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The association between childhood exposure to local wealth inequality and intergenerational income mobility in the United States

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Previous research has documented that income inequality is negatively associated with intergenerational income mobility. Beyond income, wealth is also distributed unequally. However, a lack of comprehensive wealth data has meant that the link between wealth inequality and upward mobility in income remains unclear. This study examines this association using a recently published database of local wealth inequality estimates (GEOWEALTH-US) as well as upward mobility estimates published by Opportunity Insights. Results from linear models estimated by OLS reveal a negative association between childhood exposure to local wealth inequality at the commuting zone level (N = 724) and mobility outcomes later in life. Static simulations show that local wealth inequality is more strongly associated with upward income mobility than income inequality itself. One channel through which local wealth inequality may be associated with lower upward mobility is its correlation with reduced educational attainment among children from families with a low income.

High income inequality is associated with low intergenerational mobility in income. This observation, commonly referred to as 'The Great Gatsby Curve', is a threat to the American Dream of upward mobility[1]. The negative association between income inequality and intergenerational mobility has mostly been examined between countries[1,2]. Among rich democracies, the United States is a persistent outlier, posting both exceptionally high levels of income inequality and above average levels of intergenerational immobility[1,3].

Recently, local estimates of intergenerational mobility published by Opportunity Insights have complemented a largely cross-country comparative literature[4–6]. This line of research highlighted the importance of local context for shaping opportunity; indeed research shows moving to areas with greater opportunities boosts the upward mobility prospects of children growing up in families with a low income[7]. In short, local opportunity structures are central to understanding economic mobility, particularly given eight in ten adults live within 100 miles of where they grew up[8].

Local income inequality matters for upward mobility because childhood exposure to socio-economic inequality influences economic opportunities[1,9]. In other words: where children grow up has a permanent imprint on how they fare later in life[5,7,10,11]. For a recent birth cohort in the United States, a one standard deviation increase in commuting zone-level income inequality during early adulthood is associated with a 0.63 standard deviation reduction in upward mobility[6].

Local inequality may affect upward mobility through several mechanisms[3]. Unequal access to education and varying returns on education can limit opportunities for families with lower incomes[12], while labor market conditions may further restrict income growth. Additionally, differences in social capital and parental investment affect children's mobility prospects[2]. Research shows that high-income parents invest more in their children's education in areas of higher inequality[13], possibly due to perceived competition[2]. This pattern corresponds with higher dropout rates in high-inequality areas[14].

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Moving beyond the distribution of income, why would wealth inequality matter to upward mobility in income? First, in the United States, the financing of local public sectors is predominantly achieved through property taxation. Therefore, local wealth can be directly linked to the provision of local public services and their varying quality across places. More affluent areas might attract high-end public services and specialists, targeting a clientele that can afford premium services. Wealth-segregated public spaces and specialized economies might contribute to the crowding-out of affordable services as local infrastructure becomes oriented towards the needs of affluent residents. Second, in highly unequal localities the wealthy may be to monopolize opportunities, e.g., by increasing competition for education or the cost of living in better neighborhoods[15]. This becomes evident in the sky-rocketing cost of tertiary education, which sets high barriers to entry for children with limited financial means. Third, inequality in wealth dwarfs inequality in income and can therefore serve as a multiplier to economic disparities. In short, if we fail to address the association between income mobility and unequal income and unequal wealth, we continue to lack a complete understanding of the impact of socio-economic disadvantages.

The United States stands out as a country with exceptionally high levels of inequality in income but also in wealth[16]. What is more, wealth inequality and wealth concentration in the U.S. are particularly pronounced among households with children, underscoring the potential for remarkably different lived realities and future opportunities for children growing up in different parts of the distribution[17]. However, national inequalities may not necessarily translate into local disparities; despite recent advancements in understanding the spatial patterning of upward mobility, to date we know little about the spatial distribution of wealth across local areas and potential consequences.

To fill this gap, the study at hand asks: Is childhood exposure to local wealth inequality negatively associated with upward income mobility achieved in adulthood? While previous research has convincingly documented how local income inequality is negatively associated with intergenerational income mobility, lack of comprehensive wealth data has meant that no such evidence is available for the link between wealth inequality and upward mobility in income.

To investigate the association between childhood exposure to local wealth inequality and intergenerational income mobility, this study draws on a recently published database that makes estimates of wealth inequality for commuting zones across the United States publicly available[18]. This dataset is combined with estimates of intergenerational income mobility based on linked income tax returns provided by Opportunity Insights[19] and commuting zone (CZ) characteristics from the Decennial Census. Commuting zones are popular geographical unit of analysis in economic research to address the role of local exposure, as they are designed to capture local economies. That is, unlike political boundaries, a commuting zone is composed of a set of counties that reflect local economic connectivity (where people live, work, and interact). Together, these unique data allow researchers to jointly assess local wealth inequality and intergenerational income mobility in the United States.

