Intergenerational Economic Mobility of Need-Based Financial Aid Recipients in Washington:

Evidence from Three Years After Postsecondary Graduation

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Executive Summary

A postsecondary degree is widely promoted as a great intergenerational economic equalizer for individuals born into disadvantaged economic circumstances. Yet, there is little empirical evidence documenting the extent that this may be true and whether people from all racial and ethnic, and language backgrounds are benefitting equally. We provide a rare glimpse of this by reporting the patterns of economic mobility for Washington residents who received need-based financial aid and graduated with an associate or bachelor's degree from a public postsecondary institution in Washington. To provide insights, we match wage records from Washington's Unemployment Insurance program with financial aid records that report parental family income. The matching of data allows us to directly compare the annual wages of adult children in the third year after postsecondary graduation to their parents' family income.

Although our analysis is limited to understanding patterns of mobility for need-based aid recipients, this group is very broad. The financial aid programs in the state of Washington are generous and support many families. For example, in 2021 dollars, the 25th, 50th, and 75th percentiles in parental family income from our data sample are approximately $35,000, $63,000, and $100,000, respectively. Overall, our analysis allows us to observe whether postsecondary graduates born into families below $35,000 in family income have similar wage-earning opportunities as those born into families with substantially more income.

The findings from our descriptive analysis are promising and show that need-based aid and postsecondary degrees offer a path towards economic mobility for Washingtonians. The key findings from the analysis are:

- Children from all demographic subgroups born into the most economically disadvantaged families (below the 25th percentile of the sample) earn more in wages than their parents' family income by the third year after graduation.

- Children from the most economically disadvantaged families earn more in wages than their parents' family income regardless of whether they earn an associate or a bachelor's degree.

- We consistently observe economic equalization across race and ethnicity, and language nativity. Children from all demographic subgroups with parental family income ranks below the 50th percentile move up in rank.

- We find some evidence of an opportunity ceiling. Children from all Underrepresented Minority (URM) subgroups are less likely to transition from the bottom quartile to the top quartile compared to their non-URM peers. They are also less likely to remain in the top quartile compared to their non-URM peers.[1]

[1] URM includes people that are American Indian, Alaska Native, Black, Hispanic, Native Hawaiian, and Other Pacific Islanders. Non-URM includes people that are Asian or White.

- The professional/scientific/technical, healthcare/social-assistance, and manufacturing sectors employ the most postsecondary graduates moving up from the bottom quartile to the top quartile.

Overall, our findings suggest that helping the most economically disadvantaged populations attain postsecondary degrees is critical in providing long-term equitable economic opportunities (across race/ethnicity, language nativity, and economic background) for Washington residents. A crucial lever for these people is financial aid, especially need-based aid. This form of aid allows people who would otherwise not be able afford a postsecondary education to earn a degree. With access to sufficient need-based aid, the next generation of workers in Washington will leverage the increased economic opportunities provided by Washington's public colleges and universities.

1 Introduction

Being able to reach economic prosperity regardless of the conditions one is born into is an important philosophy governing our nation and state. However, a body of evidence from the last decade suggests that family background contributes to an oversized role in determining prosperity in relation to an individual's hard work (Corak, 2013; Auten, Gee & Turner, 2013; Chetty, Hendren, Kline & Saez, 2014). The most critical impediments are linked closely with the formation of skills and education of our workforce. Evidence of this can be observed from historical trends for the college earnings premium. The earnings gap between the median college educated and median high school educated has doubled from 1979 to 2012 (Autor, 2014). Both national and international research on intergenerational economic inequalities suggests that addressing skill development and access that culminate in postsecondary success are keys to improving economic opportunities and mobility (e.g., Jerrim & Macmillian, 2015; Chetty, Hendren, Kline, Saez & Turner, 2014).

