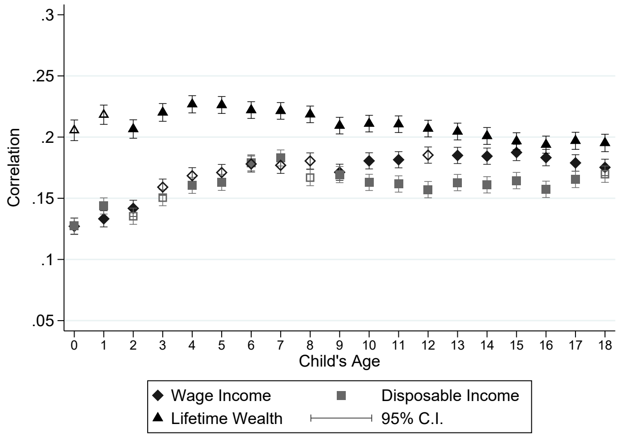
E.2 Intergenerational Correlations and Income Elasticities by Child's Gender

Figure E.5(a-b) plots the correlation between the child's language test score at age 11 and parental income variables measured at the household level at different child's ages, separately for male children (Panel a) and female children (Panel b). Figures E.5(c-d) and E.6(a-d) depict the results for the child's math test score, years of formal schooling, and participation in crime, respectively. We evaluate whether the male and female values are statistically significantly different, in which case we show the estimates using solid (as opposed to hollow) symbols.[4]

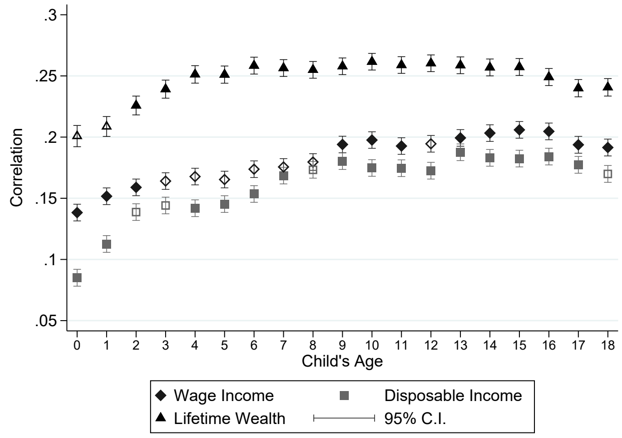
This variation is important for interpreting estimates of the IGE. The results suggest that compared to male children, there exists a greater association between parental income and academic achievement for female children. For participation in crime, on the other hand, we find a much stronger association between parental income and children's likelihood of participation in crime for male children. Moreover, for some measures of child human capital, parental resources in early childhood best predict the performance of boys whereas parental resources in early adolescence best predict the performance of girls (See Figure E.5).

[4]Note that this differs from the coloring scheme used in sections 4 and 5.

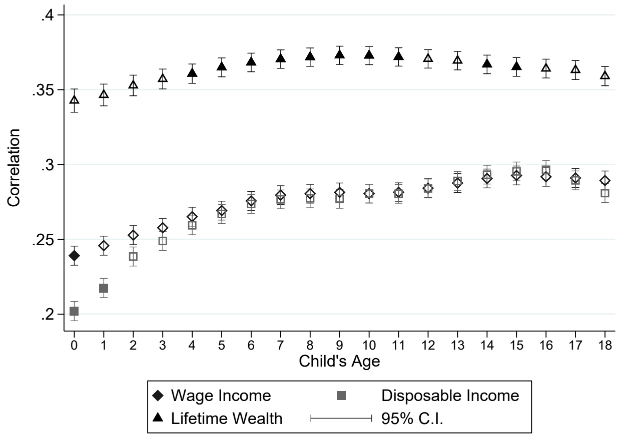
Figure E.5: Test Scores



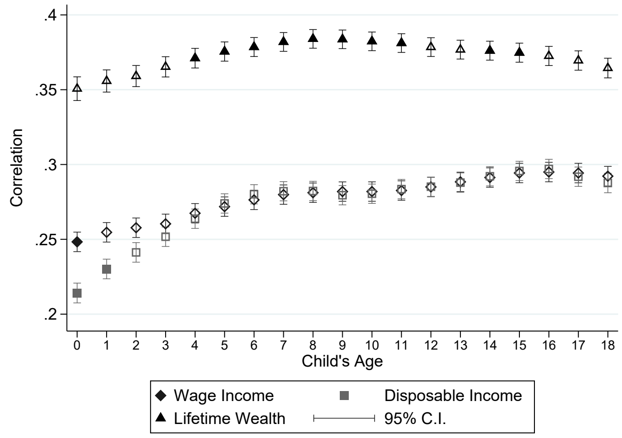
(a) Language Test Score, age 11, Male Children



(b) Language Test Score, age 11, Female Children



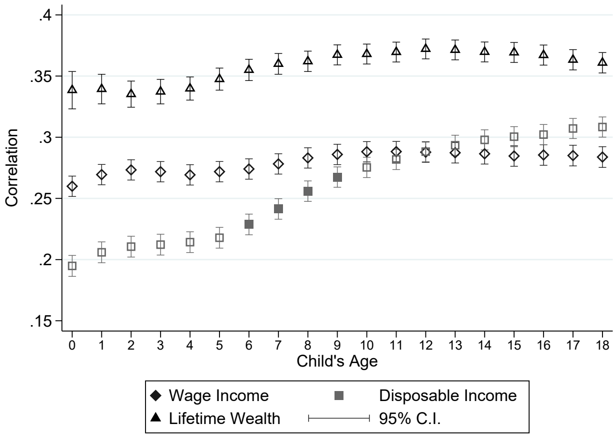
(c) Mathematics Test Score, age 16, Male Children



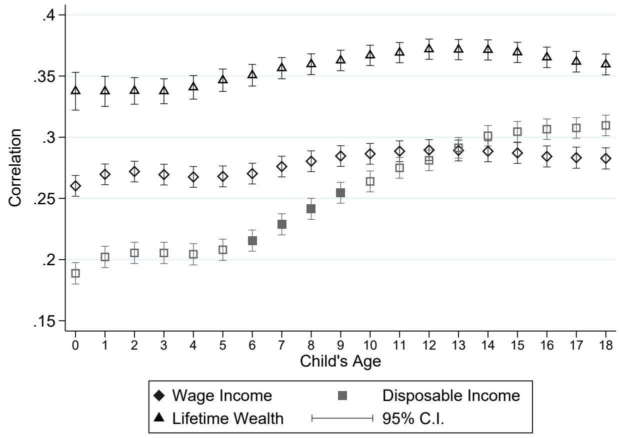
(d) Mathematics Test Score, age 16, Female Children

Notes: This figure plots the correlation between reading scores at age 11 measured for DALSC participants and Mathematics test scores at age 16, and selected parental income variables measured at the household level at different child's ages. We present the correlation for ages 0-18 for consistency, even though income measures after age 11 should have no direct effect on this outcome. DALSC participants were born in September and October of 1995. Panel (a,c) restricts the sample to male children. Panel (b,d) restricts the sample to female children. For each measure of resources, use a t-test to evaluate whether the correlation at each age is significantly different across male and female children (at the 5% level). At any given age, we depict the estimates with solid (filled) symbols if they are significantly different across males and females.

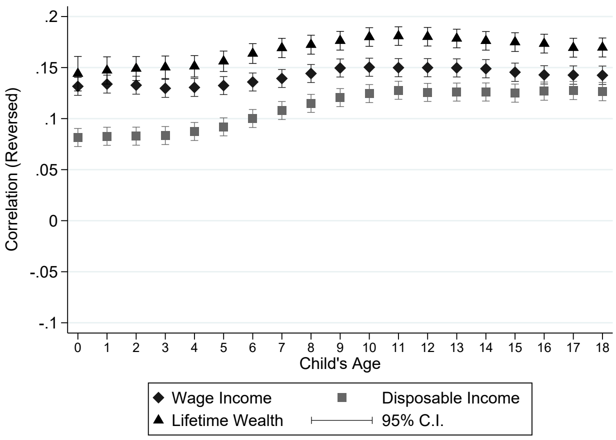
Figure E.6: EDUCATION AND PARTICIPATION IN CRIME



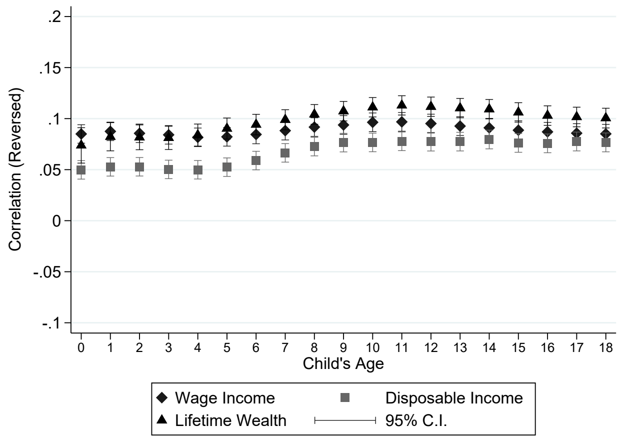
(a) Years of Schooling, Male Children



(b) Years of Schooling, Female Children



(c) Never Committed Any Crime, Male Children



(d) Never Committed Any Crime, Female Children

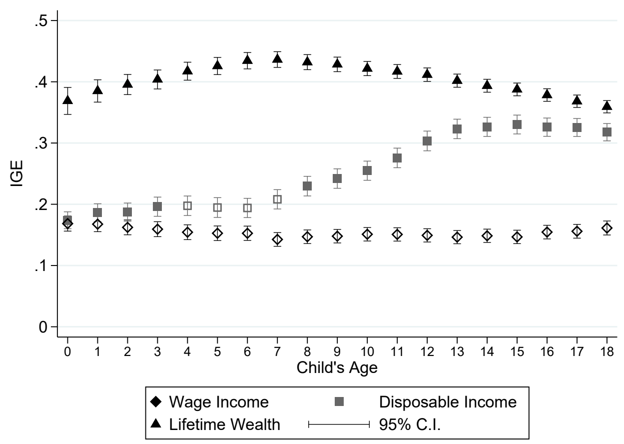
Notes: This figure plots the correlation between years of education and whether the child participated in any crime by age 35, and selected parental income variables measured at the household level at different child's ages. We include children from the 1981-1982 cohorts in these exercises. Panels (a,c) restricts the sample to male children. Panels (b,d) restricts the sample to female children. For each measure of resources, we use a t-test to evaluate whether the correlation at each age is significantly different across male and female children (at the 5% level). At any given age, we depict the estimates with solid (filled) symbols if they are significantly different across males and females.

Figure E.7 depicts the IGE estimates separately for the sample of male children (Panel a) and female children (Panel b).[5] These results point to substantially higher mobility among female children compared to the sample of male children. This is not due to traditional reasons – that daughters are compared to mothers who tend to work less. The benchmark for both groups is family income. Also, the difference in IGEs across the two genders is more pronounced using expected lifetime wealth. The expected lifetime wealth IGE estimates are around 0.45 and 0.35, respectively for male and female children. The disposable income IGEs are about 0.33 and 0.28, respectively for male and female children.

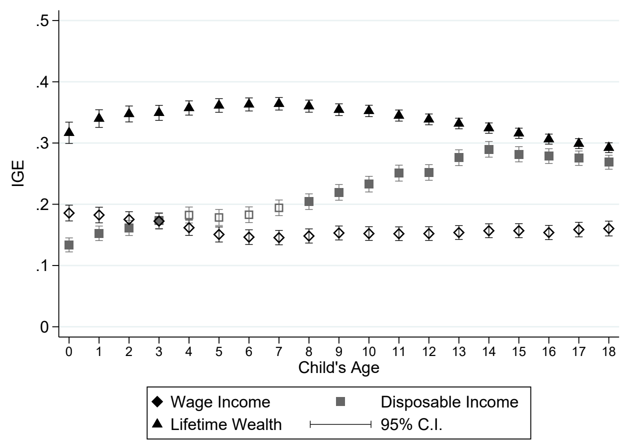
These findings are consistent with the intergenerational changes in educational attainment and labor force participation, which varies greatly across genders as documented by Eshaghnia et al. (2022). The sample of female children, on average, outperforms the sample of male children with respect to formal education measured by years of completed schooling. We next turn to relating our results to those in the preceding literature – primarily the work of Carneiro et al. (2021).

[5] We evaluate whether the male and female values are statistically significantly different, in which case we color the data points in the graph red. Note that this differs from the coloring scheme used in sections 4 and 5.

Figure E.7: Parents-Child IGE Estimates



(a) Male Children



(b) Female Children

Notes: This figure plots the IGE for selected income variables. The child's income is measured at ages 30-35 and the parental income is measured at the household level at different child's ages. We include children from the 1981-1982 cohorts in these exercises. Panel (a) restricts the sample to male children. Panel (b) restricts the sample to female children. The vertical lines around the point estimates represent the 95% confidence intervals. For each measure of resources, we use a t-test to evaluate whether the IGEs at each age are significantly different across male and female children (at the 5% level). At any given age, we depict the estimates with solid (filled) symbols if they are significantly different across males and females.

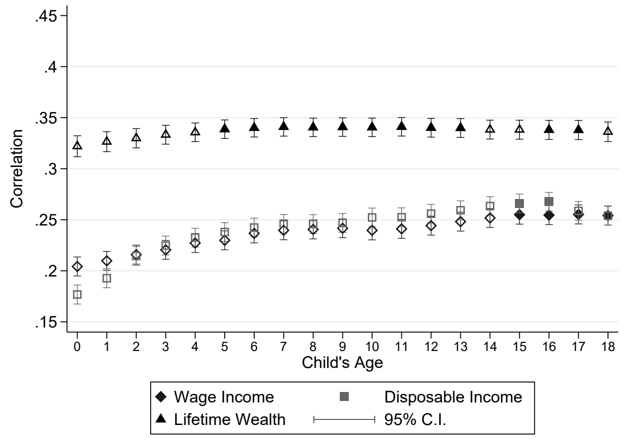
E.3 Intergenerational Correlations by Parental Marital Status at Birth

Figure E.8 plots the correlation between the child's mathematics test scores at age 16 and parental income variables measured at the household level at different child's ages, separately for married and non-married parents and by gender of the child. Panels (a) and (b) present the results for boys and girls growing up in married families, respectively. Panel (c) and (d) present the results for boys and girls growing up in non-married families, respectively. For each child, we consider the family as married if the mother and the father were registered as married at the arrival of the child.[6]

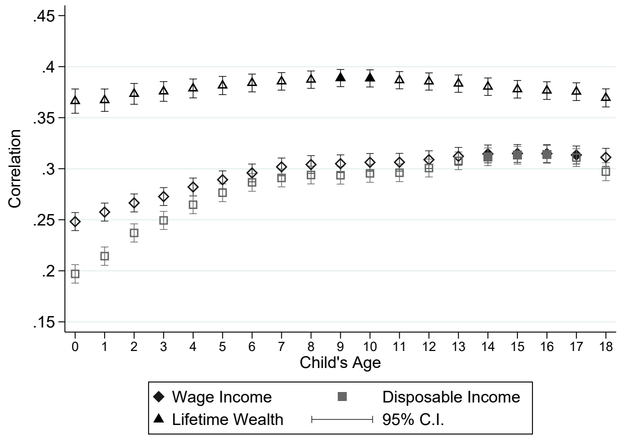
Figure E.9 plots the correlation between the child's years of formal schooling by age 35 and parental income variables measured at the household level at different child's ages, separately for the four different groups of families as described above. Finally, Figure E.10 plots the correlation between the child's participation in crime by age 35 and parental income variables measured at the household level at different child's ages, separately for the four different groups of families.

[6]Appendix Section E.4 presents the results when we estimate heterogeneity by the intactness of the family where we consider a family as intact if the mother and the father were living together over the whole childhood stage (from age zero to 18 of the child). The patterns are very similar to those presented below based on the marital status of parents at the birth of children.