Results from linear models estimated by OLS show a negative association between CZ-level wealth inequality in early adolescence and upward income mobility outcomes later in life. This relationship persists when accounting for the mean levels of income and wealth as well as income inequality and other economic and demographic characteristics. Notably, static simulations indicate that upward mobility in income is more strongly correlated with local wealth inequality than with income inequality. Finally, consistent with previous literature, additional models suggest that observed links between local wealth inequality and upward mobility may reflect differences in the educational attainment of children from families with low incomes.

This study reveals a negative association between childhood exposure to local wealth inequality and the upward mobility outcomes of children from families with low incomes across the United States. Thereby, the study contributes to our understanding of intergenerational income mobility more generally, and hints towards potential downstream consequences of wealth inequality more specifically.

Results

The distribution of opportunity and local wealth inequality

Can the spatial distribution of intergenerational income mobility and local wealth inequality give us any indication of whether the two are correlated? Figure 1 plots the geographical distribution of upward income mobility (panel A) and the Gini index of wealth inequality (panel B) across commuting zones. These maps indicate substantial spatial clustering: Upward income mobility is lowest in the South—particularly so across CZs in the cotton belt—and highest in the Midwest (see Connor and Storper[20] and Connor et al.[21] for more details on the geography of social mobility). Conversely, local wealth inequality is higher in the South and lower in states like Minnesota or Wisconsin. However, some CZs combine relatively high upward income mobility with high

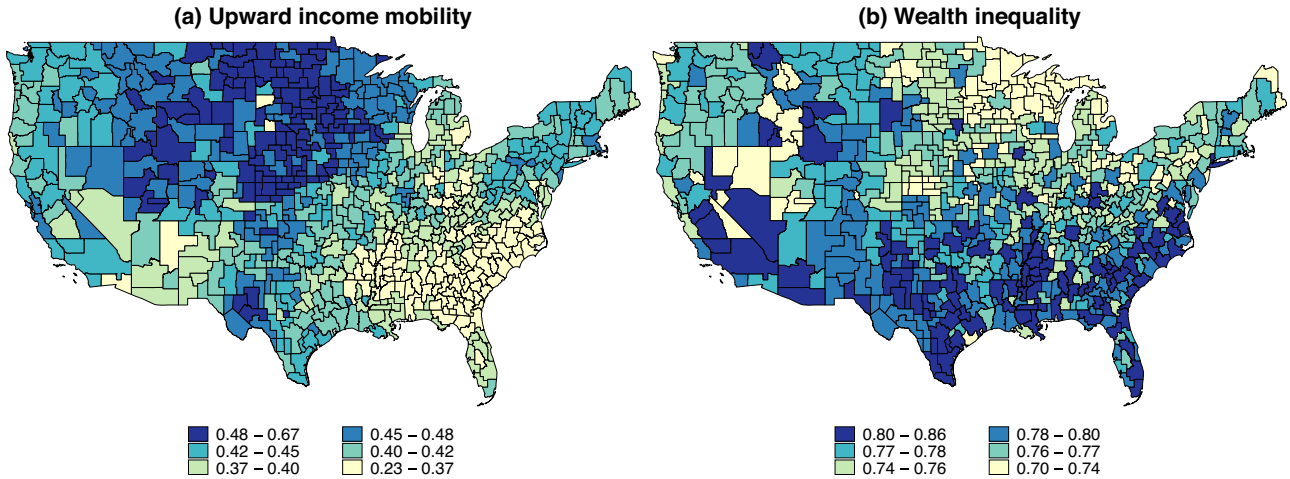

Fig. 1 | The spatial distribution of income mobility and wealth inequality. Panel (a) displays commuting zone-level variation in upward income mobility and panel (b) shows commuting zone-level variation in local wealth inequality. *Note*: Upward income mobility in (**a**) is measured as the estimated average percentile rank in the national income distribution that children growing up to parents at the 25th income percentile achieve in adulthood. Estimates are based on data published by Opportunity Insights. Wealth inequality in (**b**) is measured as the commuting zone level Gini coefficient. *Source*: GEOWEALTH-US.