Understanding intergenerational mobility by income and race is crucial given the persistent and, in some cases, growing intergenerational inequities previously uncovered (Cholli & Durlauf, 2022). Race and ethnicity are likely to be important sources of observed inequalities that exist by economic class. For example, an early study by Duncan (1962) documents how men from Black families were more likely to move down from "higher" professional, managerial, proprietor occupations and less likely to move up compared to men from White families with similar economic backgrounds. Half a century later, Mazumder (2011), Bahattacharya & Mazumder (2011), and Chetty, Hendren, Jones, & Porter (2020) also document dramatic differences in relative income mobility by race with less upward mobility among Black and American Indian families than White families.

An analysis of the direct role of postsecondary education on intergenerational economic mobility in the dimensions of race and language nativity is missing from prior literature. In a well-functioning society, all children born into families with low incomes should benefit substantially by earning a postsecondary degree, regardless of their race or nativity. We contribute to prior studies in these dimensions by examining the role of postsecondary education, specifically for need-based financial aid recipients in Washington. Findings from recent studies on need-based aid such as the federal Pell grant and Florida's Student Access Grant (FSAG) suggest that aid provides an important lever for improving long-term academic and wage-earning outcomes for economically disadvantaged students (Castleman & Long, 2016; Denning, Marx & Turner, 2019).

The generous rules for financial aid eligibility in Washington allow the state to support a significant proportion of the population of postsecondary students, especially the most economically disadvantaged students who would otherwise not be able to attend a postsecondary institution. Approximately 68 percent of students attending 4-year and 30 percent attending 2-year institutions receive need-based aid.[2,3] Our study examines Washington high school graduates that

[2] We calculate the rates by comparing IPEDS unduplicated enrollment counts to WSAC's unduplicated financial aid records for the 2015-16 academic year.

[3] Need-based aid is financial aid for students that have a financial need, regardless of source (e.g., federal or state). This form of aid can include grants, conditional scholarships, work study, and subsidized loans. Financial aid staff

ultimately graduate from a public postsecondary institution in Washington between 2009 and 2016. We conduct this analysis by matching high school graduation records, postsecondary achievement and financial aid records (of dependents), and the state's Unemployment Insurance (UI) earnings records. The earnings records span from the first quarter of 2011 through the final quarter of 2019. The complete sample includes 44,050 postsecondary graduates with earnings records. By linking financial aid records (which report combined parental family income) to UI records, we observe the economic mobility of children in relation to their parents. Our matched file also enables us to observe the characteristics of these adult children. These include race and ethnicity, gender, primary language (the child's first language), high school attended, high school performance, postsecondary degree and major, and the industry in which they are ultimately employed.

We examine patterns of mobility using earnings and economic transition probabilities by key subgroups and by comparing the wage ranks of children to the income ranks of their parents with rank-on-rank linear regressions. These ranks are assigned percentiles within our full sample between 0 and 100 for parents and children, separately.[4] For the remainder of our report, the ranks and their corresponding quartiles refer to this full sample. The fundamental advantage of using ranks instead of nominal dollar values is that it allows for more direct comparisons across groups. The measures of wage for children differ from the income measure of their parents. Child wage in our data is solely composed of wages from UI records. In contrast, parental family income is composed of income from multiple parents, which may include income not reported in UI records (e.g., capital gains). By assigning ranks to children and parents separately, we make tractable comparisons.

The findings from our descriptive analysis are promising for Washington residents and the investments in the state's need-based aid programs. By the third year after postsecondary graduation, adult children already earn more than half of their parents' combined family income. When we focus on children from families in the lowest quartile of income, children across all subgroups (by race/ethnicity and primary language) earn more than their parents combined family income, regardless of whether they earn a bachelor's or associate degree. These findings are less pronounced but similar when we focus on children from families below the state's median family income. Our analysis by primary language also displays that the entire income gap between native English speakers and non-native English speakers is eliminated across generations among children that earn a postsecondary degree.

When we focus on percentile ranks on earnings, we find that all demographic subgroups with parental ranks below 50 saw increases in ranks across generations. The striking consistency of upward mobility across the most disadvantaged demographic groups suggest that completing a postsecondary degree is an essential lever for improving intergenerational economic opportunities. Without financial aid, many of these children may have never enrolled in a postsecondary institution or earned a degree to achieve these gains.