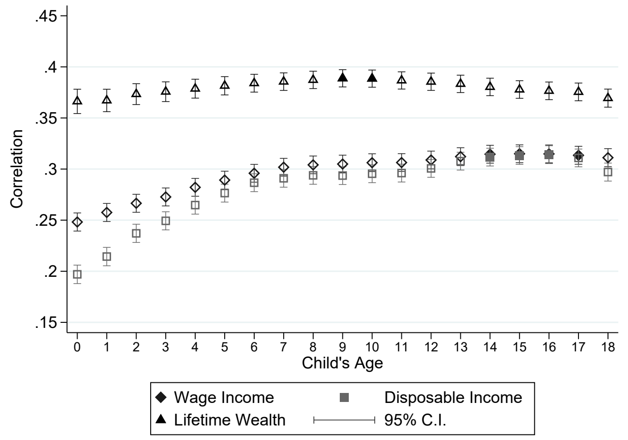
Figure E.8: Correlations with Child's Mathematics Scores by Parental Marital Status and Gender



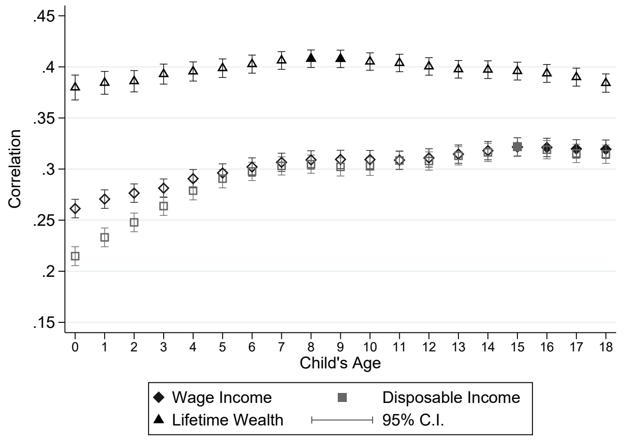
(a) Married- Boys



(b) Married- Girls



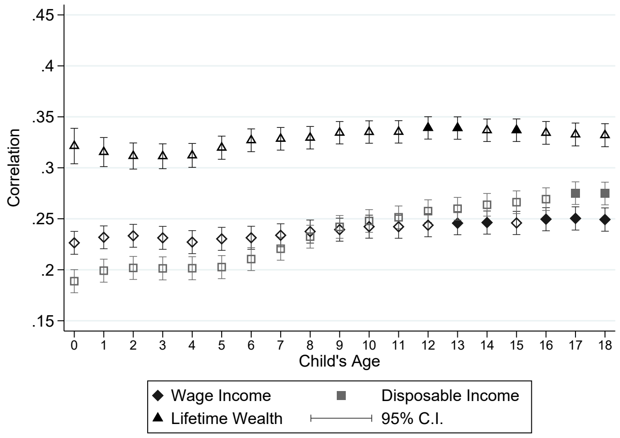
(c) Non-Married- Boys



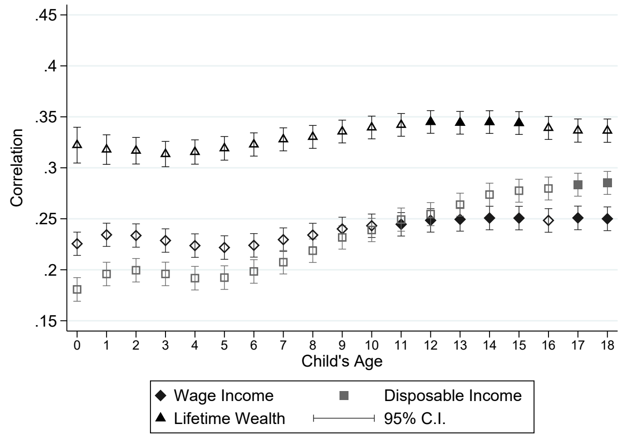
(d) Non-Married- Girls

Notes: This figure plots the correlation between Mathematics test scores measured at age 16 and parental income variables measured at the household level at different child's ages. These test scores were measured as part of national leaving examinations for cohorts born in 1995-1997. Panels (a) and (b) present the results for boys and girls growing up in married families, respectively. Panel (c) and (d) present the results for boys and girls growing up in non-married families, respectively. For each child, we consider the family as married if the mother and the father were registered as married at the arrival of the child.

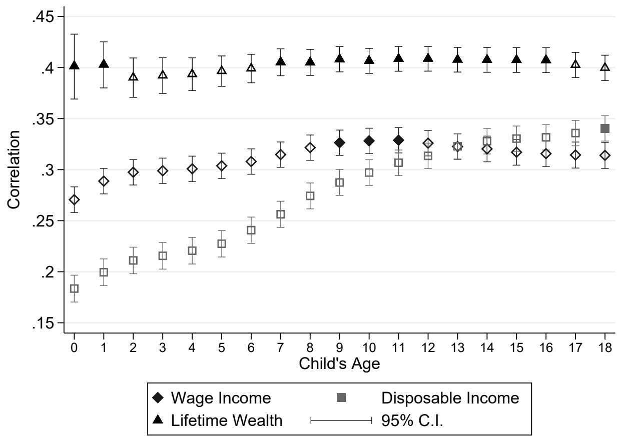
Figure E.9: Correlations with Child's Years of Education by Parental Marital Status and Gender



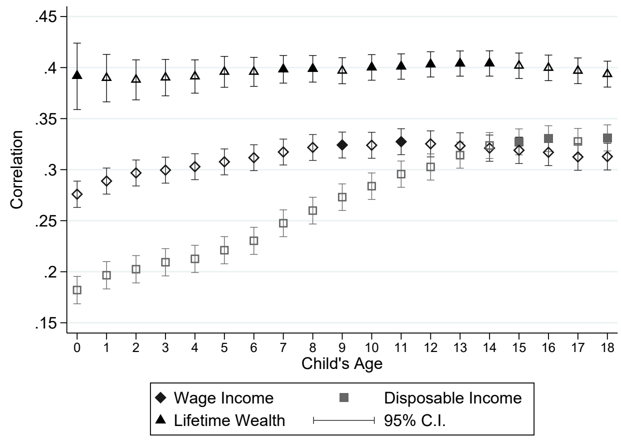
(a) Married- Boys



(b) Married- Girls



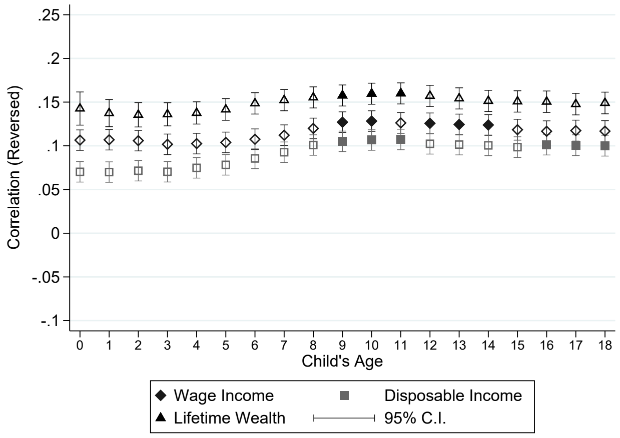
(c) Non-Married- Boys



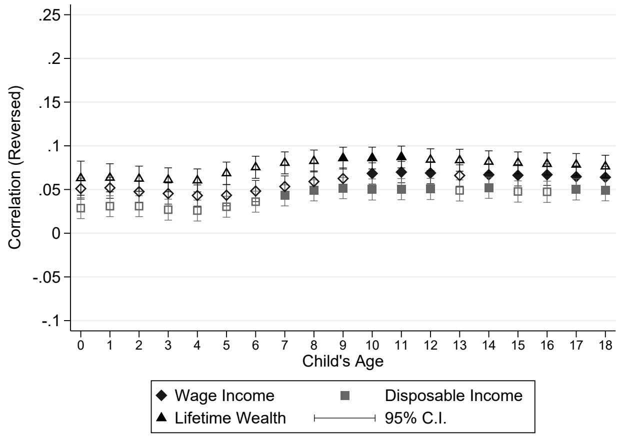
(d) Non-Married- Girls

Notes: This figure plots the correlation between years of education and parental income variables measured at the household level at different child's ages. We include children from the 1981-1982 cohorts in these exercises. Panels (a) and (b) present the results for boys and girls growing up in married families, respectively. Panel (c) and (d) present the results for boys and girls growing up in non-married families, respectively. For each child, we consider the family as married if the mother and the father were registered as married at the arrival of the child.

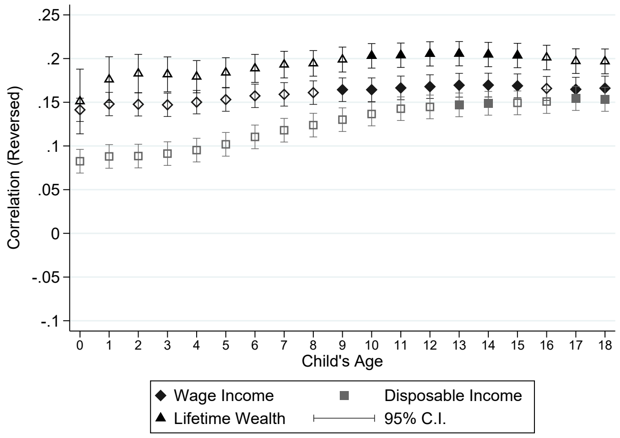
Figure E.10: Correlations with Child's Participation in Crime (Never Committed Any Crime) by Parental Marital Status and Gender



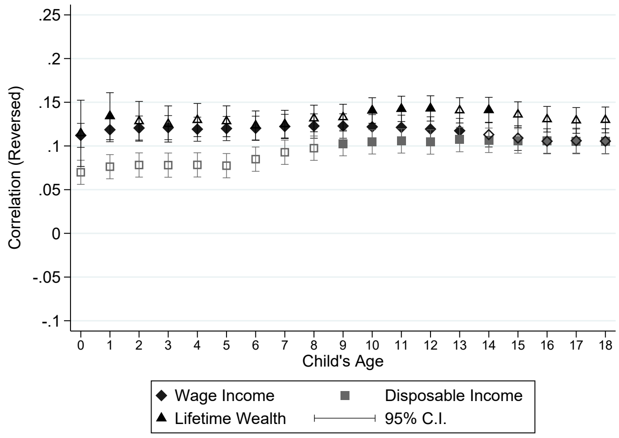
(a) Married- Boys



(b) Married- Girls



(c) Non-Married- Boys



(d) Non-Married- Girls

Notes: This figure plots the correlation between participation in crime and parental income variables measured at the household level at different child's ages. We rely on conviction information from criminal records for children from the 1981-1982 cohorts. Panels (a) and (b) present the results for boys and girls growing up in married families, respectively. Panel (c) and (d) present the results for boys and girls growing up in non-married families, respectively. For each child, we consider the family as married if the mother and the father were registered as married at the arrival of the child.

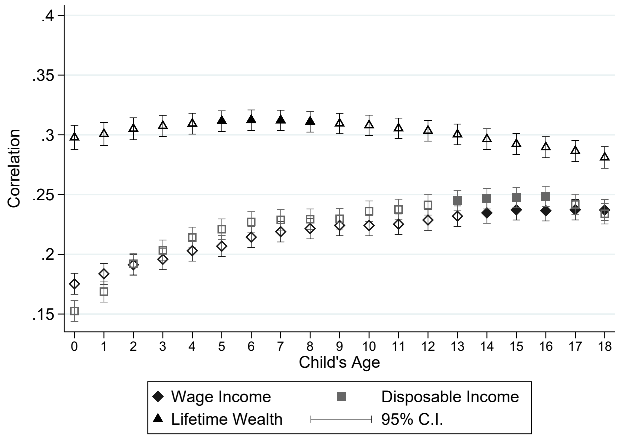
E.4 Intergenerational Correlations by Intactness of the Family

Figure E.11 plots the correlation between the child's mathematics test scores at age 16 and parental income variables measured at the household level at different ages of children, separately for intact and non-intact families and by gender of the child.[7] Panels (a) and (b) present the results for boys and girls growing up in intact families, respectively. Panel (c) and (d) present the results for boys and girls growing up in non-intact families, respectively. For each child, we consider a family as intact if the mother and the father were living together over the whole childhood stage (from age zero to 18 of the child). The patterns reported here are very similar for those based on the marital status of parents at the birth of children (see Section 6.1).

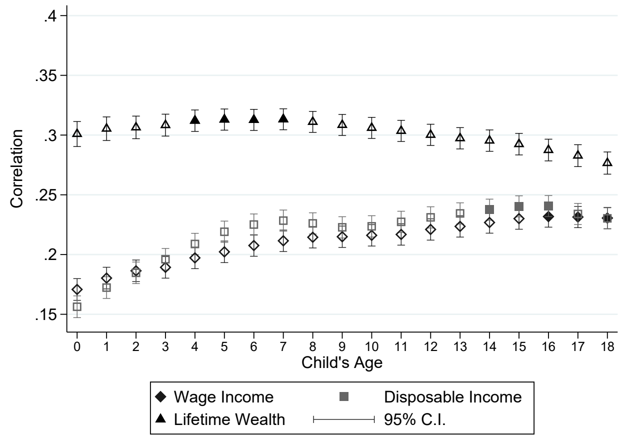
Figure E.12 plots the correlation between the child's years of formal schooling by age 35 and parental income variables measured at the household level at different child's ages, separately for the four different groups of families as described above. Finally, Figure E.13 plots the correlation between the child's participation in crime by age 35 and parental income variables measured at the household level at different child's ages, separately for the four different groups of families as in Figures E.11 and E.12.

[7] We measure household resources as the sum of the father's and mother's resources, regardless of whether they live together or not.

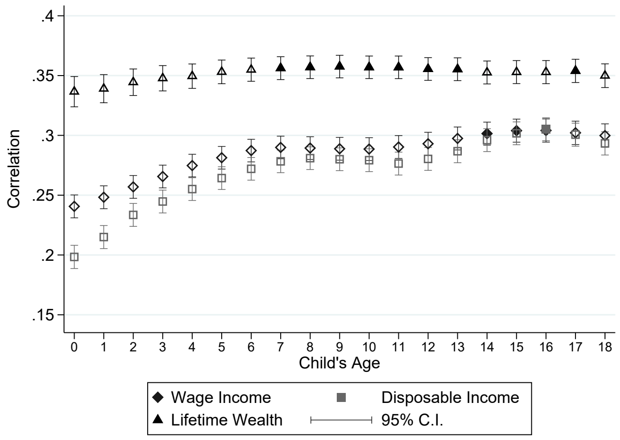
Figure E.11: Correlations with Child's Mathematics Test Scores by Family Structure and Gender



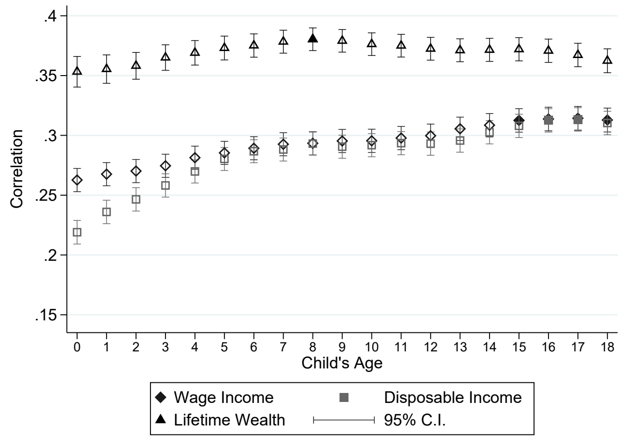
(a) Intact Family- Boys



(b) Intact Family- Girls



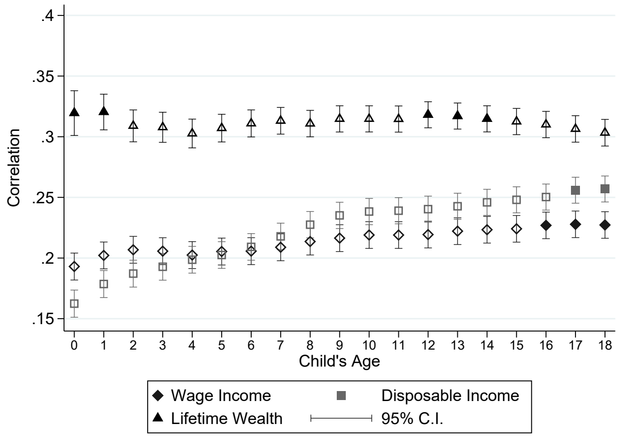
(c) Non-Intact Family- Boys



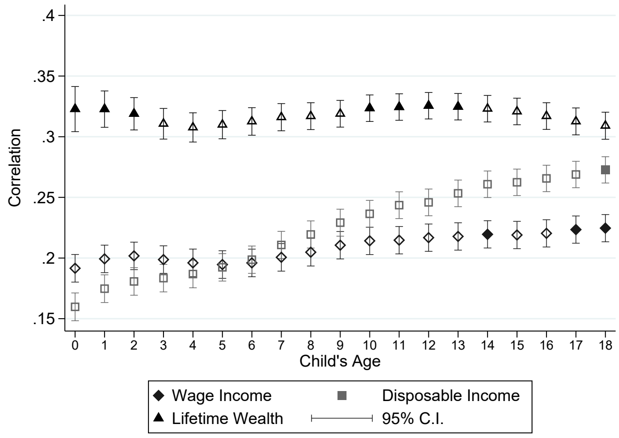
(d) Non-Intact Family- Girls

Notes: This figure plots the correlation between Mathematics test scores measured at age 16 and parental income variables measured at the household level at different child's ages. These test scores were measured as part of national leaving examinations for cohorts born in 1995-1997. Panels (a) and (b) present the results for boys and girls growing up in intact families, respectively. Panel (c) and (d) present the results for boys and girls growing up in non-intact families, respectively. For each child, we consider a family as intact if the mother and the father were living together over the whole childhood stage (from age zero to 18 of the child).