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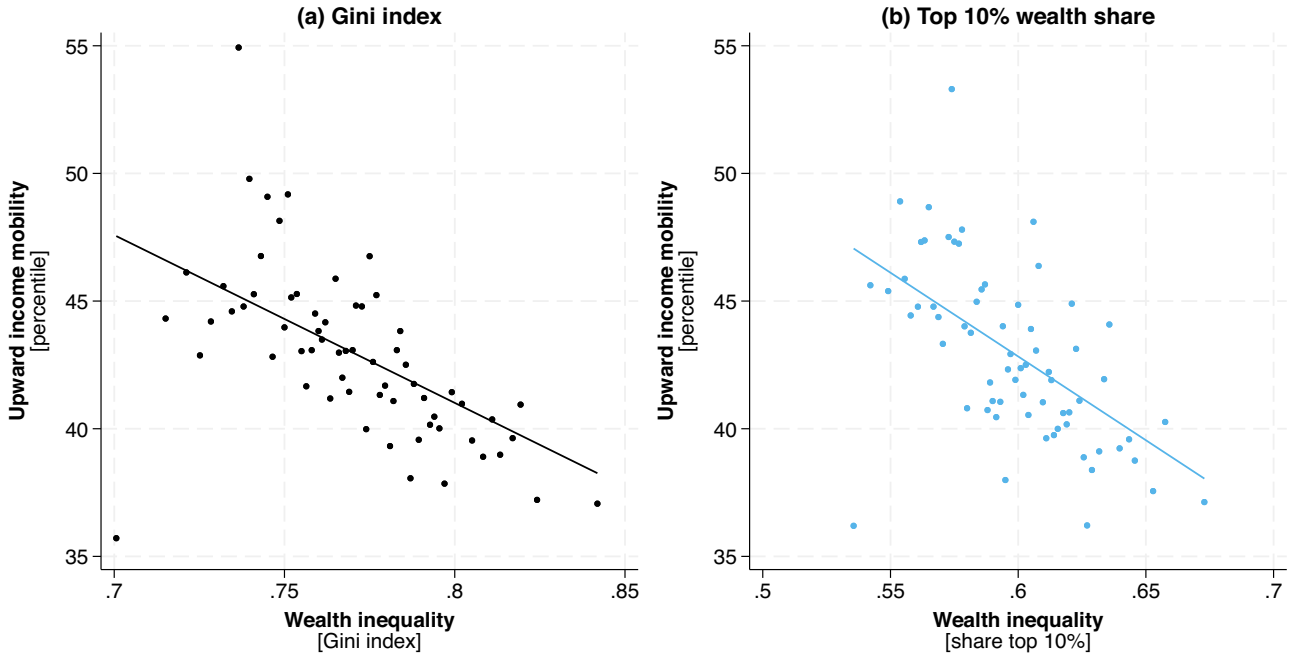

Fig. 2 | Binned bivariate association between local wealth inequality and upward income mobility across commuting zones. *Note*: All commuting zones are grouped into 70 equal-sized bins. In both panels, upward income mobility is measured as the estimated average percentile rank in the national income distribution that children growing up to parents at the 25th income percentile achieve in adulthood. Estimates are based on data published by Opportunity Insights. Wealth inequality is measured as the commuting zone level Gini coefficient in (**a**) and the share of wealth held by the top 10% in (**b**). *Source*: GEOWEALTH-US and Opportunity insights.

inequality in wealth (for instance, New York), or vice versa. Overall, these maps reveal substantial variation in both intergenerational income mobility and local wealth inequality across the United States.

Figure 2 assesses the relationship between intergenerational mobility in income and local wealth inequality more directly. Panel A shows the bivariate association between upward income mobility and the CZ-level Gini index of wealth; Panel B plots the same mobility measure against the share of wealth held by the top 10%. In places where wealth was distributed more unequally, intergenerational income mobility of children growing up in families with a low income is lower. More specifically, on average, children growing up in families at the 25th percentile of the national income distribution in commuting zones with relatively low inequality in wealth (Gini index 0.70) climb up to the 47th percentile in adulthood. However, their peers in commuting zones that exhibit relatively high inequality in wealth (Gini index 0.85) only achieve incomes around the 37th percentile of the national income distribution. The pattern is similar when using the share of local wealth held by the top 10% instead of the Gini index.

Linear models: local wealth inequality and upward income mobility

Are areas with higher inequality in wealth less upwardly mobile in income? Figure 2 suggests a negative relationship between CZ-level wealth inequality in early adolescence and the incomes achieved by children later in life. However, the bivariate association cannot account for other characteristics of commuting zones that might explain spatial differences in upward economic mobility.

Figure 3 plots predicted upward income mobility and local wealth inequality from linear models estimated by OLS. Panel A shows the predicted association for the Gini index, and Panel B for the top 10% wealth share. Both models adjust for CZ-level median wealth, mean income, income inequality, population, income growth, share of Black population, racial segregation, share of the population with a college degree, mean age, immigration, single motherhood, and the share working in manufacturing, as well as characteristics of the children in the Opportunity Insights data, namely the share married, the fraction who stayed in the commuting zone they grew up in, and the proportion with a father present during early adolescence. Full model results using the Gini index of local wealth inequality are shown in Table 1.

Accounting for CZ characteristics, in areas where wealth was distributed more unequally, the upward income mobility outcomes for children growing up in families with a low income are lower. In other words, children growing up in families at the 25th percentile of the national income distribution are less upwardly mobile in areas where wealth inequality is higher. Children growing up in commuting zones at the 10th percentile of the spatial distribution of wealth inequality (Gini index 0.735) are estimated to climb up to the 41.5th percentile of the national income distribution in adulthood; whereas their peers in commuting zones at the 90th percentile of the spatial distribution of wealth inequality (Gini index 0.835) only climb up to the 39.5th percentile of the national income distribution. This association holds net of local income inequality and the other economic and demographic characteristics mentioned above.