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often subtract the Expected Family Contribution (EFC) from Cost of Attendance (COA) to determine how much need-based aid students receive. See https://studentaid.gov/complete-aid-process/how-calculated

[4] Although our sample is constrained to need-based aid recipients, there is a wide variation in parental family income (a standard deviation of $49,000). The 10th and 90th percentiles in parental family income are $16,000 and $130,000, respectively.

While our findings are generally positive, our in-depth analysis uncovers a key area of concern. Children from all of the Underrepresented Minority (URM) groups are less likely to transition from the bottom quartile in family income to the top quartile in wage earnings compared to their Non-URM peers. Similarly, among children born into the top quartile in parental family income, all URM subgroups are less likely to remain in the top quartile compared to their non-URM peers. In our regression analysis, we find that demographic characteristics, high school attended, and high school academic performance may explain most of these disparities for Hispanic children, but less so for other URM children.

We also contribute to the literature on intergenerational mobility and the labor market by documenting the industries that account for most of the upward mobility pathways. The key industries include professional/scientific/technical services, health care and social assistance, and manufacturing. In addition, we find that URM children from low-income families are substantially more likely to move up in the industry of health care and social assistance and are substantially less likely to move up in educational services compared to children from high-income families. These trends are probably because of degree requirements in each field and the disproportionate number of URM children from lower income families earning associate degrees compared to bachelor's degrees.

2 Data and Summary Statistics

2.1 Data

The matched data drawn for this study comes from four sources, all of which are available from 2008 to 2019. They include Washington's K-12 public education system, WSAC's need-based financial aid records, Washington's postsecondary achievement records, and Washington's Employment Security Department's (ESD) quarterly UI records. To gather race and ethnicity, primary language, high school GPA, and high school graduation dates, we rely on data from Washington's Office of Superintendent of Public Instruction (OSPI) starting from 2008. We rely on WSAC's need-based aid records to capture parental family income for dependent children. The postsecondary achievement records enable us to observe all degrees earned at public institutions in the state. The UI records allow us to observe in-state quarterly earnings by employer and NAICS two-digit industry codes. The natural caveat of UI records is that it will miss individuals who are not employed, have moved out of state, or work for an employer that does not contribute to Washington's UI program (e.g., federal employees and self-employed individuals).

Our analytic sample consists of dependent need-based aid recipients who graduated from both a public Washington high school and a public Washington postsecondary institution from 2008 through 2016. These children must also have at least one quarterly record of earnings in the third year after graduation. We select the third year to allow children time to adjust to the workforce after graduation, while simultaneously limiting loss of wage data for analysis.[5] A natural consequence of conducting an intergenerational study is that we need to observe earnings for both

[5] With each additional year, there is a greater chance an individual will move out of state or decide to leave the labor market due to family obligations, etc.

parents and their children. We can only observe parental family income for dependents (commonly under the age of 24). Once the children are independent (starting at the age of 24), they report their own income instead of their parents' family income. For this reason, we only include need-based aid recipients with at least one record of dependency.

Our final sample restriction hinges on identifying the last postsecondary degree earned. To ensure a high likelihood that we are capturing the last degree, we selected a sample that only comprises children that received their highest degree by the end of 2016. We determine the last degree attained by observing achievement records through 2019. In summary, our analysis accounts for 44,050 children from a pool of 105,000 children who graduated from a Washington high school and a public postsecondary institution between 2008 and 2016.

2.2 Summary Statistics

In this study, we examine the characteristics of postsecondary graduates and general patterns of intergenerational economic mobility by demographic group. Table 1 displays the descriptive statistics for the analysis sample and patterns of mobility. Mobility is observed by comparing parental family income to their children's wage. As previously outlined, these income measures are derived from separate data sources. Parental family income originates from financial aid records and reflects self-reported parental family income. Child (the postsecondary graduate) wage records come from Washington's UI. The most substantial difference between the measures is that parental family income has the potential to represent the combined earnings of two parents. In contrast, child wage only represents wages earned by an individual. Another difference between parents' and their child's earnings is that parental family income captures full income, while child wage captured by UI records does not include income from outside of Washington, nor their income from capital gains, windfalls, etc.