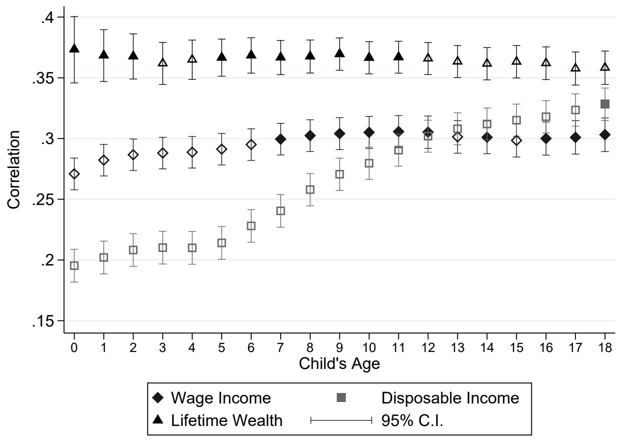
Figure E.12: Correlations with Child's Years of Education by Family Structure and Gender



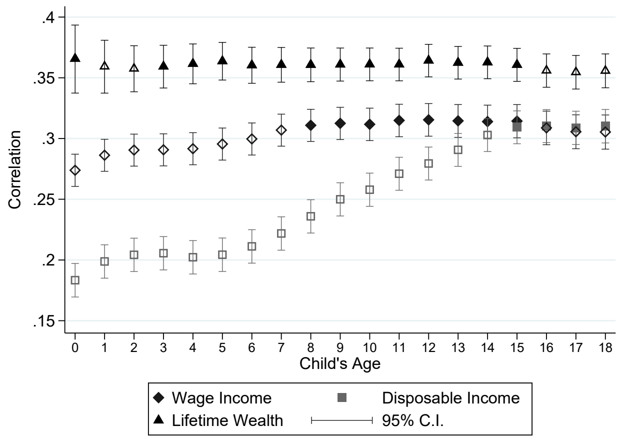
(a) Intact Family- Boys



(b) Intact Family- Girls



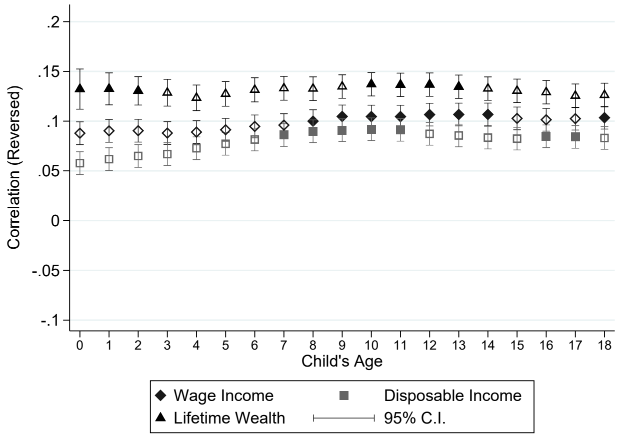
(c) Non-Intact Family- Boys



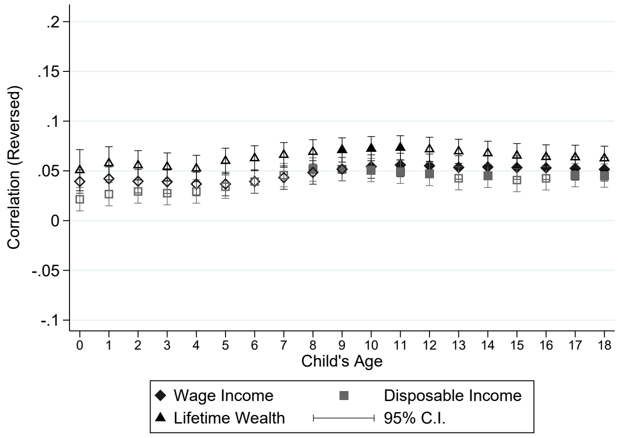
(d) Non-Intact Family- Girls

Notes: This figure plots the correlation between years of education and parental income variables measured at the household level at different child's ages. We include children from the 1981-1982 cohorts in these exercises. Panels (a) and (b) present the results for boys and girls growing up in intact families, respectively. Panel (c) and (d) present the results for boys and girls growing up in non-intact families, respectively. For each child, we consider a family as intact if the mother and the father were living together over the whole childhood stage (from age zero to 18 of the child).

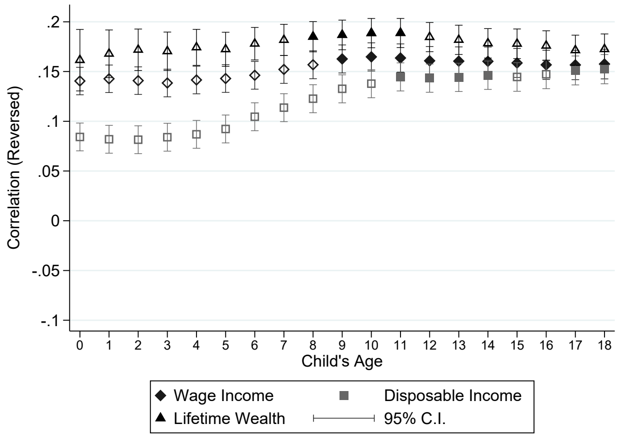
Figure E.13: Correlations with Child's Participation in Crime (Never Committed Any Crime) by Family Structure and Gender



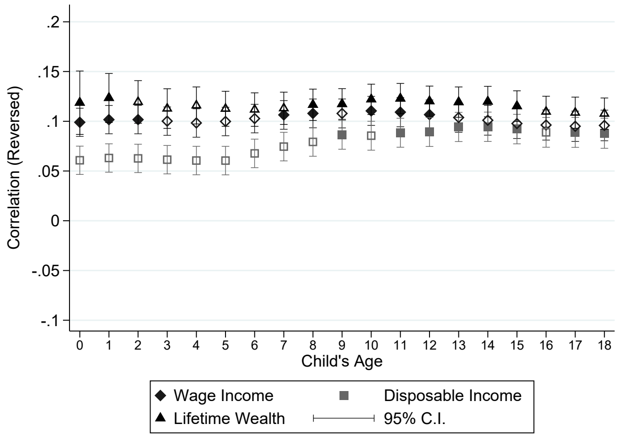
(a) Intact Family- Boys



(b) Intact Family- Girls



(c) Non-Intact Family- Boys



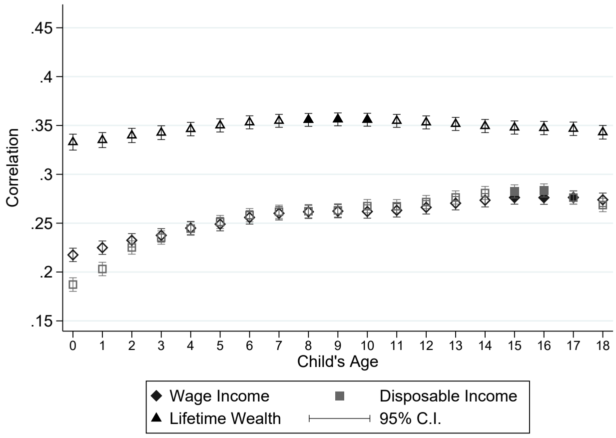
(d) Non-Intact Family- Girls

Notes: This figure plots the correlation between participation in crime and parental income variables measured at the household level at different child's ages. We rely on conviction information from criminal records for children from the 1981-1982 cohorts. Panels (a) and (b) present the results for boys and girls growing up in intact families, respectively. Panel (c) and (d) present the results for boys and girls growing up in non-intact families, respectively. For each child, we consider a family as intact if the mother and the father were living together over the whole childhood stage (from age zero to 18 of the child).

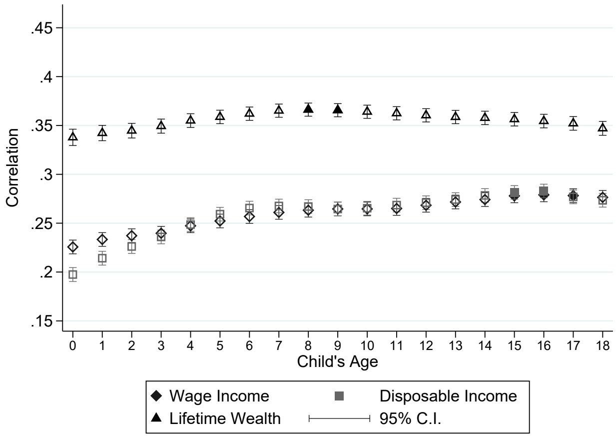
E.5 Intergenerational Correlations by Parental Cohabitational Status

Figure E.14 plots the correlation between the child's mathematics test scores at age 16 and parental income variables measured at the household level at different child's ages, separately for cohabitant and non-cohabitant parents and by gender of the child. Panels (a) and (b) present the results for boys and girls growing up in cohabitant families, respectively. Panel (c) and (d) present the results for boys and girls growing up in non-cohabitant families, respectively. For each child, we consider the family as cohabitant if the mother and the father were cohabitants at the time of the arrival of the child. Figure E.15 plots the correlation between the child's years of formal schooling by age 35 and parental income variables measured at the household level at different child's ages, separately for the four different groups of families as described above. Figure E.16 plots the correlation between the child's participation in crime by age 35 and parental income variables measured at the household level at different child's ages, separately for the four different groups of families.

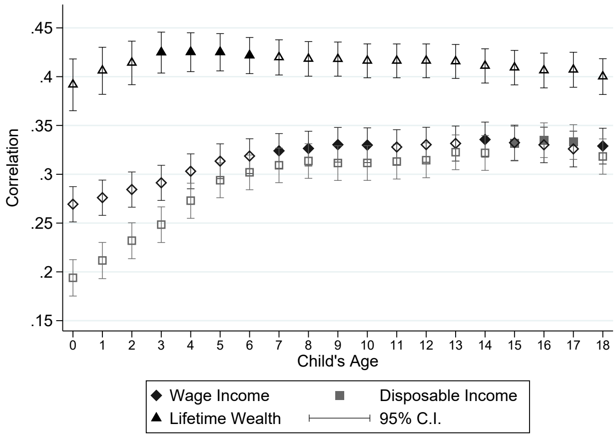
Figure E.14: Correlations with Child's Mathematics Test Scores by Parental Cohabitant Status and Gender



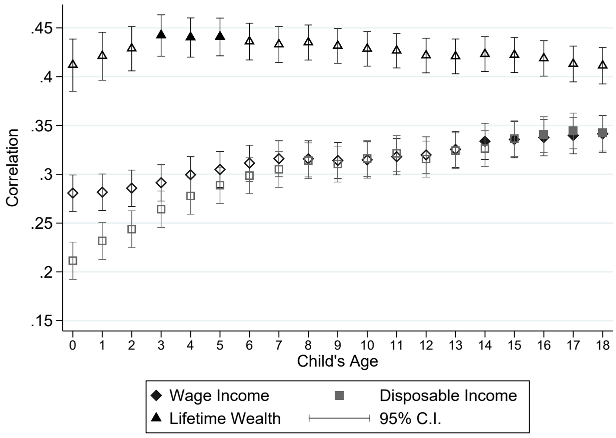
(a) Cohabitant Parents- Boys



(b) Cohabitant Parents- Girls



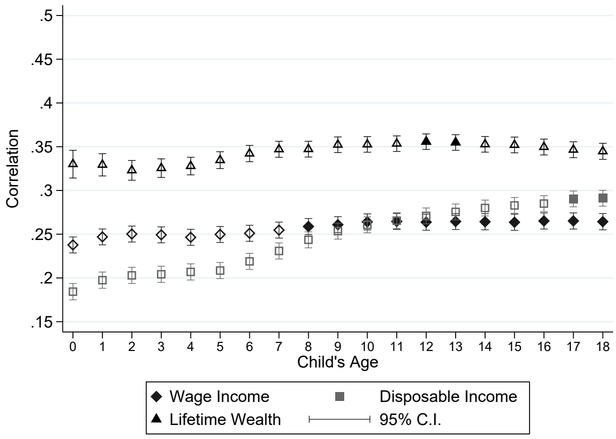
(c) Non-Cohabitant Parents- Boys



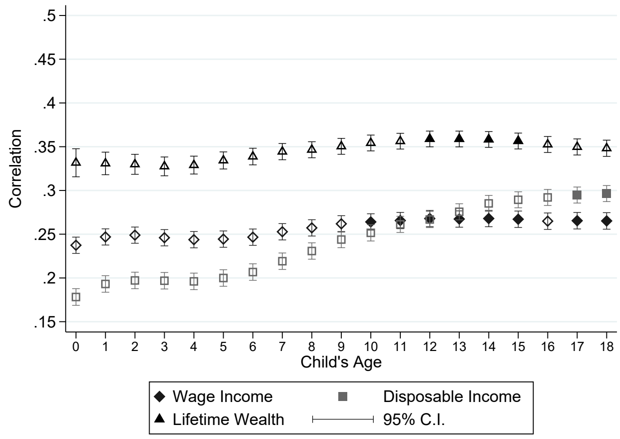
(d) Non-Cohabitant Parents- Girls

Notes: This figure plots the correlation between Mathematics test scores measured at age 16 and parental income variables measured at the household level at different child's ages. These test scores were measured as part of national leaving examinations for cohorts born in 1995-1997. Panels (a) and (b) present the results for boys and girls growing up in cohabitating families, respectively. Panel (c) and (d) present the results for boys and girls growing up in non-cohabitating families, respectively. For each child, we consider the family as cohabitant if the mother and the father were cohabitants at the arrival of the child.

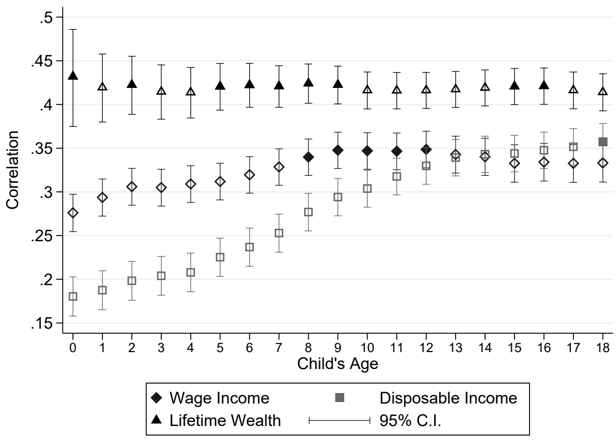
Figure E.15: Correlations with Child's Years of Education by Parental Cohabitant Status and Gender



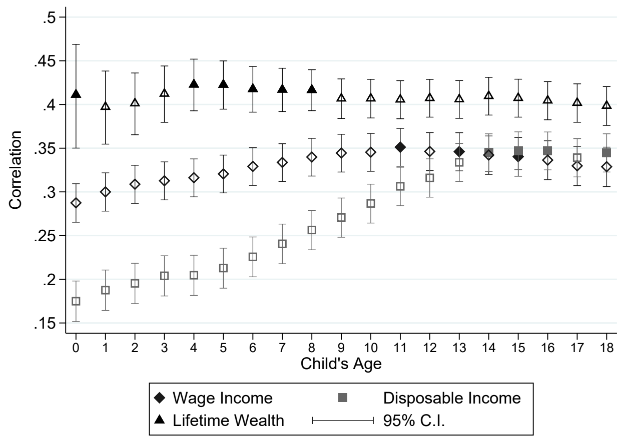
(a) Cohabitant Parents- Boys



(b) Cohabitant Parents- Girls



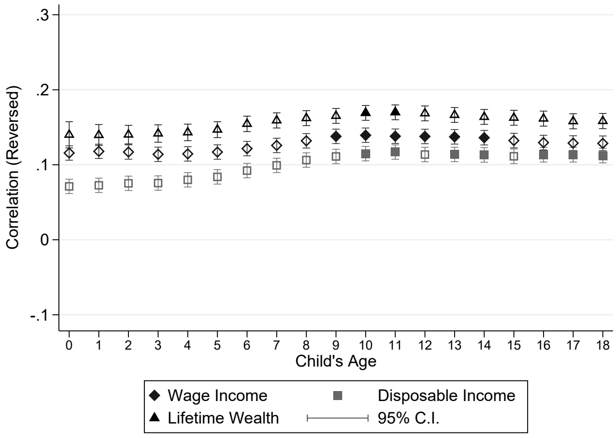
(c) Non-Cohabitant Parents- Boys



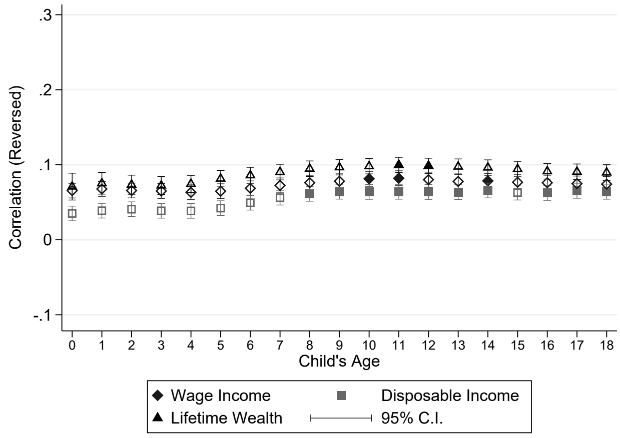
(d) Non-Cohabitant Parents- Girls

Notes: This figure plots the correlation between years of education and parental income variables measured at the household level at different child's ages. We include children from the 1981-1982 cohorts in these exercises. Panels (a) and (b) present the results for boys and girls growing up in cohabitant families, respectively. Panel (c) and (d) present the results for boys and girls growing up in non-cohabitant families, respectively. For each child, we consider the family as cohabitant if the mother and the father were cohabitants at the arrival of the child.