Static inequality simulation

What would intergenerational income mobility look like if these children were exposed to less local income or wealth inequality during childhood? The linear model can be used for a simple exercise: Let's suppose either local wealth inequality or income inequality were reduced by 50 percent. Figure 4 plots the predicted average upward income mobility of children growing up in families with a low income for the observed and the two simulated scenarios.

In the baseline model, the average predicted income achieved in adulthood is around the 42nd percentile of the national income distribution. This figure is only marginally higher in the simulated scenario where CZ income inequality is reduced by 50 percent during children's early adolescence. Predicted upward income mobility jumps up to the 53th percentile in the simulated scenario where local wealth inequality (measured with the Gini index) is reduced by 50 percent. Put differently, a 10 percent decrease in commuting zone wealth inequality

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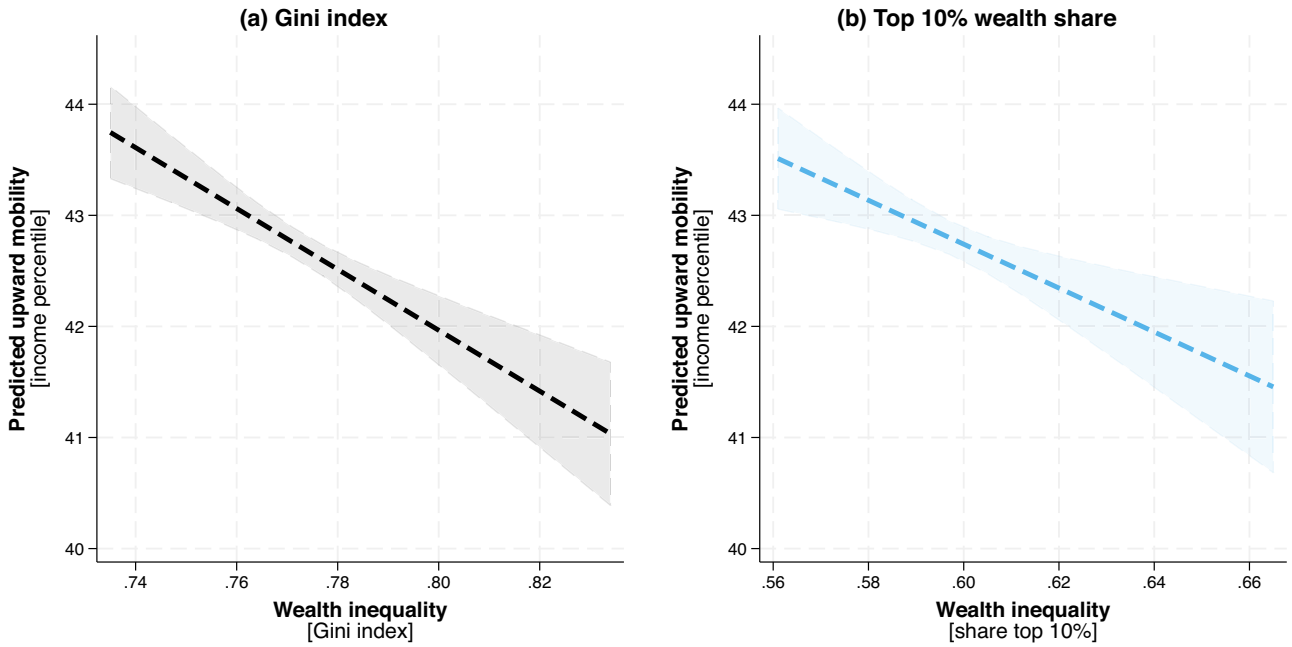

Fig. 3 | The association between local wealth inequality and upward income mobility as predicted by multivariate linear models. *Note*: Figure displays the linear prediction with 95% confidence intervals. In both panels, upward income mobility is measured as the predicted average percentile rank in the national income distribution that children growing up to parents at the 25th percentile achieve in adulthood. Covariates at the CZ-level include: Median household net wealth (log), average household income (log), total population (log), average growth in incomes between 2000 and 2010, population share Black, racial segregation measured as the Theil index, population share with a college degree, average age, share of immigrants, share of employees working in manufacturing, share of children from the 1978–1983 cohort who are claimed by married parents on their income tax returns in the late 90s, share of children from the 1978–1983 cohort with a father present in the household in the late 90s, share of children from the 1978–1983 cohort who live in the same commuting zone they grew up in, share of single motherhood. Mobility data is based on information published by Opportunity Insights. Wealth inequality is measured as the commuting zone level Gini coefficient in (**a**) and the share of wealth held by the top 10% in the (**b**). *Source*: GEOWEALTH-US and Opportunity insights. Author's calculation.

is estimated to be associated with roughly a 2 percentile rank increase in the upward income mobility of children growing up in families with a low income.

A potential pathway: educational attainment

Several potential pathways might explain the association between local inequality and upward mobility in income[3]. Previous research highlighted that disparities in access and returns to education can restrict opportunities for families with a low income, limiting their ability to climb up the income ladder[12]. At the same time, local labor market dynamics, such as wage stagnation and job insecurity, might exacerbate these issues by preventing significant income growth for less advantaged individuals. Other theories focus on disparities in social capital and parental investment which impact the ability of children from backgrounds with a low income to achieve upward mobility[2].

One pathway through which inequality might affect gaps in child investments is through its effect on high-income parents. That is, Schneider et al.[13] demonstrate that affluent parents spend more on their children's education in states where income inequality is higher. This might suggest that high-income parents are more likely to invest in their children because they perceive their high-inequality local environment as particularly competitive[2]. Supporting this line of research, Kearney and Levine[14] find that income inequality is associated with higher high school dropout rates at the state and local level. Local wealth inequality might similarly lead to disparities in access to education with downstream consequences for upward economic mobility (see, for example,[22,23]).

To gauge whether childhood exposure to local wealth inequality is associated with reduced educational attainment, Fig. 5 displays standardized coefficients of CZ-level wealth inequality on three different measures of education: the share of children growing up in families with a low income in the Opportunity Insights data with some college (upper), the share completing a community college degree (center), and the share obtaining a college degree (lower). Across all model specifications, estimates indicate negative associations between local wealth inequality and the share of children growing up in families with a low income obtaining a community college degree, or some college (see Supplementary Tables S2, S3, and S4 for full model results).

These findings suggest that fewer children growing up in families with a low income complete local community colleges where wealth inequality is higher. It is important to note that most children growing up in families with a low income do not compete for top national universities and rely on local infrastructure for further education. That is, little more than 10% of children from families with a low income complete a four-year college degree by age 32; and gaps in college completion between children from low vs high-income parents have increased dramatically[24]. Educational opportunities provided by local community colleges are thus critical for upward income mobility of children growing up in families with a low income. More specifically, mediation analyses suggest that about 30% of the observed association between upward mobility and local wealth inequality can be accounted for by the correlation between local wealth inequality and community college attendance (p<0.05, see Supplementary Table S5). Notably, while highlighting the central role of educational attainment, this analysis suggests there are still other important pathways to be investigated by future research.

Robustness checks

In supplementary analyses, the main models presented here are replicated substituting the outcome measure of intergenerational income mobility with two different operationalizations of upward mobility: (1) the probability that a child born to parents in the bottom quintile of the national income distribution climbs up to the top quintile in adulthood, and (2) the causal effect of place for children

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Table 1 | Full model results

	Model 1	Model 2	Model 3
Wealth inequality [Gini index]	−0.307	−0.103	−0.125
	($p < 0.001$)	(0.032)	($p < 0.001$)
	[−0.379,−0.235]	[−0.197,-0.009]	[−0.174,−0.076]
Income inequality [Gini index]		−0.199	−0.049
		($p < 0.001$)	(0.016)
		[−0.283,−0.115]	[−0.089,−0.009]
Median household wealth [log]		−0.392	−0.289
		($p < 0.001$)	($p < 0.001$)
		[−0.522,−0.262]	[−0.370,−0.208]
Mean household income [log]		0.281	0.306
		($p < 0.001$)	($p < 0.001$)
		[0.163,0.398]	[0.218,0.394]
Population [log]		−0.252	0.030
		($p < 0.001$)	(0.512)
		[−0.355,−0.150]	[−0.060,0.121]
Income growth [2000-10]		0.255	0.089
		($p < 0.001$)	(0.017)
		[0.176,0.335]	[0.016,0.161]
Black [share]		−0.277	0.088
		($p < 0.001$)	(0.005)
		[−0.326,-0.227]	[0.027,0.149]
Racial Segregation		−0.069	0.013
		(0.030)	(0.544)
		[−0.131,−0.007]	[−0.030,0.057]
College degree [share]		0.420	0.194
		($p < 0.001$)	($p < 0.001$)
		[0.304,0.536]	[0.135,0.252]
Age [mean]		0.316	0.178
		($p < 0.001$)	($p < 0.001$)
		[0.238,0.395]	[0.142,0.215]
Migration Inflow Rate		−0.112	−0.073
		($p < 0.001$)	($p < 0.001$)
		[−0.164,−0.060]	[−0.105,−0.042]
Share Working in Manufacturing		0.052	−0.074
		(0.209)	(0.001)
		[−0.029,0.133]	[−0.118,−0.030]
Married			0.652
			($p < 0.001$)
			[0.555,0.748]
Father present			−0.066
			(0.124)
			[−0.149,0.018]
CZ stayers			−0.215
			($p < 0.001$)
			[−0.291,−0.139]
Single motherhood			−0.157
			($p < 0.001$)
			[−0.242,−0.072]
Constant	−0.033	−0.003	−0.001
	(0.348)	(0.908)	(0.972)
	[−0.103,0.036]	[−0.049,0.044]	[−0.031,0.030]
Observations	741	724	724