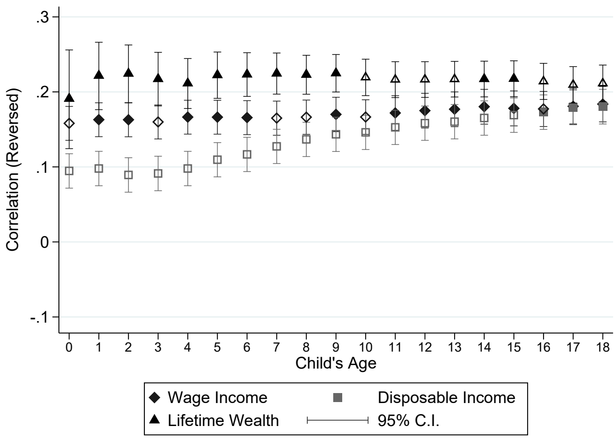
Figure E.16: Correlations with Child's Participation in Crime (Never Committed Any Crime) by Parental Cohabitant Status and Gender



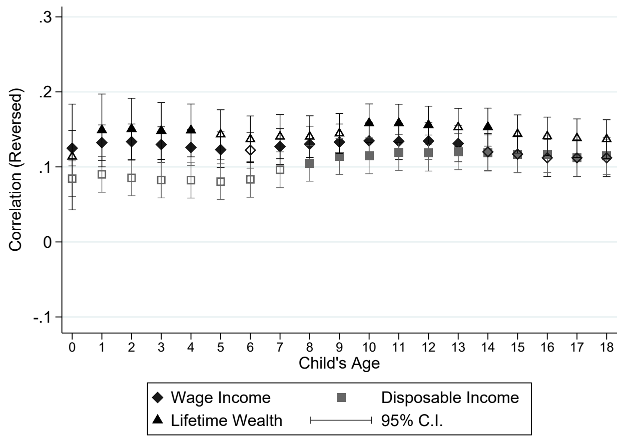
(a) Cohabitant Parents- Boys



(b) Cohabitant Parents- Girls



(c) Non-Cohabitant Parents- Boys



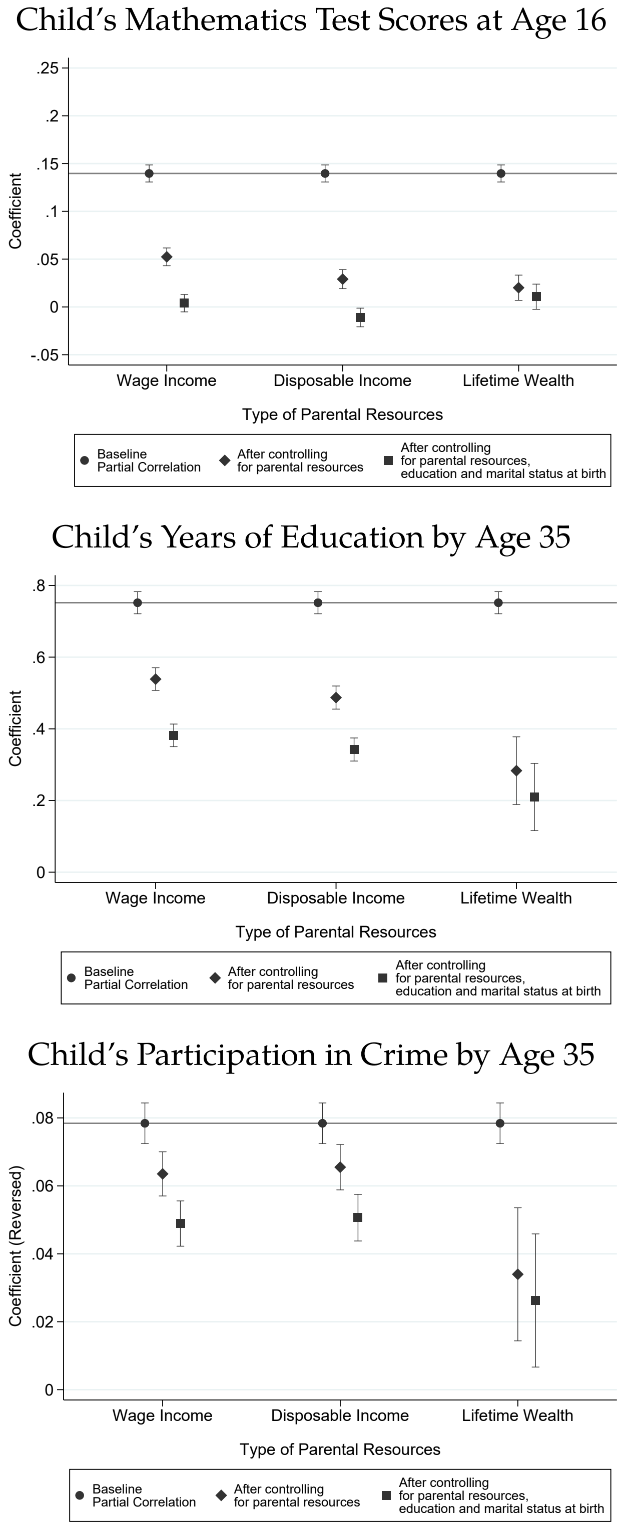
(d) Non-Cohabitant Parents- Girls

Notes: This figure plots the correlation between participation in crime and parental income variables measured at the household level at different child's ages. We rely on conviction information from criminal records for children from the 1981-1982 cohorts. Panels (a) and (b) present the results for boys and girls growing up in cohabitant families, respectively. Panel (c) and (d) present the results for boys and girls growing up in non-cohabitant families, respectively. For each child, we consider the family as cohabitant if the mother and the father were cohabitants at the arrival of the child.

F The Role of Other Family Characteristics

Figure F.1 plots the association between various child's outcomes and parental age (when the child was born) both before and after adjusting for the impact of parental resources during childhood stage between ages of zero and 18 of the child and other characteristics of parents, i.e., parental education and marital status of parents. We use an indicator for older parents. It is defined as a binary variable, which takes the value of one if the mother's age at birth is higher than the sample median (i.e., 32). Controlling for family background has a substantial impact on child outcomes.

Figure F.1: Association of Parental Average Age at Arrival of Children with Child Outcomes before and after Adjusting for Parental Resources



Notes: This figure plots the association between various child outcomes and parental age (when the child was born) both before and after adjusting for the impact of parental resources during childhood stage between ages of zero and 18 of the child and other characteristics of parents, i.e., parental education and marital status of parents. Parental age is defined as a binary variable, which takes the value of one if the mother's age at birth is higher than the median. Unadjusted coefficients are obtained by regressing the corresponding child's outcome on parental characteristics (years of schooling of parents or their marital status). Adjusted coefficients report the estimate of the effect of parental age after we add regressors to control for parental resources in different childhood ages from zero to 18 and other parental characteristics. Panels (a) present the results for child's mathematics test score (at around age 16) in national leaving examinations (for cohorts born in 1995-1997). Panels (b) present the results for child's years of education (for cohorts born in 1981-1982). Panels (c) present the results for child's participation in crime (for cohorts born in 1981-1982).

G Child Outcome Measures and Adult Earnings

Table G.1 presents the correlation between child outcome measures such as years of schooling and participation in crime with different measures of child resources in adulthood over ages 30–35. For this analysis, we only focus on education and participation in crime (and not child test scores) due to data limitations. The cohorts of 1995-1997 whom we use for language test scores and Mathematics test scores are not observed at ages 30–35.

Table G.1: CORRELATION BETWEEN CHILD OUTCOME MEASURES AND CHILD RESOURCES OVER AGES 30–35

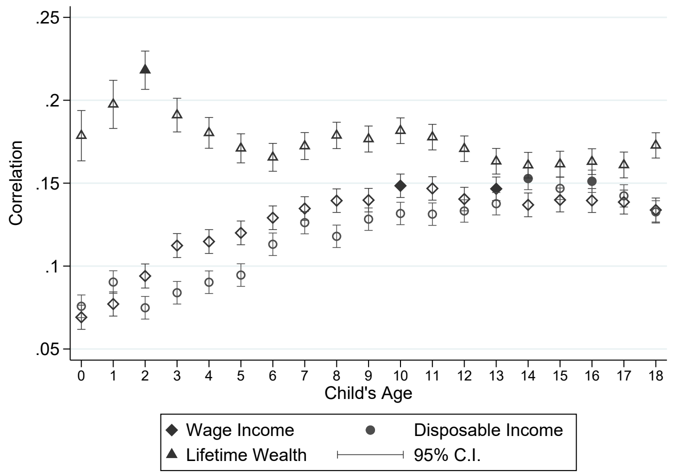
Measure	**Years of Schooling**	**Never Committed Any Crime by Age 35**
(1)	(2)	(3)
Wage Income	0.423	0.032
Disposable Income	0.268	0.012
Lifetime Wealth	0.721	0.146

Notes: For each measure of resources for the child (Column 1), this table presents the correlation with the child's years of completed schooling at age 35 (Column 2), and never committed any crime by age 35 (column 3). We measure the child's measures of resources (listed in the first column) over ages 30-35.

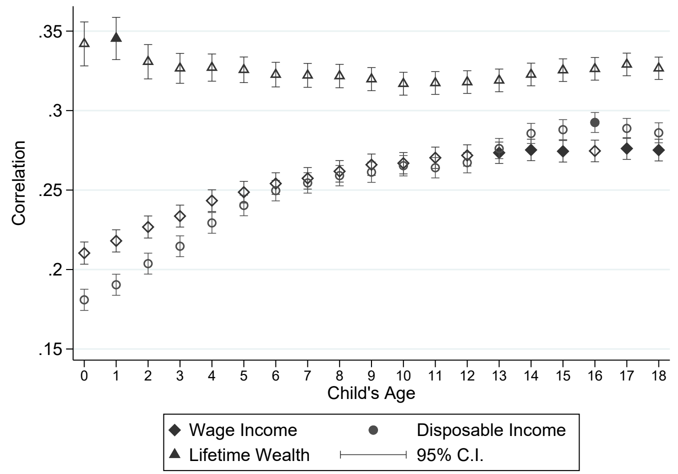
H Intergenerational Correlations for an Alternative Sample Selection

Figure H.1 reports the results in Figure 2 for a balanced sample.

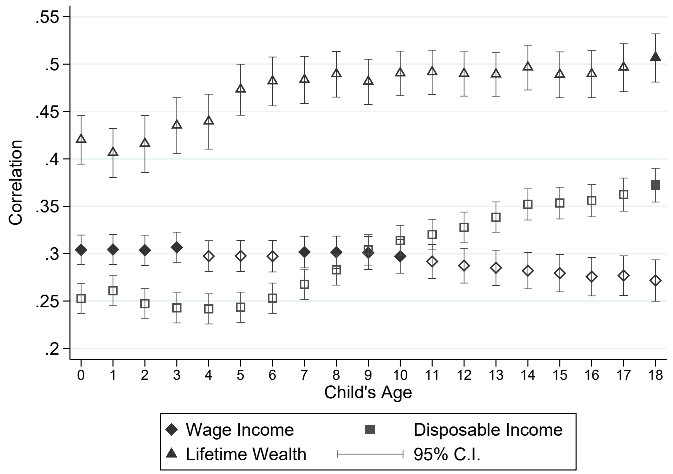
Figure H.1: Correlations between Parental Resources and Child Human Capital Outcomes for Balanced Sample- by Child's Age



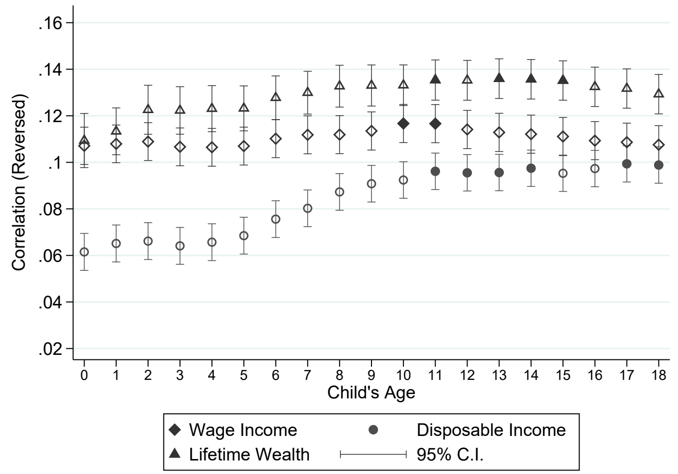
(a) Child's Language Test Score at Age 11



(b) Math. National Leaving Exam Grade at Age 16



(c) Years of Education at Age 35



(d) Participation in Crime by 35

Notes: Panels (a), (b), and (c) plot the correlations between the different parental income measures measured at the different child ages and the child's language test score at age 11, the child's national math test score at age 15, and the child's years of completed schooling at age 35, respectively. Figure (d) plots the inverted correlation between the child's participation in crime by age 35 and their parental resources. For each measure of resources, we use a t-test to evaluate whether the correlation at each age is significantly different from the maximum correlation (at the 5% level). We depict the estimate with solid (filled) symbols if it is not significantly different from the max.

I Approximating The Skill Formation Technology

I.1 Summary Statistics

Table I.1 shows that parental lifetime wealth across different intervals of childhood are highly correlated. Table I.2 presents the correlations across all children's ages from zero to 18. Figure I.1 presents the eigenvalues from principal components analysis of parents' lifetime wealth over the child's age intervals of $[0, 5]$, $[6, 11]$, $[12, 17]$, $[18, 23]$, and $[24, 29]$. Except for the first eigenvalue, other eigenvalues are close to zero.

Table I.1: Correlations Between Parents' Expected Lifetime Wealth across Intervals of Children's Ages

Child Ages	Child Ages $[0, 5]$	Child Ages $[6, 11]$	Child Ages $[12, 17]$	Child Ages$[18, 23]$
Child Ages $[6, 11]$	0.910			
Child Ages $[12, 17]$	0.879	0.933		
Child Ages $[18, 23]$	0.848	0.879	0.944	
Child Ages $[24, 29]$	0.808	0.816	0.881	0.941

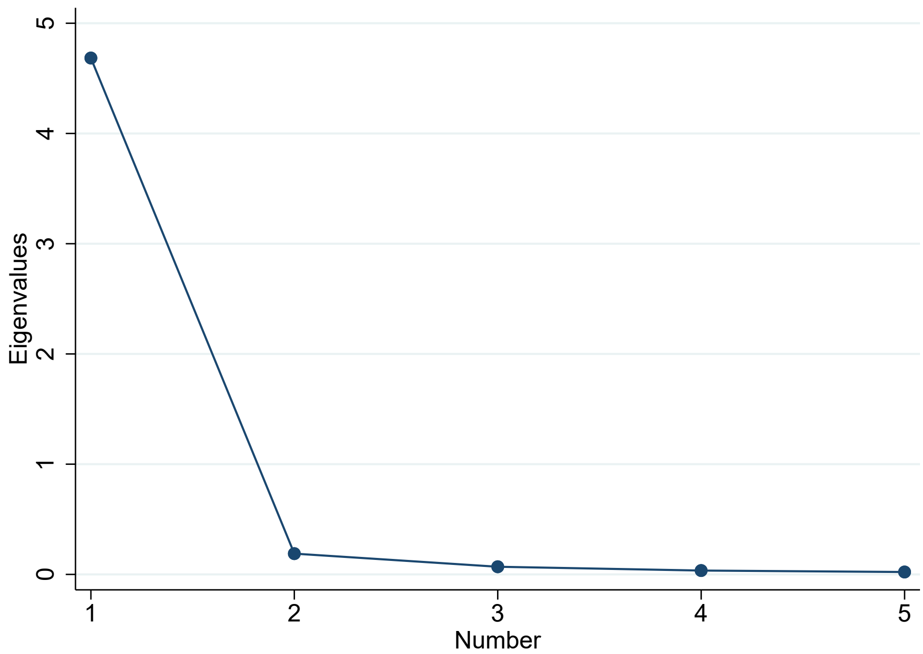
Notes: This table presents the correlations between parents' lifetime wealth across different intervals of child's ages, i.e., $[0, 5]$, $[6, 11]$, $[12, 17]$, $[18, 23]$, and $[24, 29]$. We include children from the 1981-1982 cohorts in Denmark and their parents.

Table I.2: Correlations Between Expected Lifetime Wealth across Children's Ages from 0 to 18

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Age 1 of the Child	.97																	
Age 2 of the Child	.95	.98																
Age 3 of the Child	.92	.96	.98															
Age 4 of the Child	.90	.94	.96	.98														
Age 5 of the Child	.89	.92	.94	.96	.98													
Age 6 of the Child	.88	.89	.92	.94	.96	.98												
Age 7 of the Child	.87	.88	.90	.92	.94	.97	.98											
Age 8 of the Child	.87	.88	.89	.90	.93	.95	.97	.99										
Age 9 of the Child	.86	.88	.89	.90	.91	.94	.96	.97	.99									
Age 10 of the Child	.86	.87	.88	.89	.90	.92	.94	.96	.97	.99								
Age 11 of the Child	.86	.87	.88	.89	.89	.91	.93	.94	.96	.97	.99							
Age 12 of the Child	.85	.86	.87	.88	.89	.91	.92	.93	.94	.96	.97	.99						
Age 13 of the Child	.85	.86	.87	.88	.88	.90	.91	.92	.93	.94	.96	.98	.99					
Age 14 of the Child	.84	.85	.86	.87	.87	.89	.90	.91	.92	.93	.94	.96	.98	.99				
Age 15 of the Child	.84	.85	.85	.86	.87	.88	.89	.90	.91	.92	.93	.95	.96	.98	.99			
Age 16 of the Child	.83	.84	.85	.86	.86	.88	.88	.89	.90	.91	.92	.93	.95	.96	.98	.99		
Age 17 of the Child	.83	.84	.84	.85	.86	.87	.87	.88	.89	.90	.91	.92	.94	.95	.97	.98	.99	
Age 18 of the Child	.82	.83	.84	.85	.85	.86	.87	.87	.88	.89	.90	.91	.93	.94	.95	.97	.98	.99

Notes: This table presents the serial correlations of parents' expected lifetime wealth by children's ages from zero to 18. We include children from the 1981-1982 cohorts in Denmark and their parents.

Figure I.1: Principal Component Analysis of Parental Expected Lifetime Wealth in Different Intervals- Eigenvalues



Notes: This figure plots the eigenvalues from principal components analyses of parents' expected lifetime wealth over the child's age intervals of $[0,5]$, $[6,11]$, $[12,17]$, $[18,23]$, and $[24,29]$. We include children from the 1981-1982 cohorts in Denmark and their parents.

I.2 Estimates of the Technology of Skill Formation

Tables I.4-I.8 present estimates of our approximation to the technology of skill formation using equation (8) in the main paper, taking coefficients $\alpha_0(t)$, $\boldsymbol{\alpha}'_{1,i}(t)$, and $\boldsymbol{\Psi}_{i,j}(t)$ to be constant within intervals.