Note: Linear models estimated by OLS with upward income mobility as the dependent variable. Upward income mobility is measured as the predicted average percentile rank in the national income distribution that children growing up to parents at the 25th percentile achieve in adulthood. Wealth inequality is measured as the commuting zone level Gini coefficient in household net wealth. Covariates at the CZ-level include: Income inequality measured as the Gini coefficient in household income, median household net wealth (log), average household income (log), total population (log), average growth in incomes between 2000 and 2010, population share Black, racial segregation measured as the Theil index, population share with a college degree, average age, share of immigrants, share of employees working in manufacturing, share of children from the 1978–1983 cohort who are claimed by married parents on their income tax returns in the late 90s, share of children from the 1978–1983 cohort with a father present in the household in the late 90s, share of children from the 1978–1983 cohort who live in the same commuting zone they grew up in, share of single motherhood. *Source:* GEOWEALTH-US and Opportunity Insights.
Two-sided t-test, *p* values and confidence intervals in parentheses

born to families at the 25th percentile. This measure indicates the estimated percentage increase in income from experiencing one additional year of childhood exposure to a given commuting zone. Both measures are generated by ref. 6 and accessed through Berger and Engzell's replication package[25]. Supplementary Tables S6 and S7 show that exposure to local wealth inequality remains negatively associated with both alternative outcome specifications.

Next, upward income mobility in the U.S. is systematically confounded by structural racism. That is, Black Americans are often living in racially segregated and disadvantaged neighborhoods; indeed, less upward mobility was observed for Black Americans compared to their white counterparts in every state[26]. The main linear models presented here adjust for racial segregation in early adulthood, yet they might yield biased estimates if commuting zones with more prevalent historical racial regimes[27] exhibit both higher local wealth inequality and concentrated Black disadvantage in upward income mobility (and Black children are clustering in families with low incomes). Supplementary Table S8 replicates linear models for White children only, thereby ensuring the negative association of local wealth inequality and intergenerational income mobility is not confounded by the level of structural racism (results are largely similar for Black Americans, see Supplementary Table S9).

Commuting zone wealth inequality is measured in 2000. This year best matches the time when children in the Opportunity Insights data are reported on their parents' income tax returns. It is also the timing closest to early adolescence—a period where neighborhood exposure matters most for future economic mobility prospects[19]. Measuring exposure to local wealth inequality at other time periods likely introduces measurement error and a mismatch regarding when exposure to local wealth inequality matters for economic opportunities. To further substantiate this justification of exposure timing, Supplementary Fig. S1 plots the estimated coefficient from seven separate models, each identical to the specification presented in the main analysis yet measuring local wealth inequality in 10-year intervals from 1960 to 2020. The estimated coefficient is largest when local wealth inequality (Gini index) is measured during early adolescence and not associated with upward mobility when measured before children are born or when they are in their 30s.

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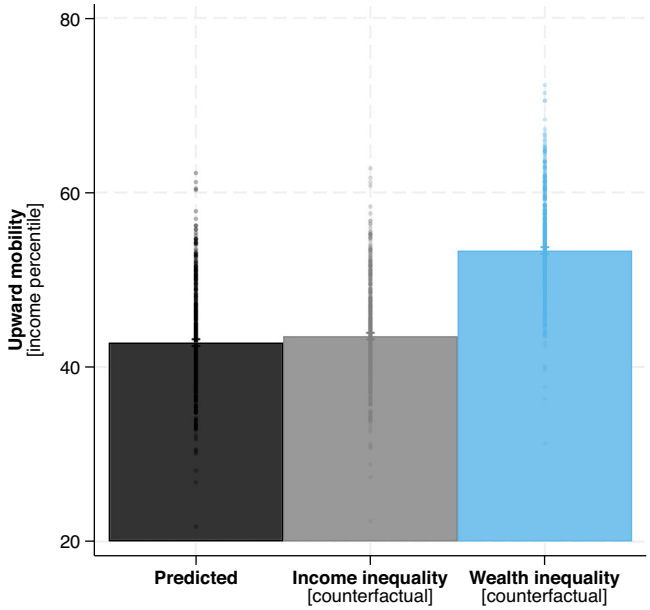

Fig. 4 | Static simulations of upward mobility in income. *Note*: Figure shows predicted upward income mobility for actual and simulated scenarios. Simulated scenarios are modeled as a 50% decline in income inequality (center) and wealth inequality (right), everything else equal. Whiskers indicate 95% confidence intervals. Each dot represents one of 724 commuting zones. In both panels, upward income mobility is measured as the predicted average percentile rank in the national income distribution that children growing up to parents at the 25th percentile achieve in adulthood. Covariates at the CZ-level include: Median household net wealth (log), average household income (log), total population (log), average growth in incomes between 2000 and 2010, population share Black, racial segregation measured as the Theil index, population share with a college degree, average age, share of immigrants, share of employees working in manufacturing, share of children from the 1978–1983 cohort who are claimed by married parents on their income tax returns in the late 90s, share of children from the 1978-1983 cohort with a father present in the household in the late 90s, share of children from the 1978–1983 cohort who live in the same commuting zone they grew up in, share of single motherhood. Data are based on information published by Opportunity Insights. Income inequality and wealth inequality are measured as the commuting zone level Gini coefficient. *Source*: GEOWEALTH-US and Opportunity insights. Author's calculation based on 724 commuting zones.

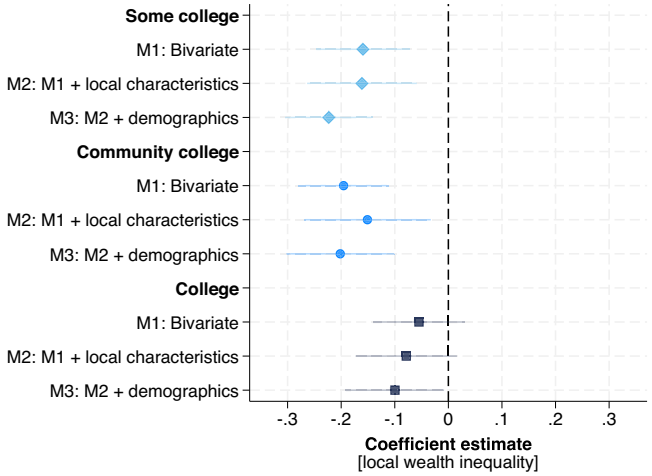

Fig. 5 | Standardized coefficients of local wealth inequality on educational attainment as estimated by multivariate linear models. *Note*: Linear models estimated by OLS. Figure shows the estimated, standardized coefficient of local wealth inequality on college attainment. Whiskers indicate 95% confidence intervals. Educational attainment is measured as the share of children growing up to parents at the 25th percentile with some college (upper), the share that complete a community college degree (center), or a college degree (right). Wealth inequality is measured as the commuting zone level Gini coefficient in household net wealth. Model 1 indicates the bivariate association, Model 2 adds to that a parsimonious set of CZ-level covariates: Income inequality measured as the Gini coefficient in household income, median household net wealth (log), average household income (log), total population (log), average growth in incomes between 2000 and 2010, population share Black, racial segregation measured as the Theil index, population share with a college degree, average age, share of immigrants, share of employees working in manufacturing. Model 3 further adds demographic characteristics: The share of children from the 1978-1983 cohort who are claimed by married parents on their income tax returns in the late 90s, share of children from the 1978-1983 cohort with a father present in the household in the late 90s, share of children from the 1978-1983 cohort who live in the same commuting zone they grew up in, share of single motherhood. Data are based on information published by Opportunity Insights. Wealth inequality is measured as the commuting zone level Gini coefficient. *Source*: GEOWEALTH-US and Opportunity insights. Author's calculation based on 724 commuting zones.

Last, results are not sensitive to other model specifications, such as weighting commuting zones by the inverse variance of the underlying mobility estimates (Supplementary Table S10) to account for the estimated nature of the dependent variable (see[28]) nor to winsorizing extreme values (Supplementary Table S11). In addition, results remain unchanged when using income mobility estimates at the individual- rather than the household-level (Supplementary Table S12), separating estimates for males (Supplementary Table S13) and females (Supplementary Table S14), and also when measuring income inequality as the Gini index of the bottom 99% (Supplementary Table S15). The negative association also holds when splitting the sample to commuting zones in the South vs the non-South (Supplementary Table S16) as well as accounting for state-level fixed-effects (Supplementary Table S17).

Discussion

Previous research convincingly demonstrated that intergenerational upward mobility in income is negatively associated with income inequality[1,3,5]. This study investigates the association between local wealth inequality and upward income mobility. More specifically, this article examines how childhood exposure to inequality in wealth at the CZ-level relates to upward mobility in income of children growing up in families with a low income. The study draws on a recently published database that makes estimates of local wealth inequality publicly available[18].

Results from linear models estimated by OLS show a negative association between CZ-level exposure to wealth inequality in early adolescence and upward income mobility outcomes later in life. In other words: children from families with a low income growing up in commuting zones with higher local wealth inequality achieve lower incomes in adulthood compared to their peers growing up in commuting zones with lower inequality in wealth. This relationship is robust to accounting for local levels of income and wealth as well as income inequality and other economic and demographic covariates. Static simulations indicate that upward mobility in income is more closely linked to local wealth inequality than to income inequality. Finally, further analyses indicate that links between local wealth inequality and upward mobility may reflect disparities in educational attainment among children from low-income families.

Estimates of intergenerational income mobility at the commuting zone level are only available for a single cohort of children born between 1978 and 1983. Therefore, results should not be interpreted as causal because they are limited to descriptive associations using a single birth cohort. It is also worth noting that this approach does not allow for investigating the heterogeneous effects of exposure to local wealth inequality. Moreover, ideally, one would examine exposure to inequality in wealth on a more granular level than currently feasible. However, there is broad interest in understanding the (potentially) negative consequences of local wealth inequality, particularly so in

light of the sky-rocketing wealth concentration in recent decades. This study provides a glimpse into the data and can serve as a starting point for future investigation.