We specify the approximated skill formation technology for the child's mathematics test score as follows. We use a similar structure for other child outcome measures with the only difference being that the number of intervals varies depending on the timing of the realization of the child outcome as discussed in the paper. We drop coefficient subscripts to simplify the notation.

$$
\begin{aligned}
y^c = {} & \alpha + \alpha_{L_1} L_1 + \psi_{L_1^2} L_1^2 + \alpha_{L2} L_2 + \psi_{L_2^2} L_2^2 + \alpha_{L3} L_3 + \psi_{L_3^2} L_3^2 \\
& + \psi_{L_1,L_2} L_1 L_2 + \psi_{L_1,L_3} L_1 L_3 + \psi_{L_2,L_3} L_2 L_3 \\
& + \beta_{edu} edu_p + \beta_{edu^2} edu_p^2 + \beta_{mar} mar_p + \beta_{age} age_p + \beta_{age^2} age_p^2 \\
& + \delta_{edu,mar} edu_p mar_p + \delta_{edu,age} edu_p age_p + \delta_{mar,age} mar_p age_p + \delta_{edu,mar,age} edu_p mar_p age_p \\
& + \delta_{edu,L_1} edu_p L_1 + \delta_{edu,L_2} edu_p L_2 + \delta_{edu,L_3} edu_p L_3 + \delta_{edu,L_1^2} edu_p L_1^2 + \delta_{edu,L_2^2} edu_p L_2^2 + \delta_{edu,L_3^2} edu_p L_3^2 \\
& + \delta_{mar,L_1} mar_p L_1 + \delta_{mar,L_2} mar_p L_2 + \delta_{mar,L_3} mar_p L_3 + \delta_{mar,L_1^2} mar_p L_1^2 + \delta_{mar,L_2^2} mar_p L_2^2 + \delta_{mar,L_3^2} mar_p L_3^2 \\
& + \delta_{age,L_1} age_p L_1 + \delta_{age,L_2} age_p L_2 + \delta_{age,L_3} age_p L_3 + \delta_{age,L_1^2} age_p L_1^2 + \delta_{age,L_2^2} age_p L_2^2 + \delta_{age,L_3^2} age_p L_3^2 \\
& + \delta_{edu,L_1,L_2} edu_p L_1 L_2 + \delta_{edu,L_2,L_3} edu_p L_2 L_3 + \delta_{edu,L_1,L_3} edu_p L_1 L_3 \\
& + \delta_{mar,L_1,L_2} mar_p L_1 L_2 + \delta_{mar,L_2,L_3} mar_p L_2 L_3 + \delta_{mar,L_1,L_3} mar_p L_1 L_3 \\
& + \delta_{age,L_1,L_2} age_p L_1 L_2 + \delta_{age,L_2,L_3} age_p L_2 L_3 + \delta_{age,L_1,L_3} age_p L_1 L_3 + \varepsilon,
\end{aligned} \tag{3}
$$

where L_1, L_2, and L_3 are parental lifetime wealth in age intervals 1, 2, and 3, respectively. edu_p is parental average years of schooling, mar_p is an indicator equal to one if parents were married when the child was born and zero otherwise, and age_p is the average age of parents when the child was born.

The derivative with respect to parental lifetime wealth in period 1 L_1 is:

$$\frac{\partial y^c}{\partial L_1} = \alpha_{L_1} + 2\psi_{L_1^2} L_1 + \psi_{L_1,L_2} L_2 + \psi_{L_1,L_3} L_3 \tag{4}$$
$$+ \delta_{edu,L_1} edu_p + 2\delta_{edu,L_1^2} edu_p L_1 + \delta_{mar,L_1} mar_p + 2\delta_{mar,L_1^2} mar_p L_1 + \delta_{age,L_1} age_p L_1 + 2\delta_{age,L_1^2} age_p L_1$$
$$+ \delta_{edu,L_1,L_2} edu_p L_2 + \delta_{edu,L_1,L_3} edu_p L_3$$
$$+ \delta_{mar,L_1,L_2} mar_p L_2 + \delta_{mar,L_1,L_3} mar_p L_3$$
$$+ \delta_{age,L_1,L_2} age_p L_2 + \delta_{age,L_1,L_3} age_p L_3.$$

The derivative with respect to parental lifetime wealth in period 2 L_2 is:

$$\frac{\partial y^c}{\partial L_2} = \alpha_{L_2} + 2\psi_{L_2^2} L_2 + \psi_{L_1,L_2} L_1 + \psi_{L_2,L_3} L_3 \tag{5}$$
$$+ \delta_{edu,L_2} edu_p + 2\delta_{edu,L_2^2} edu_p L_2 + \delta_{mar,L_2} mar_p + 2\delta_{mar,L_2^2} mar_p L_2 + \delta_{age,L_2} age_p L_2 + 2\delta_{age,L_2^2} age_p L_2$$
$$+ \delta_{edu,L_1,L_2} edu_p L_1 + \delta_{edu,L_2,L_3} edu_p L_3$$
$$+ \delta_{mar,L_1,L_2} mar_p L_1 + \delta_{mar,L_2,L_3} mar_p L_3$$
$$+ \delta_{age,L_1,L_2} age_p L_1 + \delta_{age,L_2,L_3} age_p L_3.$$

The derivative with respect to parental lifetime wealth in period 3 L_3 is:

$$\frac{\partial y^c}{\partial L_3} = \alpha_{L_3} + 2\psi_{L_3^2} L_3 + \psi_{L_1,L_3} L_1 + \psi_{L_2,L_3} L_2 \tag{6}$$
$$+ \delta_{edu,L_3} edu_p + 2\delta_{edu,L_3^2} edu_p L_3 + \delta_{mar,L_3} mar_p + 2\delta_{mar,L_3^2} mar_p L_3 + \delta_{age,L_3} age_p L_3 + 2\delta_{age,L_3^2} age_p L_3$$
$$+ \delta_{edu,L_1,L_3} edu_p L_1 + \delta_{edu,L_2,L_3} edu_p L_2$$
$$+ \delta_{mar,L_1,L_3} mar_p L_1 + \delta_{mar,L_2,L_3} mar_p L_2$$
$$+ \delta_{age,L_1,L_3} age_p L_1 + \delta_{age,L_2,L_3} age_p L_2.$$

The derivative with respect to parental average years of schooling edu_p is:

$$\frac{\partial y^c}{\partial edu_p} = \beta_{edu} + 2\beta_{edu^2} edu_p + \delta_{edu,mar} mar_p + \delta_{edu,age} age_p + \delta_{edu,mar,age} mar_p age_p \tag{7}$$
$$+ \delta_{edu,L_1} L_1 + \delta_{edu,L_2} L_2 + \delta_{edu,L_3} L_3 + \delta_{edu,L_1^2} L_1^2 + \delta_{edu,L_2^2} L_2^2 + \delta_{edu,L_3^2} L_3^2$$
$$+ \delta_{edu,L_1,L_2} L_1 L_2 + \delta_{edu,L_2,L_3} L_2 L_3 + \delta_{edu,L_1,L_3} L_1 L_3.$$

Table I.4: Derivative of Child Outcomes with respect to Parental Expected lifetime wealth at Different Childhood Intervals, Evaluated at the Mean (First Specification)

(1) Child's Outcome	(2) Child's age $[0, 5]$	(3) Child's age $[6, 11]$	(4) Child's age $[12, 17]$	(5) Child's age $[18, 23]$	(6) Child's age $[24, 29]$
Language Test Score (Age 11)	0.0048 [-0.0751, 0.0765]	0.0355 [-0.0335, 0.1070]			
Mathematics Score (Age 16)	0.0060*** [0.0037, 0.008]	0.0042*** [0.0012, 0.00701]	0.0062*** [0.0039, 0.0081]		
Participated in Crime by Age 35	-0.00025 [-0.0021, 0.0017]	0.00144 [-0.00104, 0.00403]	-0.00272** [-0.00514, -0.00003]	-0.00041 [-0.00349, 0.00202]	-0.00104 [-0.00282, 0.00102]
Years of Schooling by Age 35	-0.0007 [-0.0088, 0.0084]	0.0156** [0.0031, 0.0262]	0.0150*** [0.0045, 0.0274]	0.0094* [-0.0035, 0.0211]	0.0074 [-0.0020, 0.0159]

95% confidence intervals in brackets.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Note: This table shows the value of the derivative of each of the child outcomes with respect to parental expected lifetime wealth in each interval, evaluated at the mean. We estimate equation (8), taking coefficients $\alpha_0(t)$, $\boldsymbol{\alpha}'_{1,i}(t)$, and $\boldsymbol{\Psi}_{i,j}(t)$ to be constant within intervals. The full set of estimation results including the constant and the coefficients on the interaction terms are reported in Tables I.5-I.8 of Appendix I. Column (1) lists the child's outcome of interest. Columns (2)-(6) present the value of the derivative with respect to each age interval, evaluated at the mean parental expected lifetime wealth in each interval. The 95% confidence intervals are computed using a bootstrapped method with 200 iterations.

Table I.5: Main Effects and Dynamic Complementarities of Parental Lifetime Wealth at Different Childhood Intervals on Child's Language Score

	(1) Language test score (at age 11)	(2) Language test score (at age 11)
Parents' Lifetime Wealth at ages [0, 5]	-0.654 (0.768)	-0.506 (0.845)
Parents' Lifetime Wealth at ages [0, 5]- Squared	-0.0320*** (0.0123)	-0.0310** (0.0136)
Parents' Lifetime Wealth at ages [6, 11]	0.456 (0.674)	-0.543 (1.156)
Parents' Lifetime Wealth at ages [6, 11]- Squared	-0.0348*** (0.0100)	-0.00537 (0.0262)
Parents' Lifetime Wealth at ages [12, 17]		1.089 (0.710)
Parents' Lifetime Wealth at ages [12, 17]- Squared		0.0184* (0.0108)
Dynamic Complementarity		
Parents' Lifetime Wealth [0, 5] $\times$ [6, 11]	0.0685*** (0.0214)	0.0628* (0.0337)
Parents' Lifetime Wealth [0, 5] $\times$ [12, 17]		0.00152 (0.0182)
Parents' Lifetime Wealth [6, 11] $\times$ [12, 17]		-0.0456 (0.0298)
Parental Characteristics (Levels and Interactions)		
Parents' Marital Status at Birth	8.337 (11.20)	12.82 (11.83)
Parents' Average Age at Birth	1.138** (0.571)	2.254*** (0.659)
Parents' Average Age at Birth- Squared	-0.00843* (0.00449)	-0.0151*** (0.00551)
Parents' Average Years of Schooling	-1.475 (1.243)	-2.208* (1.299)

Parents' Average Years of Schooling- Squared	0.0819* (0.0420)	0.107** (0.0448)
Parents' Average Years of Schooling × Age at Birth	-0.0305 (0.0209)	-0.0390 (0.0244)
Parents' Average Years of Schooling × Marital Status	-0.442 (0.715)	-1.033 (0.778)
Parents' Marital Status × Age at Birth	-0.266 (0.326)	-0.480 (0.353)
Parents' Avg Years of Schooling × Marital Status × Age at Birth	0.0159 (0.0225)	0.0351 (0.0245)
Parental Characteristics Interacted with Parental Lifetime Wealth		
Parents' Avg Years of Schooling × Lifetime Wealth [0, 5]	0.0508 (0.0403)	0.0523 (0.0424)
Parents' Avg Years of Schooling × Lifetime Wealth [6, 11]	-0.0341 (0.0328)	0.0234 (0.0528)
Parents' Avg Years of Schooling × Lifetime Wealth [12, 17]		-0.0539 (0.0338)
Parents' Avg Years of Schooling × Lifetime Wealth [0, 5]- Squared	0.000272 (0.000619)	0.000450 (0.000662)
Parents' Avg Years of Sch. × Lifetime Wealth [6, 11]- Squared	0.000615 (0.000444)	-0.000825 (0.00124)
Parents' Avg Years of Sch. × Lifetime Wealth [12, 17]- Squared		-0.00114** (0.000500)
Parents' Avg Years of Sch. × Lifetime Wealth [0, 5] × [6, 11]	-0.000998 (0.00102)	-0.00121 (0.00165)
Parents' Avg Years of Sch. ×Lifetime Wealth [0, 5] × [12, 17]		-0.000135 (0.000942)
Parents' Avg Years of Sch. × Lifetime Wealth [6, 11] × [12, 17]		0.00273* (0.00140)
Parents' Avg Age at Birth × Lifetime Wealth [0, 5]	-0.00235 (0.0179)	-0.00673 (0.0201)
Parents' Avg Age at Birth × Lifetime Wealth [6, 11]	0.00118 (0.0154)	0.00490 (0.0262)
Parents' Avg Age at Birth × Lifetime Wealth [12, 17]		-0.0103 (0.0163)

Parents' Avg Age at Birth × Lifetime Wealth [0, 5]- Squared	0.000820***	0.000693**
	(0.000291)	(0.000338)
Parents' Avg Age at Birth × Lifetime Wealth [6, 11]- Squared	0.000753***	0.000667
	(0.000233)	(0.000629)
Parents' Avg Age at Birth × Lifetime Wealth [12, 17]- Squared		0.0000547
		(0.000242)
Parents' Avg Age at Birth × Lifetime Wealth [0, 5] × [6, 11]	-0.00157***	-0.00135
	(0.000507)	(0.000836)
Parents' Avg Age at Birth × Lifetime Wealth [0, 5] × [12, 17]		0.0000909
		(0.000423)
Parents' Avg Age at Birth × Lifetime Wealth [6, 11] × [12, 17]		-0.000109
		(0.000690)
Parents' Marital Status × Lifetime Wealth [0, 5]	-0.0354	0.0220
	(0.179)	(0.186)
Parents' Marital Status × Lifetime Wealth [6, 11]	0.0183	-0.0885
	(0.146)	(0.218)
Parents' Marital Status × Lifetime Wealth [12, 17]		0.0895
		(0.134)
Parents' Marital Status × Lifetime Wealth [0, 5]- Squared	-0.00106	-0.00213
	(0.00284)	(0.00298)
Parents' Marital Status × Lifetime Wealth [6, 11]- Squared	-0.00129	-0.00686
	(0.00201)	(0.00505)
Parents' Marital Status × Lifetime Wealth [12, 17]- Squared		-0.00136
		(0.00201)
Parents' Marital Status × Lifetime Wealth [0, 5] × [6, 11]	0.00241	0.00786
	(0.00467)	(0.00681)
Parents' Marital Status × Lifetime Wealth [0, 5] × [12, 17]		-0.00383
		(0.00373)
Parents' Marital Status × Lifetime Wealth [6, 11] × [12, 17]		0.00622
		(0.00564)
Constant	9.597	-8.081
	(19.44)	(20.66)
Adjusted R^2	0.073	0.075
p_value	0.0805	0.00179

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table shows the coefficients of the model defined in equation (8), taking coefficients $\alpha_0(t)$, $\boldsymbol{\alpha}'_{1,i}(t)$, and $\boldsymbol{\Psi}_{i,j}(t)$ to be constant within intervals. The α_0 corresponds to the constant parameter in the model above. The $\boldsymbol{\alpha}'_{1,i}$ is the coefficient of interval i, while $\boldsymbol{\Psi}_{i,j}$ is the coefficient of the interaction between interval i and interval j. Expected Lifetime Wealth is expressed in units of $10,000$\$. In this table, $K(t+1)$ is taken to be the child's language test score. The first column contains all intervals until realization of the child outcome and their interactions. The second column contains all intervals in childhood (i.e., until age 17).

Table I.6: MAIN EFFECTS AND DYNAMIC COMPLEMENTARITIES OF PARENTAL LIFETIME WEALTH AT DIFFERENT CHILDHOOD INTERVALS ON CHILD'S MATHEMATICS TEST SCORE

	Mathematics Score (Age 16)
Parents' Lifetime Wealth [0, 5]	-0.0489** (0.0206)
Parents' Lifetime Wealth [0, 5] - Squared	-0.000587** (0.000293)
Parents' Lifetime Wealth [6, 11]	0.0203 (0.0286)
Parents' Lifetime Wealth [6, 11] - Squared	-0.00189*** (0.000584)
Parents' Lifetime Wealth [12, 17]	0.0485*** (0.0183)
Parents' Lifetime Wealth [12, 17] - Squared	-0.00102*** (0.000259)
Dynamic Complementarity	
Parents' Lifetime Wealth [0, 5] × [6, 11]	0.00187*** (0.000721)
Parents' Lifetime Wealth [0, 5] × [12, 17]	-0.000124 (0.000471)
Parents' Lifetime Wealth [6, 11] × [12, 17]	0.00181** (0.000709)
Parental Characteristics (*Levels and Interactions*)	
Parents' Marital Status	-0.200 (0.329)
Parents' Average Age at Birth	0.0799*** (0.0181)
Parents' Average Age at Birth - Squared	-0.000441*** (0.000155)
Parents' Average Years of Schooling	0.0288 (0.0340)
Parents' Average Years of Schooling - Squared	-0.00257** (0.00126)

Parents' Average Years of Schooling × Age at Birth	0.000770 (0.000674)
Parents' Marital Status × Years of Schooling	0.0413* (0.0223)
Parents' Marital Status × Age at Birth	0.00979 (0.00999)
Parents' Marital Status × Age at Birth × Years of Schooling	-0.00126* (0.000699)
Parental Characteristics Interacted with Parental Lifetime Wealth	
Parents' Lifetime Wealth [0, 5] × Years of Schooling	0.00106 (0.00103)
Parents' Lifetime Wealth [6, 11] × Years of Schooling	0.000362 (0.00127)
Parents' Lifetime Wealth [12, 17] × Years of Schooling	-0.0000166 (0.000857)
Parents' Lifetime Wealth [0, 5] - Squared × Years of Schooling	-0.00000441 (0.0000146)
Parents' Lifetime Wealth [6, 11] - Squared × Years of Schooling	0.0000435 (0.0000268)
Parents' Lifetime Wealth [12, 17] - Squared × Years of Schooling	0.0000311*** (0.0000117)
Parents' Lifetime Wealth [0, 5] × [6, 11] × Years of Schooling	-0.0000255 (0.0000339)
Parents' Lifetime Wealth [0, 5] × [12, 17] × Years of Schooling	0.0000144 (0.0000234)
Parents' Lifetime Wealth [6, 11] × [12, 17] × Years of Schooling	-0.0000648** (0.0000327)
Parents' Lifetime Wealth [0, 5] × Age at Birth	0.00106** (0.000536)
Parents' Lifetime Wealth [6, 11] × Age at Birth	-0.000634 (0.000712)
Parents' Lifetime Wealth [12, 17] × Age at Birth	-0.000602 (0.000452)
Parents' Lifetime Wealth [0, 5] - Squared × Age at Birth	0.0000179** (0.00000736)

Parents' Lifetime Wealth [6, 11] - Squared × Age at Birth	0.0000248* (0.0000136)
Parents' Lifetime Wealth [12, 17] - Squared × Age at Birth	0.00000617 (0.00000565)
Parents' Lifetime Wealth [0, 5] × [6, 11] × Age at Birth	-0.0000367** (0.0000176)
Parents' Lifetime Wealth [0, 5] × [12, 17] × Age at Birth	-0.00000654 (0.0000107)
Parents' Lifetime Wealth [6, 11] × [12, 17] × Age at Birth	-0.00000799 (0.0000160)
Parents' Marital Status × Lifetime Wealth [0, 5]	-0.000666 (0.00483)
Parents' Marital Status × Lifetime Wealth [6, 11]	0.000619 (0.00615)
Parents' Marital Status × Lifetime Wealth [12, 17]	-0.00172 (0.00399)
Parents' Marital Status × Lifetime Wealth [0, 5] - Squared	-0.000106 (0.0000696)
Parents' Marital Status × Lifetime Wealth [6, 11] - Squared	-0.0000438 (0.000124)
Parents' Marital Status × Lifetime Wealth [12, 17] - Squared	0.0000161 (0.0000492)
Parents' Marital Status × Lifetime Wealth [0, 5] × [6, 11]	0.000154 (0.000165)
Parents' Marital Status × Lifetime Wealth [0, 5] × [12, 17]	0.0000683 (0.000101)
Parents' Marital Status × Lifetime Wealth [6, 11] × [12, 17]	-0.0000813 (0.000142)
Constant	-4.802*** (0.538)
Adjusted R^2	0.169
p_value	0

Standard errors in parentheses

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

Note: This table shows the coefficients of the model defined in equation (8), taking coefficients $\alpha_0(t)$, $\boldsymbol{\alpha}'_{1,i}(t)$, and $\boldsymbol{\Psi}_{i,j}(t)$ to be constant within intervals. The α_0 corresponds to the constant parameter in the model above. The $\boldsymbol{\alpha}'_{1,i}$ is the coefficient of interval i, while $\boldsymbol{\Psi}_{i,j}$ is the coefficient of the interaction between interval i and interval j. Expected Lifetime Wealth is expressed in units of $10,000$\$. In this table, $K(t+1)$ is taken to be the child's Mathematics test score, realized at age 16.

Table I.7: Main Effects and Dynamic Complementarities of Parental Lifetime Wealth at Different Childhood Intervals on Child's Participation in Crime by 35

	(1) Whether participated in crime by age 35	(2) Whether participated in crime by age 35
Parents' Lifetime Wealth [0, 5]	-0.0246 (0.0222)	-0.0133 (0.0171)
Parents' Lifetime Wealth [0, 5] - Squared	0.000525* (0.000308)	0.000535** (0.000244)
Parents' Lifetime Wealth [6, 11]	-0.0254 (0.0267)	-0.00139 (0.0209)
Parents' Lifetime Wealth [6, 11] - Squared	0.00148*** (0.000520)	0.00127*** (0.000419)
Parents' Lifetime Wealth [12, 17]	0.0141 (0.0284)	-0.0164 (0.0143)
Parents' Lifetime Wealth [12, 17] - Squared	0.000848* (0.000506)	0.000389** (0.000173)
Parents' Lifetime Wealth [18, 23]	0.00260 (0.0287)	
Parents' Lifetime Wealth [18, 23] - Squared	0.000804 (0.000524)	
Parents' Lifetime Wealth [24, 29]	-0.00978 (0.0201)	
Parents' Lifetime Wealth [24, 29] - Squared	0.000335 (0.000254)	
Dynamic Complementarity		
Parents' Lifetime Wealth [0, 5] $\times$ [6, 11]	-0.00111 (0.000690)	-0.00134** (0.000555)
Parents' Lifetime Wealth [0, 5] $\times$ [12, 17]	0.0000258 (0.000710)	0.000453 (0.000364)
Parents' Lifetime Wealth [0, 5] $\times$ [18, 23]	0.000450 (0.000709)	
Parents' Lifetime Wealth [0, 5] $\times$ [24, 29]	-0.000177 (0.000497)	
Parents' Lifetime Wealth [6, 11] $\times$ [12, 17]	-0.00130	-0.00117**

	(0.000871)	(0.000476)
Parents' Lifetime Wealth [6, 11] × [18, 23]	-0.000445	
	(0.000902)	
Parents' Lifetime Wealth [12, 17] × [18, 23]	-0.000897	
	(0.000903)	
Parents' Lifetime Wealth [12, 17] × [24, 29]	0.000269	
	(0.000652)	
Parents' Lifetime Wealth [18, 23] × [24, 29]	-0.000806	
	(0.000643)	
Parental Characteristics (Levels and Interactions)		
Parents' Marital Status	-0.209	-0.187
	(0.268)	(0.214)
Parents' Average Age at Birth	-0.118***	-0.0797***
	(0.0218)	(0.0154)
Parents' Average Age at Birth - Squared	0.000940***	0.000551***
	(0.000175)	(0.000119)
Parents' Average Years of Schooling	0.0437	0.0190
	(0.0279)	(0.0217)
Parents' Average Years of Schooling - Squared	-0.000253	-0.000142
	(0.000770)	(0.000656)
Parents' Average Years of Schooling × Age at Birth	-0.000921	-0.000363
	(0.000624)	(0.000464)
Parents' Marital Status × Years of Schooling	-0.00156	-0.00430
	(0.0166)	(0.0128)
Parents' Marital Status × Age at Birth	-0.00295	-0.00241
	(0.00748)	(0.00564)
Parents' Marital Status × Age at Birth × Years of Schooling	0.000106	0.000139
	(0.000552)	(0.000418)
Parental Characteristics Interacted with Parental Lifetime Wealth		
Parents' Lifetime Wealth [0, 5] × Years of Schooling	-0.000870	-0.000142
	(0.000819)	(0.000636)
Parents' Lifetime Wealth [6, 11] × Years of Schooling	0.000464	-0.000682
	(0.000935)	(0.000730)
Parents' Lifetime Wealth [12, 17] × Years of Schooling	-0.000457	0.000575
	(0.00104)	(0.000546)
Parents' Lifetime Wealth [18, 23] × Years of Schooling	0.000596	
	(0.00108)	
Parents' Lifetime Wealth [24, 29] × Years of Schooling	-0.0000173	

	(0.000756)	
Parents' Lifetime Wealth [0, 5] - Squared × Years of Schooling	-0.00000170	-0.00000807
	(0.0000121)	(0.00000965)
Parents' Lifetime Wealth [6, 11] - Squared × Years of Schooling	-0.0000345*	-0.0000279*
	(0.0000184)	(0.0000151)
Parents' Lifetime Wealth [12, 17] - Squared × Years of Schooling	-0.0000528**	-0.0000188***
	(0.0000220)	(0.00000726)
Parents' Lifetime Wealth [18, 23] - Squared × Years of Schooling	-0.0000297	
	(0.0000240)	
Parents' Lifetime Wealth [24, 29] - Squared × Years of Schooling	-0.00000357	
	(0.0000111)	
Parents' Lifetime Wealth [0, 5] × [6, 11] × Years of Schooling	0.00000610	0.0000227
	(0.0000261)	(0.0000212)
Parents' Lifetime Wealth [0, 5] × [12, 17] × Years of Schooling	0.0000419	-0.00000466
	(0.0000282)	(0.0000146)
Parents' Lifetime Wealth [0, 5] × [18, 23] × Years of Schooling	-0.0000512*	
	(0.0000298)	
Parents' Lifetime Wealth [0, 5] × [24, 29] × Years of Schooling	0.0000140	
	(0.0000208)	
Parents' Lifetime Wealth [6, 11] × [12, 17] × Years of Schooling	0.0000372	0.0000372**
	(0.0000335)	(0.0000177)
Parents' Lifetime Wealth [6, 11] × [18, 23] × Years of Schooling	0.0000365	
	(0.0000369)	
Parents' Lifetime Wealth [6, 11] × [24, 29] × Years of Schooling	-0.0000207	
	(0.0000259)	
Parents' Lifetime Wealth [12, 17] × [18, 23] × Years of Schooling	0.0000430	
	(0.0000400)	
Parents' Lifetime Wealth [12, 17] × [24, 29] × Years of Schooling	-0.00000839	
	(0.0000285)	
Parents' Lifetime Wealth [18, 23] × [24, 29] × Years of Schooling	0.0000244	
	(0.0000291)	
Parents' Lifetime Wealth [0, 5] × Age at Birth	0.00114*	0.000443
	(0.000615)	(0.000429)
Parents' Lifetime Wealth [6, 11] × Age at Birth	0.000501	0.000240
	(0.000727)	(0.000511)
Parents' Lifetime Wealth [12, 17] × Age at Birth	-0.000434	0.000104
	(0.000773)	(0.000346)
Parents' Lifetime Wealth [18, 23] × Age at Birth	-0.000346	

	(0.000776)	
Parents' Lifetime Wealth [24, 29] × Age at Birth	0.000290	
	(0.000544)	
Parents' Lifetime Wealth [0, 5] - Squared × Age at Birth	-0.0000127	-0.0000100
	(0.00000919)	(0.00000676)
Parents' Lifetime Wealth [6, 11] - Squared × Age at Birth	-0.0000250*	-0.0000216**
	(0.0000143)	(0.0000110)
Parents' Lifetime Wealth [12, 17] - Squared × Age at Birth	-0.00000292	-0.00000155
	(0.0000139)	(0.00000402)
Parents' Lifetime Wealth [18, 23] - Squared × Age at Birth	-0.0000107	
	(0.0000143)	
Parents' Lifetime Wealth [24, 29] - Squared × Age at Birth	-0.00000668	
	(0.00000707)	
Parents' Lifetime Wealth [0, 5] × [6, 11] × Age at Birth	0.0000236	0.0000254*
	(0.0000200)	(0.0000150)
Parents' Lifetime Wealth [0, 5] × [12, 17] × Age at Birth	-0.0000157	-0.0000113
	(0.0000197)	(0.00000953)
Parents' Lifetime Wealth [0, 5] × [18, 23] × Age at Birth	0.0000100	
	(0.0000200)	
Parents' Lifetime Wealth [0, 5] × [24, 29] × Age at Birth	-0.00000280	
	(0.0000143)	
Parents' Lifetime Wealth [6, 11] × [12, 17] × Age at Birth	0.0000222	0.0000159
	(0.0000236)	(0.0000118)
Parents' Lifetime Wealth [6, 11] × [18, 23] × Age at Birth	-0.00000610	
	(0.0000253)	
Parents' Lifetime Wealth [6, 11] × [24, 29] × Age at Birth	0.00000683	
	(0.0000183)	
Parents' Lifetime Wealth [12, 17] × [18, 23] × Age at Birth	0.0000109	
	(0.0000253)	
Parents' Lifetime Wealth [12, 17] × [24, 29] × Age at Birth	-0.00000761	
	(0.0000186)	
Parents' Lifetime Wealth [18, 23] × [24, 29] × Age at Birth	0.0000121	
	(0.0000179)	
Parents' Lifetime Wealth [0, 5] × Marital Status	0.00308	0.00360
	(0.00461)	(0.00384)
Parents' Lifetime Wealth [6, 11] × Marital Status	-0.00382	-0.00469
	(0.00527)	(0.00428)
Parents' Lifetime Wealth [12, 17] × Marital Status	0.00451	0.00575*

	(0.00595)	(0.00309)
Parents' Lifetime Wealth [18, 23] × Marital Status	0.00493	
	(0.00593)	
Parents' Lifetime Wealth [24, 29] × Marital Status	-0.00371	
	(0.00421)	
Parents' Marital Status × Lifetime Wealth [0, 5] - Squared	-0.0000340	-0.0000597
	(0.0000623)	(0.0000523)
Parents' Marital Status × Lifetime Wealth [6, 11] - Squared	-0.00000694	-0.0000136
	(0.0000994)	(0.0000799)
Parents' Marital Status × Lifetime Wealth [12, 17] - Squared	0.000217*	0.0000202
	(0.000112)	(0.0000358)
Parents' Marital Status × Lifetime Wealth [18, 23] - Squared	0.000108	
	(0.000113)	
Parents' Marital Status × Lifetime Wealth [24, 29] - Squared	-0.00000689	
	(0.0000532)	
Parents' Marital Status × Lifetime Wealth [0, 5] × [6, 11]	0.000138	0.000113
	(0.000136)	(0.000114)
Parents' Marital Status × Lifetime Wealth [0, 5] × [12, 17]	-0.000170	-0.0000126
	(0.000148)	(0.0000779)
Parents' Marital Status × Lifetime Wealth [0, 5] × [18, 23]	0.0000131	
	(0.000154)	
Parents' Marital Status × Lifetime Wealth [0, 5] × [24, 29]	0.0000878	
	(0.000107)	
Parents' Marital Status × Lifetime Wealth [6, 11] × [12, 17]	-0.000143	-0.0000664
	(0.000184)	(0.0000921)
Parents' Marital Status × Lifetime Wealth [6, 11] × [18, 23]	0.0000468	
	(0.000188)	
Parents' Marital Status × Lifetime Wealth [6, 11] × [24, 29]	-0.0000156	
	(0.000133)	
Parents' Marital Status × Lifetime Wealth [12, 17] × [18, 23]	-0.000231	
	(0.000194)	
Parents' Marital Status × Lifetime Wealth [12, 17] × [24, 29]	0.0000790	
	(0.000143)	
Parents' Marital Status × Lifetime Wealth [18, 23] × [24, 29]	-0.000104	
	(0.000139)	
Constant	3.512***	2.779***
	(0.635)	(0.486)
Adjusted R^2	0.025	0.026
p_value	0	0.0000190

Standard errors in parentheses

$^{*}\ p < 0.10$, $^{**}\ p < 0.05$, $^{***}\ p < 0.01$

Note: This table shows the coefficients of the model defined in equation (8), taking coefficients $\alpha_0(t)$, $\boldsymbol{\alpha}'_{1,i}(t)$, and $\boldsymbol{\Psi}_{i,j}(t)$ to be constant within intervals. The α_0 corresponds to the constant parameter in the model above. The $\boldsymbol{\alpha}'_{1,i}$ is the coefficient of interval i, while $\boldsymbol{\Psi}_{i,j}$ is the coefficient of the interaction between interval i and interval j. Expected Lifetime Wealth is expressed in units of $10,000$\$. In this table, $K(t+1)$ is taken to be whether the child ever participated in crime by the age of 35, realized at age 35. The first column contains all intervals until realization of the child outcome and their interactions (intervals 1–5). The second column contains all intervals in childhood (i.e., until age 17).