That is, we know little about the downstream consequences of wealth inequality on social outcomes. This study foregrounds the unequal opportunities observed among children from low-income families in communities characterized by higher wealth inequality. Policies tackling the intergenerational perpetuation of wealth[29], such as comprehensive estate and gift taxation, might be key to fighting increasingly entrenched disparities in economic opportunities of American children.

All told, this article provides evidence showing a negative association between childhood exposure to local wealth inequality and intergenerational upward mobility in income later in life.

Methods

Data sources

First, this study builds on data published by Opportunity Insights[19]. Opportunity Insights provides mobility estimates from parent-child linked income tax returns from the IRS as well as commuting zone characteristics obtained through the American Community Survey (ACS). Second, this study draws on recent local-area wealth estimates from GEOWEALTH-US[18]. This database builds on the Survey of Consumer Finances (SCF) and public-use Decennial and American Community Survey (ACS) microdata from the U.S. Census Bureau and applies machine-learning-based imputation to estimate wealth at several spatial levels. GEOWEALTH-US provides numerous estimates of wealth and wealth inequality between 1960 and 2020 for PUMAs, commuting zones, metro areas, and 48 states.

Measures of wealth inequality

GEOWEALTH-US constructs average wealth and wealth inequality variables for commuting zones by building a model of household-level wealth drawing on the SCF that is then used to impute wealth using Census population survey data. Next, GEOWEALTH-US uses Pareto tail estimation to account for wealth inequality at the top in the Decennial Census and American Community Survey. Finally, wealth aggregates and wealth inequality indicators are estimated for each commuting zone[18]. This study uses two different measures of wealth inequality provided by GEOWEALTH-US: (1) the Gini index and, (2) the wealth share held by the top 10% of the CZ wealth distribution. Supplementary Fig. S2 shows the distribution of wealth inequality (Gini index).

Measure of intergenerational income mobility

Intergenerational income mobility is measured using data from Opportunity Insights who provide estimates of the income mobility outcomes of children born between 1978 and 1983[6,19]. The main measure of upward mobility in income is the estimated mean income percentile rank achieved by children raised by families at the 25^{th} percentile of the national income distribution. Parents' income is measured based on income tax returns in the late 1990s, while the mobility outcomes of their children are measured in 2014-2015. Supplementary Fig. S3 shows the distribution of upward income mobility estimates.

Linear models

This study estimates the relationship between wealth inequality and upward income mobility across commuting zones using linear models estimated using ordinary least squares regression:

$$Y_c = \beta_1 G_c + \mathbf{X}_c' \beta_2 + \varepsilon_c \quad (1)$$

Where Y_c is the commuting zone-specific income mobility outcome of children growing up in families with a low income, G_c indicates commuting zone-level Gini index of wealth inequality (or the top 10% wealth share, respectively), and $\mathbf{X}_c'$ denotes a vector of commuting zone covariates detailed below. All main models are estimated using bootstrapped standard errors.

Covariates are included stepwise: The first model gives the simple, bivariate association without any CZ-level covariates. The second model adds mean income (log), median wealth (log), income inequality (Gini index), population (log), income growth (2000-2010), share Black, racial segregation (Theil index), share population with a college degree, mean age, immigration, and the share working in manufacturing. The third model adds characteristics of the children in the Opportunity Insights data, namely the share married in their mid-30s, the fraction who stayed in the commuting zone they grew up in, and the proportion with a father present during early adolescence. To adjust for community-level family stability, the final models also include the local share of single mothers from US Census data.

All covariates except for the children's outcomes (mobility, marriage, father present, and stayed in the commuting zone) are measured in 2000, the year closest to when the children are claimed on their parent's income tax returns. For descriptive statistics of all variables in the main models, see Supplementary Table S1. All variables are standardized to a mean of 0 and a standard deviation of 1 in all models. Supplementary Fig. S4 shows the correlation matrix of all variables in the main model specification, Supplementary Table S18 indicates partial correlations between the dependent variable and all variables in the models.

All analysis was performed in Stata 18.0.

Ethics statement

This study complies with all relevant ethical regulations. No IRB approval was sought as only publicly available data at an aggregated, de-identified level was used.

Reporting summary

Further information on research design is available in the Nature Portfolio Reporting Summary linked to this article.

Data availability

The GEOWEALTH-US data are available online under restricted access for registered users at ICPSR, access can be obtained by creating an ICPSR user account. The Opportunity Insights data used in this study are available online at (https://opportunityinsights.org/data/).

Code availability

All code necessary to reproduce this study can be accessed via a repository at the Open Science Framework (https://doi.org/10.17605/OSF.IO/F62J8).

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Author contributions

M.S. conceived the study, wrote the manuscript, and performed all analyses.

Competing interests

The author declares no competing interests.

Additional information

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