Table I.8: Main Effects and Dynamic Complementarities of Parental Lifetime Wealth at Different Childhood Intervals on Child's Years of Schooling

	(1) Years of education at age 35	(2) Years of education at age 35
Parents' Lifetime Wealth [0, 5]	0.110	0.114
	(0.105)	(0.0822)
Parents' Lifetime Wealth [0, 5] - Squared	-0.000269	-0.000125
	(0.00146)	(0.00117)
Parents' Lifetime Wealth [6, 11]	-0.127	-0.127
	(0.127)	(0.100)
Parents' Lifetime Wealth [6, 11]- Squared	-0.00174	0.000495
	(0.00247)	(0.00201)
Parents' Lifetime Wealth [12, 17]	0.142	0.308***
	(0.135)	(0.0687)
Parents' Lifetime Wealth [12, 17] - Squared	-0.00597**	-0.00173**
	(0.00239)	(0.000828)
Parents' Lifetime Wealth [18, 23]	0.0914	
	(0.136)	
Parents' Lifetime Wealth [18, 23] - Squared	-0.00378	
	(0.00248)	
Parents' Lifetime Wealth [24, 29]	0.0986	
	(0.0953)	
Parents' Lifetime Wealth [24, 29] - Squared	0.000413	
	(0.00120)	
Dynamic Complementarity		
Parents' Lifetime Wealth [0, 5] × [6, 11]	0.00138	-0.00137
	(0.00327)	(0.00266)
Parents' Lifetime Wealth [0, 5] × [12, 17]	-0.00340	0.000329
	(0.00337)	(0.00174)
Parents' Lifetime Wealth [0, 5] × [18, 23]	0.00265	
	(0.00336)	
Parents' Lifetime Wealth [0, 5] × [24, 29]	-0.00139	
	(0.00236)	

Parents' Lifetime Wealth [6, 11]× [12, 17]	0.00761* (0.00413)	0.00124 (0.00228)
Parents' Lifetime Wealth [6, 11]× [18, 23]	-0.00814* (0.00428)	
Parents' Lifetime Wealth [6, 11]× [24, 29]	0.00367 (0.00305)	
Parents' Lifetime Wealth [12, 17] × [18, 23]	0.0114*** (0.00427)	
Parents' Lifetime Wealth [12, 17] × [24, 29]	-0.00439 (0.00309)	
Parents' Lifetime Wealth [18, 23] × [24, 29]	0.000652 (0.00304)	
Parental Characteristics (Levels and Interactions)		
Parents' Marital Status	0.916 (1.271)	0.890 (1.028)
Parents' Average Age at Birth	0.540*** (0.104)	0.391*** (0.0740)
Parents' Average Age at Birth - Squared	-0.00347*** (0.000831)	-0.00180*** (0.000571)
Parents' Average Years of Schooling	0.204 (0.132)	0.432*** (0.104)
Parents' Average Years of Schooling - Squared	-0.00248 (0.00365)	-0.00273 (0.00314)
Parents' Average Years of Schooling × Age at Birth	0.00132 (0.00296)	-0.000524 (0.00222)
Parents' Marital Status × Years of Schooling	0.0455 (0.0786)	0.0165 (0.0615)
Parents' Marital Status × Age at Birth	0.0377 (0.0355)	0.0298 (0.0270)
Parents' Marital Status × Age at Birth × Years of Schooling	-0.00216 (0.00262)	-0.00143 (0.00200)
Parental Characteristics Interacted with Parental Lifetime Wealth		
Parents' Lifetime Wealth [0, 5] × Years of Schooling	0.00322 (0.00388)	-0.00130 (0.00305)
Parents' Lifetime Wealth [6, 11]× Years of Schooling	0.00504	0.00277

	(0.00444)	(0.00350)
Parents' Lifetime Wealth [12, 17] × Years of Schooling	-0.00941*	-0.00687***
	(0.00494)	(0.00262)
Parents' Lifetime Wealth [18, 23] × Years of Schooling	0.000285	
	(0.00511)	
Parents' Lifetime Wealth [24, 29] × Years of Schooling	-0.00218	
	(0.00358)	
Parents' Lifetime Wealth [0, 5] - Squared× Years of Schooling	-0.0000232	-0.0000108
	(0.0000572)	(0.0000462)
Parents' Lifetime Wealth [6, 11]- Squared × Years of Schooling	-0.00000971	0.0000376
	(0.0000873)	(0.0000725)
Parents' Lifetime Wealth [12, 17] - Squared × Years of Schooling	0.0000916	0.0000675*
	(0.000104)	(0.0000348)
Parents' Lifetime Wealth [18, 23] - Squared × Years of Schooling	0.000124	
	(0.000114)	
Parents' Lifetime Wealth [24, 29] - Squared × Years of Schooling	-0.00000380	
	(0.0000526)	
Parents' Lifetime Wealth [0, 5] × [6, 11]× Years of Schooling	-0.0000177	0.0000154
	(0.000124)	(0.000101)
Parents' Lifetime Wealth [0, 5] × [12, 17] × Years of Schooling	-0.0000699	0.0000277
	(0.000133)	(0.0000698)
Parents' Lifetime Wealth [0, 5] × [18, 23] × Years of Schooling	0.000117	
	(0.000141)	
Parents' Lifetime Wealth [0, 5] × [24, 29] × Years of Schooling	0.00000488	
	(0.0000984)	
Parents' Lifetime Wealth [6, 11]× [12, 17] × Years of Schooling	0.0000560	-0.000102
	(0.000159)	(0.0000849)
Parents' Lifetime Wealth [6, 11]× [18, 23] × Years of Schooling	-0.0000753	
	(0.000175)	
Parents' Lifetime Wealth [6, 11]× [24, 29] × Years of Schooling	0.0000207	
	(0.000123)	
Parents' Lifetime Wealth [12, 17] × [18, 23] × Years of Schooling	-0.000199	
	(0.000189)	
Parents' Lifetime Wealth [12, 17] × [24, 29] × Years of Schooling	0.000110	
	(0.000135)	

Parents' Lifetime Wealth [18, 23] × [24, 29] × Years of Schooling	-0.0000973 (0.000138)	
Parents' Lifetime Wealth [0, 5] × Age at Birth	-0.00363 (0.00292)	-0.00194 (0.00206)
Parents' Lifetime Wealth [6, 11]× Age at Birth	0.00236 (0.00345)	0.00363 (0.00245)
Parents' Lifetime Wealth [12, 17] × Age at Birth	0.00130 (0.00367)	-0.00448*** (0.00166)
Parents' Lifetime Wealth [18, 23] × Age at Birth	-0.00290 (0.00369)	
Parents' Lifetime Wealth [24, 29] × Age at Birth	-0.00118 (0.00258)	
Parents' Lifetime Wealth [0, 5] - Squared× Age at Birth	-0.00000263 (0.0000435)	-0.0000118 (0.0000323)
Parents' Lifetime Wealth [6, 11]- Squared × Age at Birth	0.0000503 (0.0000676)	-0.0000510 (0.0000524)
Parents' Lifetime Wealth [12, 17] - Squared × Age at Birth	0.000126* (0.0000658)	0.00000753 (0.0000192)
Parents' Lifetime Wealth [18, 23] - Squared × Age at Birth	0.0000233 (0.0000676)	
Parents' Lifetime Wealth [24, 29] - Squared × Age at Birth	-0.0000399 (0.0000334)	
Parents' Lifetime Wealth [0, 5] × [6, 11]× Age at Birth	-0.0000192 (0.0000948)	0.0000598 (0.0000719)
Parents' Lifetime Wealth [0, 5] × [12, 17] × Age at Birth	0.000141 (0.0000936)	-0.0000183 (0.0000456)
Parents' Lifetime Wealth [0, 5] × [18, 23] × Age at Birth	-0.000136 (0.0000949)	
Parents' Lifetime Wealth [0, 5] × [24, 29] × Age at Birth	0.0000535 (0.0000676)	
Parents' Lifetime Wealth [6, 11]× [12, 17] × Age at Birth	-0.000258** (0.000112)	0.0000192 (0.0000565)
Parents' Lifetime Wealth [6, 11]× [18, 23] × Age at Birth	0.000290** (0.000120)	
Parents' Lifetime Wealth [6, 11]× [24, 29] × Age at Birth	-0.000132 (0.0000866)	

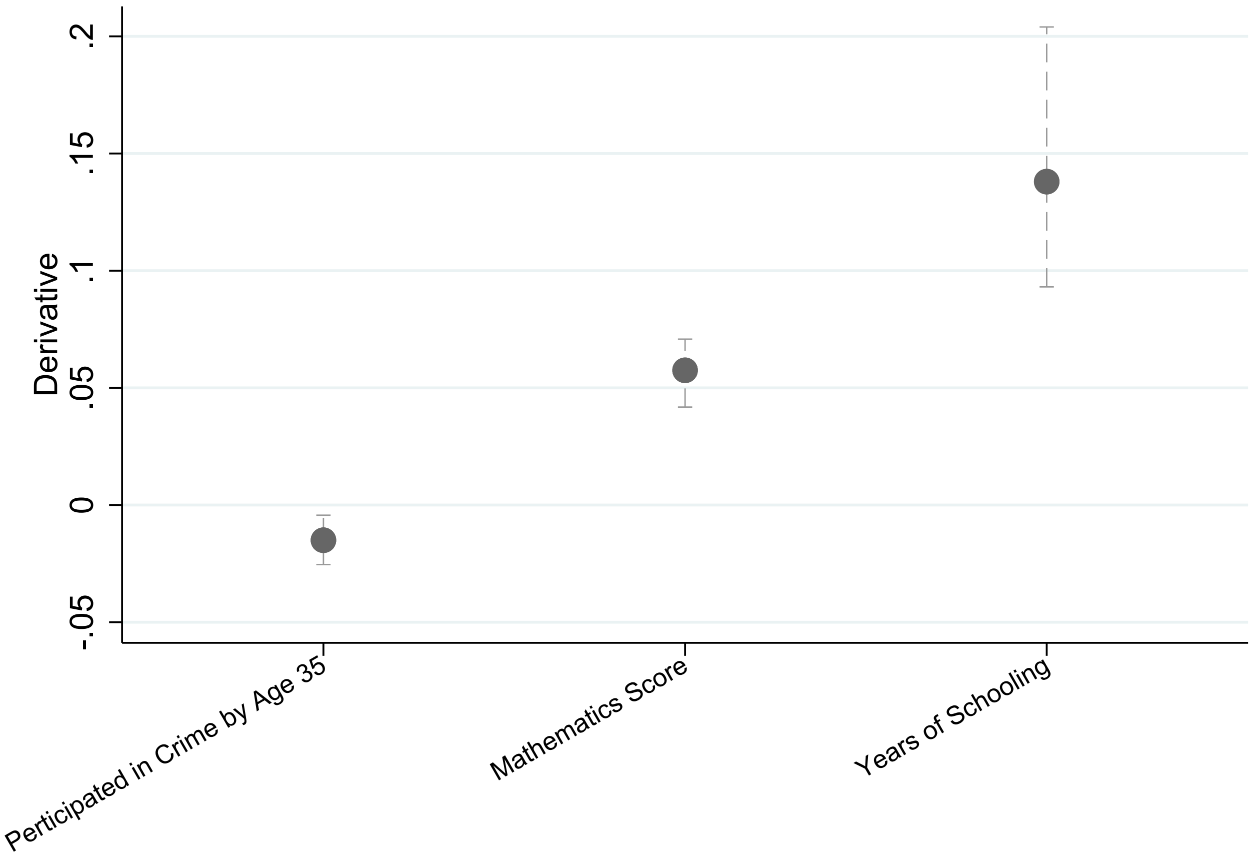
Parents' Lifetime Wealth [12, 17] × [18, 23] × Age at Birth	-0.000237**	
	(0.000120)	
Parents' Lifetime Wealth [12, 17] × [24, 29] × Age at Birth	0.0000746	
	(0.0000882)	
Parents' Lifetime Wealth [18, 23] × [24, 29] × Age at Birth	0.0000751	
	(0.0000845)	
Parents' Marital Status × Lifetime Wealth [0, 5]	-0.0372*	-0.0284
	(0.0219)	(0.0184)
Parents' Marital Status × Lifetime Wealth [6, 11]	-0.0261	-0.0218
	(0.0250)	(0.0205)
Parents' Marital Status × Lifetime Wealth [12, 17]	0.0324	0.0260*
	(0.0282)	(0.0148)
Parents' Marital Status × Lifetime Wealth [18, 23]	-0.0161	
	(0.0281)	
Parents' Marital Status × Lifetime Wealth [24, 29]	0.0183	
	(0.0199)	
Parents' Marital Status × Lifetime Wealth [0, 5] - Squared	0.000490*	0.000514**
	(0.000295)	(0.000250)
Parents' Marital Status × Lifetime Wealth [6, 11]- Squared	-0.0000603	-0.00000853
	(0.000470)	(0.000382)
Parents' Marital Status × Lifetime Wealth [12, 17] - Squared	-0.000630	-0.000212
	(0.000529)	(0.000171)
Parents' Marital Status × Lifetime Wealth [18, 23] - Squared	0.000327	
	(0.000534)	
Parents' Marital Status × Lifetime Wealth [24, 29] - Squared	-0.00000638	
	(0.000251)	
Parents' Marital Status × Lifetime Wealth [0, 5] × [6, 11]	-0.000325	-0.000409
	(0.000641)	(0.000543)
Parents' Marital Status × Lifetime Wealth [0, 5] × [12, 17]	0.000145	-0.000311
	(0.000699)	(0.000372)
Parents' Marital Status × Lifetime Wealth [0, 5] × [18, 23]	-0.0000726	
	(0.000727)	
Parents' Marital Status × Lifetime Wealth [0, 5] × [24, 29]	-0.000438	
	(0.000507)	
Parents' Marital Status × Lifetime Wealth [6, 11]× [12, 17]	0.000380	0.000533
	(0.000870)	(0.000440)

Parents' Marital Status × Lifetime Wealth [6, 11]× [18, 23]	0.000433	
	(0.000889)	
Parents' Marital Status × Lifetime Wealth [6, 11]× [24, 29]	-0.000164	
	(0.000629)	
Parents' Marital Status × Lifetime Wealth [12, 17] × [18, 23]	-0.000351	
	(0.000917)	
Parents' Marital Status × Lifetime Wealth [12, 17] × [24, 29]	0.000903	
	(0.000674)	
Parents' Marital Status × Lifetime Wealth [18, 23] × [24, 29]	-0.000524	
	(0.000655)	
Constant	-9.550***	-8.463***
	(3.014)	(2.331)
Adjusted R^2	0.158	0.162
F	118.0	291.2
p_value	0	0

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table shows the coefficients of the model defined in equation (8), taking coefficients $\alpha_0(t)$, $\boldsymbol{\alpha}'_{1,i}(t)$, and $\boldsymbol{\Psi}_{i,j}(t)$ to be constant within intervals. The α_0 corresponds to the constant parameter in the model above. The $\boldsymbol{\alpha}'_{1,i}$ is the coefficient of interval i, while $\boldsymbol{\Psi}_{i,j}$ is the coefficient of the interaction between interval i and interval j. Expected Lifetime Wealth is expressed in units of $10,000$\$. In this table, $K(t+1)$ is taken to be the child's total years of completed education, realized at age 35. The first column contains all intervals until realization of the child outcome and their interactions (intervals 1–5). The second column contains all intervals in childhood (i.e., until age 17).

Figure I.2: DERIVATIVE OF CHILD OUTCOMES WITH RESPECT TO PARENTAL AVERAGE YEARS OF SCHOOLING, EVALUATED AT THE MEAN (FIRST SPECIFICATION)



Notes: This figure depicts the value of the derivative of each of the child outcomes (mathematics test scores at age 16, years of education by age 35, and crime measured by participation in crime by age 35) with respect to parents' average years of schooling, evaluated at the mean. Children's test scores have mean zero and unit standard deviation. We estimate Equation (8), taking coefficients $\alpha_0(t)$, $\boldsymbol{\alpha}'_{1,i}(t)$, and $\boldsymbol{\Psi}_{i,j}(t)$ to be constant within the selected intervals. The full set of estimation results including the constant and the coefficients on the interaction terms are reported in Tables I.10-I.13 of Appendix I.

I.3 Approximated Skill Formation Technology without Accounting for Parental Characteristics

Tables I.9-I.13 present estimates of our approximation to the technology of skill formation using equation (8) in the main paper, taking coefficients $\alpha_0(t)$, $\boldsymbol{\alpha}'_{1,i}(t)$, and $\boldsymbol{\Psi}_{i,j}(t)$ to be constant within intervals. However, we do not control for parental characteristics such as education level, marital status, and age of parents.

We specify the approximated skill formation technology for the child's mathematics test score as follows. We use a similar structure for other child outcome measures with the only difference being that the number of intervals varies depending on the timing of the realization of the child outcome as discussed in the paper.

$$
\begin{aligned}
y^c = {} & \alpha + \alpha_{L_1} L_1 + \psi_{L_1^2} L_1^2 + \alpha_{L2} L_2 + \psi_{L_2^2} L_2^2 + \alpha_{L3} L_3 + \psi_{L_3^2} L_3^2 \\
& + \psi_{L_1,L_2} L_1 L_2 + \psi_{L_1,L_3} L_1 L_3 + \psi_{L_2,L_3} L_2 L_3 + \varepsilon.
\end{aligned} \tag{8}
$$

The derivative with respect to parental lifetime wealth in period 1 L_1 is:

$$\frac{\partial y^c}{\partial L_1} = \alpha_{L_1} + 2\psi_{L_1^2} L_1 + \psi_{L_1,L_2} L_2 + \psi_{L_1,L_3} L_3.$$

The derivative with respect to parental lifetime wealth in period 2 L_2 is:

$$\frac{\partial y^c}{\partial L_2} = \alpha_{L_2} + 2\psi_{L_2^2} L_2 + \psi_{L_1,L_2} L_1 + \psi_{L_2,L_3} L_3.$$

The derivative with respect to parental lifetime wealth in period 3 L_3 is:

$$\frac{\partial y^c}{\partial L_3} = \alpha_{L_3} + 2\psi_{L_3^2} L_3 + \psi_{L_1,L_3} L_1 + \psi_{L_2,L_3} L_2.$$

Table I.9: Derivative of Child Outcomes with respect to Parental Expected lifetime wealth at Different Childhood Intervals, Evaluated at the Mean (First Specification)

(1) Child's Outcome	(2) Child's age $[0, 5]$	(3) Child's age $[6, 11]$	(4) Child's age $[12, 17]$	(5) Child's age $[18, 23]$	(6) Child's age $[24, 29]$
Language Test Score (Age 11)	0.0223	0.0361***			
	[-0.00756, 0.0503]	[0.0114, 0.0637]			
Mathematics Score (Age 16)	0.0105***	0.00469***	0.00373***		
	[0.00957, 0.0114]	[0.004, 0.00542]	[0.00255, 0.00483]		
Participated in Crime by Age 35	0.00239***	-0.00369***	-0.0014***	-0.000863*	0.000558*
	[0.00168, 0.00315]	[-0.00237, -0.000503]	[-0.00181, 0.000002]	[-0.000075, 0.00136]	[-0.00458, -0.00272]
Years of Schooling by Age 35	-0.00708***	0.0253***	0.0262***	0.00826***	-0.00556***
	[-0.0104, -0.00368]	[0.0212, 0.0297]	[0.0211, 0.0308]	[0.0032, 0.0129]	[-0.00901, -0.00206]

95% confidence intervals in brackets.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Note: This table shows the value of the derivative of each of the child outcomes with respect to parental expected lifetime wealth in each interval (in 10,000 USD in 2010 values), evaluated at the mean. Children's test scores have mean zero and unit standard deviation. We estimate equation (8), taking coefficients $\alpha_0(t)$, $\boldsymbol{\alpha}'_{1,i}(t)$, and $\boldsymbol{\Psi}_{i,j}(t)$ to be constant within intervals. The full set of estimation results including the constant and the coefficients on the interaction terms are reported in Tables I.10-I.13 of Appendix I.3. Column (1) lists the child's outcome of interest. Columns (2)-(6) present the value of the derivative with respect to each age interval, evaluated at the mean parental expected lifetime wealth in each interval. The 95% confidence intervals are computed using a bootstrapped method with 200 iterations.

Table I.10: MAIN EFFECTS AND DYNAMIC COMPLEMENTARITIES OF PARENTAL EXPECTED LIFETIME WEALTH AT DIFFERENT CHILDHOOD INTERVALS ON CHILD'S LANGUAGE SCORE

	(1) Language test score (at age 11)	(2) Language test score (at age 11)
Parents' expected Lifetime Wealth at ages [0,5]	0.110	0.136*
	(0.0749)	(0.0797)
Parents' expected Lifetime Wealth at ages [0,5]- Squared	-0.000373	-0.00108
	(0.00118)	(0.00129)
Parents' expected Lifetime Wealth at ages [6,11]	-0.00237	0.0158
	(0.0621)	(0.101)
Parents' expected Lifetime Wealth at ages [6,11]- Squared	0.000214	0.000732
	(0.000871)	(0.00244)
Parents' expected Lifetime Wealth at ages [12,17]		-0.0380
		(0.0603)
Parents' expected Lifetime Wealth at ages [12,17]- Squared		0.00164*
		(0.000934)
Dynamic Complementarity		
Parents' expected Lifetime Wealth at ages [0, 5] × [6, 11]	-0.0000622	0.00133
	(0.00197)	(0.00318)
Parents' expected Lifetime Wealth at ages [0, 5] × [12, 17]		-0.000245
		(0.00170)
Parents' expected Lifetime Wealth at ages [6, 11] × [12, 17]		-0.00262
		(0.00271)
Constant	11.97***	11.42***
	(1.869)	(1.923)
Adjusted R^2	0.054	0.055
p_value	0.00228	0.00352

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table shows the coefficients of the model defined in equation (8), taking coefficients $\alpha_0(t)$, $\boldsymbol{\alpha}'_{1,i}(t)$, and $\boldsymbol{\Psi}_{i,j}(t)$ to be constant within intervals. The α_0 corresponds to the constant parameter in the model above. The $\boldsymbol{\alpha}'_{1,i}$ is the coefficient of interval i, while $\boldsymbol{\Psi}_{i,j}$ is the coefficient of the interaction between interval i and interval j. Expected Lifetime Wealth is expressed in units of $10,000$\$. In this table, $K(t+1)$ is taken to be the child's language test score. The first column contains all intervals until the realization of the child outcome and their interactions. The second column contains all intervals in childhood (i.e., until age 17).

Table I.11: Main Effects and Dynamic Complementarities of Parental Expected Lifetime Wealth at Different Childhood Intervals on Child's Mathematics Test Score

	Mathematics Test Score (Age 16)
Parents' expected Lifetime Wealth at ages [0, 5]	0.0322***
	(0.00215)
Parents' expected Lifetime Wealth at ages [0, 5]- Squared	-0.0000818***
	(0.0000300)
Parents' expected Lifetime Wealth at ages [6, 11]	0.00702**
	(0.00287)
Parents' expected Lifetime Wealth at ages [6, 11]- Squared	-0.000333***
	(0.0000584)
Parents' expected Lifetime Wealth at ages [12, 17]	0.00807***
	(0.00178)
Parents' expected Lifetime Wealth at ages [12, 17]- Squared	-0.000156***
	(0.0000233)
Dynamic Complementarity	
Parents' expected Lifetime Wealth at ages [0, 5] × [6, 11]	0.000174**
	(0.0000750)
Parents' expected Lifetime Wealth at ages [0, 5] × [12, 17]	-0.000216***
	(0.0000468)
Parents' expected Lifetime Wealth at ages [6, 11] × [12, 17]	0.000484***
	(0.0000680)
Constant	-3.451***
	(0.0515)
Adjusted R^2	0.152
p_value	0

Standard errors in parentheses

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

Note: This table shows the coefficients of the model defined in equation (8), taking coefficients $\alpha_0(t)$, $\boldsymbol{\alpha}'_{1,i}(t)$, and $\boldsymbol{\Psi}_{i,j}(t)$ to be constant within intervals. The α_0 corresponds to the constant parameter in the model above. The $\boldsymbol{\alpha}'_{1,i}$ is the coefficient of interval i, while $\boldsymbol{\Psi}_{i,j}$ is the coefficient of the interaction between interval i and interval j. Expected Lifetime Wealth is expressed in units of $10,000$\$. In this table, $K(t+1)$ is taken to be the child's Mathematics test score, realized at age 16.

Table I.12: Main Effects and Dynamic Complementarities of Parental Expected Lifetime Wealth at Different Childhood Intervals on Child's Participation in Crime by 35

	(1) Whether participated in crime by age 35	(2) Whether participated in crime by age 35
Parents' expected Lifetime Wealth at ages [0, 5]	-0.000774 (0.00208)	0.00172 (0.00168)
Parents' expected Lifetime Wealth at ages [0, 5]- Squared	0.0000923*** (0.0000289)	0.0000657*** (0.0000238)
Parents' expected Lifetime Wealth at ages [6, 11]	-0.00303 (0.00240)	-0.00577*** (0.00193)
Parents' expected Lifetime Wealth at ages [6, 11]- Squared	0.000163*** (0.0000462)	0.000138*** (0.0000374)
Parents' expected Lifetime Wealth at ages [12, 17]	-0.00543** (0.00273)	-0.000359 (0.00138)
Parents' expected Lifetime Wealth at ages [12, 17]- Squared	0.000135*** (0.0000524)	0.0000317* (0.0000173)
Parents' expected Lifetime Wealth at ages [18, 23]	0.00344 (0.00273)	
Parents' expected Lifetime Wealth at ages [18, 23]- Squared	0.000107** (0.0000535)	
Parents' expected Lifetime Wealth at ages [24, 29]	-0.000586 (0.00191)	
Parents' expected Lifetime Wealth at ages [24, 29]- Squared	0.0000741*** (0.0000249)	
Dynamic Complementarity		
Parents' expected Lifetime Wealth at ages [0, 5] × [6, 11]	-0.000205*** (0.0000629)	-0.000157*** (0.0000519)
Parents' expected Lifetime Wealth at ages [0, 5] × [12, 17]	0.0000697 (0.0000683)	0.0000339 (0.0000357)
Parents' expected Lifetime Wealth at ages [0, 5] × [18, 23]	-0.0000204 (0.0000716)	
Parents' expected Lifetime Wealth at ages [0, 5] × [24, 29]	0.00000619 (0.0000498)	
Parents' expected Lifetime Wealth at ages [6, 11] × [12, 17]	-0.000180** (0.0000847)	-0.000104** (0.0000441)

Parents' expected Lifetime Wealth at ages [6, 11] × [18, 23]	0.00000539	
	(0.0000876)	
Parents' expected Lifetime Wealth at ages [6, 11] × [24, 29]	0.0000502	
	(0.0000620)	
Parents' expected Lifetime Wealth at ages [12, 17] × [18, 23]	-0.000100	
	(0.0000923)	
Parents' expected Lifetime Wealth at ages [12, 17] × [24, 29]	-0.0000258	
	(0.0000667)	
Parents' expected Lifetime Wealth at ages [18, 23] × [24, 29]	-0.000154**	
	(0.0000645)	
Constant	0.808***	0.702***
	(0.0529)	(0.0414)
Adjusted R^2	0.018	0.018
p_value	0	0

Standard errors in parentheses

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

Note: This table shows the coefficients of the model defined in equation (8), taking coefficients $\alpha_0(t)$, $\boldsymbol{\alpha}'_{1,i}(t)$, and $\boldsymbol{\Psi}_{i,j}(t)$ to be constant within intervals. The α_0 corresponds to the constant parameter in the model above. The $\boldsymbol{\alpha}'_{1,i}$ is the coefficient of interval i, while $\boldsymbol{\Psi}_{i,j}$ is the coefficient of the interaction between interval i and interval j. Expected Lifetime Wealth is expressed in units of $10,000$\$. In this table, $K(t+1)$ is taken to be whether the child ever participated in crime by the age of 35, realized at age 35. The first column contains all intervals until realization of the child outcome and their interactions (intervals 1–5). The second column contains all intervals in childhood (i.e., until age 17).

Table I.13: Main Effects and Dynamic Complementarities of Parental Expected Lifetime Wealth at Different Childhood Intervals on Child's Years of Schooling

	(1) Years of education by age 35	(2) Years of education by age 35
Parents' expected Lifetime Wealth at ages [0, 5]	-0.00161 (0.00999)	-0.0188** (0.00818)
Parents' expected Lifetime Wealth at ages [0, 5]- Squared	-0.000217 (0.000138)	-0.0000983 (0.000115)
Parents' expected Lifetime Wealth at ages [6, 11]	0.0230** (0.0115)	0.0410*** (0.00937)
Parents' expected Lifetime Wealth at ages [6, 11]- Squared	-0.0000504 (0.000221)	-0.000154 (0.000181)
Parents' expected Lifetime Wealth at ages [12, 17]	0.0954*** (0.0131)	0.0570*** (0.00668)
Parents' expected Lifetime Wealth at ages [12, 17]- Squared	-0.00115*** (0.000251)	-0.000223*** (0.0000836)
Parents' expected Lifetime Wealth at ages [18, 23]	-0.0131 (0.0131)	
Parents' expected Lifetime Wealth at ages [18, 23]- Squared	-0.00113*** (0.000256)	
Parents' expected Lifetime Wealth at ages [24, 29]	-0.0136 (0.00916)	
Parents' expected Lifetime Wealth at ages [24, 29]- Squared	-0.000636*** (0.000119)	
Dynamic Complementarity		
Parents' expected Lifetime Wealth at ages [0, 5] × [6, 11]	0.0000741 (0.000301)	0.000184 (0.000252)
Parents' expected Lifetime Wealth at ages [0, 5] × [12, 17]	-0.000157 (0.000327)	0.000133 (0.000173)
Parents' expected Lifetime Wealth at ages [0, 5] × [18, 23]	0.000394 (0.000344)	
Parents' expected Lifetime Wealth at ages [0, 5] × [24, 29]	0.000113 (0.000239)	

Parents' expected Lifetime Wealth at ages [6, 11] × [12, 17]	0.000677* (0.000406)	-0.0000220 (0.000214)
Parents' expected Lifetime Wealth at ages [6, 11] × [18, 23]	-0.000613 (0.000421)	
Parents' expected Lifetime Wealth at ages [6, 11] × [24, 29]	-0.0000643 (0.000298)	
Parents' expected Lifetime Wealth at ages [12, 17] × [18, 23]	0.00134*** (0.000442)	
Parents' expected Lifetime Wealth at ages [12, 17] × [24, 29]	-0.000243 (0.000320)	
Parents' expected Lifetime Wealth at ages [18, 23] × [24, 29]	0.00145*** (0.000309)	
Constant	8.375*** (0.254)	9.139*** (0.201)
Adjusted R^2	0.131	0.133
p_value	0	0

Standard errors in parentheses

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

Note: This table shows the coefficients of the model defined in equation (8), taking coefficients $\alpha_0(t)$, $\boldsymbol{\alpha}'_{1,i}(t)$, and $\boldsymbol{\Psi}_{i,j}(t)$ to be constant within intervals. The α_0 corresponds to the constant parameter in the model above. The $\boldsymbol{\alpha}'_{1,i}$ is the coefficient of interval i, while $\boldsymbol{\Psi}_{i,j}$ is the coefficient of the interaction between interval i and interval j. Expected Lifetime Wealth is expressed in units of $10,000$\$. In this table, $K(t+1)$ is taken to be the child's total years of completed education, realized at age 35. The first column contains all intervals until realization of the child outcome and their interactions (intervals 1–5). The second column contains all intervals in childhood (i.e., until age 17).

Table I.14: DYNAMIC COMPLEMENTARY FOR EDUCATION ATTAINMENT BY AGE 35 (FIRST SPECIFICATION) (INCOME REALIZED UP TO INDICATED AGE)

Child's Age	$[0, 5]$	$[6, 11]$	$[12, 17]$	$[18, 23]$
$[6, 11]$	0.00007			
	(0.00030)			
$[12, 17]$	-0.00016	0.00068*		
	(0.00033)	(0.00041)		
f $[18, 23]$	0.00039	-0.00061	0.00134***	
	(0.00034)	(0.00042)	(0.00044)	
$[24, 29]$	0.00011	-0.00006	-0.00024	0.00145***
	(0.00024)	(0.00030)	(0.00032)	(0.00031)

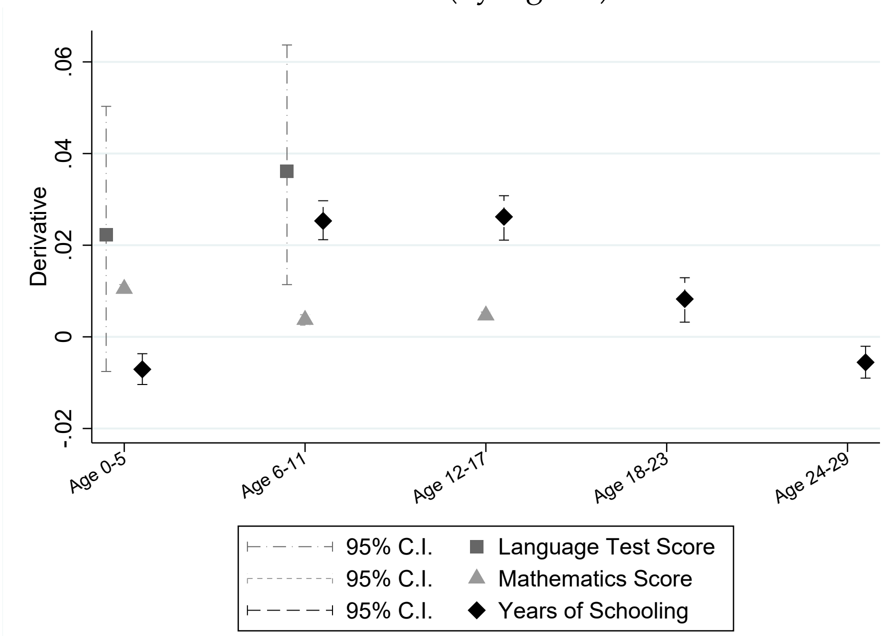
Standard errors in parentheses.

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

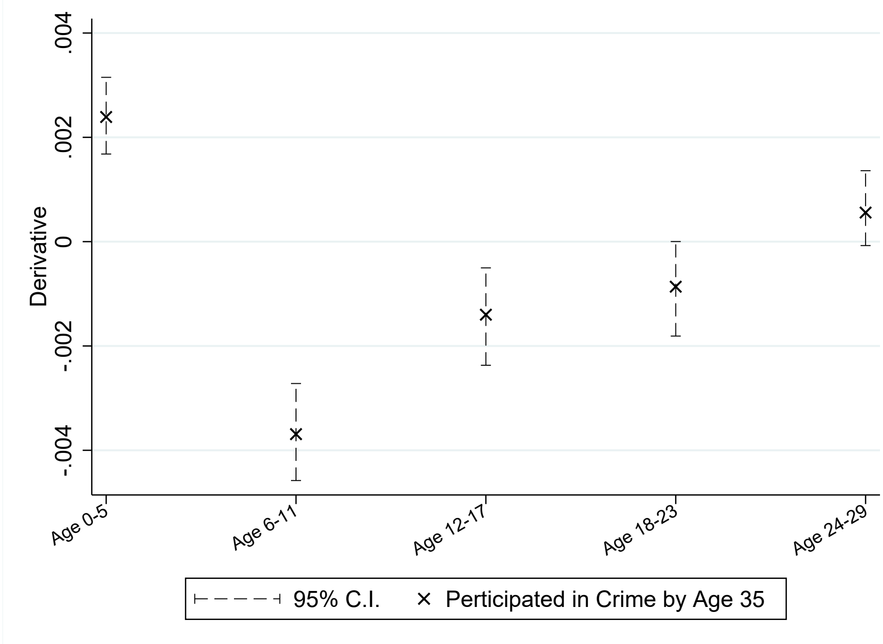
Notes: This table presents the dynamic complementary for education attainment by age 35. We estimate Equation (8), taking coefficients $\alpha_0(t)$, $\boldsymbol{\alpha}'_{1,i}(t)$, and $\boldsymbol{\Psi}_{i,j}(t)$ to be constant within the selected intervals. The full set of estimation results are reported in Tables I.10-I.13 of Appendix I.3.

Figure I.3: Derivative of Child Outcomes with respect to Parental Expected lifetime wealth at Different Childhood Age Intervals, Evaluated at the Mean (First Specification)

(a) Language Test Scores (Age 11), Mathematics Test Scores (Age 16), and Years of Education (by Age 35)



(b) Participation in Crime (Ever Participated in Crime by Age 35)



Notes: This figure depicts the value of the derivative of each of the child outcomes (language test scores at age 11, mathematics test scores at age 16, years of education by age 35, crime measured by ever participated in crime by age 35) with respect to the parental expected lifetime wealth in each interval (in 10,000 USD in 2010 values), evaluated at the mean. Children's test scores have mean zero and unit standard deviation. Table I.9 reports the values. We estimate Equation (8), taking coefficients $\alpha_0(t)$, $\boldsymbol{\alpha}'_{1,i}(t)$, and $\boldsymbol{\Psi}_{i,j}(t)$ to be constant within the selected intervals. The full set of estimation results including the constant and the coefficients on the interaction terms are reported in Tables I.10-I.13 of Appendix I.3.

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