In order to understand mobility by demographic group, we follow prior literature (e.g., Chetty et al., 2014; Davis & Mazumder, 2018) and convert income/wage to ranks in terms of percentiles between 0 and 100 for parents and children separately. As previously discussed, we rely on ranks for comparisons because family income and child wage data come from different sources of data. By definition, the mean rank for both parents and children is 50. We construct these ranks solely using the full analytic sample which consists of 44,050 children. These ranks and corresponding quartiles are preserved throughout our entire analysis regardless of the subgroups we examine.

Panel A in Table 1 displays a summary of median income/wage and percentile ranks for both parents and children, as well as the racial and ethnic makeup. The racial breakdown is similar to the number of four-year college graduates reported by race at Washington's Education Research & Data Center (ERDC). ERDC reports that in 2015-2016, 57% of all 4-year public institution graduates were White, 13% were Asian or Pacific Islander, 8% were Hispanic, 6% were multi-racial, 3% were Black, and 1% were Native American. Subtle differences are likely to exist because our data also includes two-year institutions. The median family income for our sample is approximately $63,000 (in 2021 dollars). As anticipated, the families of need-based-aid recipients in Washington have substantially lower income than most Washington families (a median of approximately $92,000). The panel also displays that by the third year after postsecondary

graduation children earn approximately half of their parental family income (both parental family income and child wages are converted into 2021 dollars throughout our analysis).

Table 1: Summary Statistics

		Median (2021 $'s)		Income Rank (0-100)		Race and Ethnicity (Share)							
	n	Family Inc.	Child Wage	Parents	Child	Asian	Black	Hispanic	Native American	Pacific Islander	White	Two or more	Other
Panel A: Full Sample													
Full Sample	*44050*	63183	31927	50	50	0.14	0.04	0.12	0.01	0.00	0.66	0.02	0.00
Panel B: By Primary Language													
English	*34195*	70981	31957	56	50	0.08	0.04	0.06	0.01	0.00	0.77	0.03	0.01
Not English	*9855*	44904	31810	34	50	0.35	0.05	0.32	0.00	0.00	0.26	0.01	0.00
Panel C: By Degree													
Bachelors	*25313*	73927	46102	58	70	0.17	0.04	0.09	0.01	0.00	0.66	0.02	0.01
Associates	*18737*	57137	23424	45	37	0.12	0.04	0.15	0.01	0.00	0.65	0.03	0.00
Panel D: By Race and Ethnicity													
Asian	*6323*	51152	35261	40	55								
Black	*1716*	44342	30857	34	48								
Hispanic	*5320*	48066	30233	37	48								
Native American	*412*	55885	29797	44	47								
Pacific Islander	*141*	69221	34238	55	53								
White	*28866*	71384	31838	56	50								
Two or More	*1064*	67061	27312	53	43								
Other	*208*	64543	39867	51	62								

Source: Authors' calculations using data from the Education Research and Data Center (ERDC).
Notes: Ranks are in percentiles between 0 and 100. By construct, the mean rank is 50 for the full sample. When a child's rank is higher than their parents, it signifies that they have moved up in rank across generations. Child denotes the student that recently graduated from a postsecondary institution. Parental family income is self-reported family income from financial aid records and child wage is reported from Washington's unemployment insurance records on the third year after graduation. Values are in 2021 dollars.

Panel B disaggregates patterns by primary language (whether English or a non-English language is learned first). We examine this important sub-population because they are a predominantly disadvantaged and rapidly growing population in the state. There are widespread concerns that many of these children will not be adequately served by Washington's education system because of limited language support.[6] This panel displays that approximately a quarter of need-based aid recipients graduating from postsecondary institutions did not learn English as their first language. We also confirm that people in this population are more likely to be economically disadvantaged. Among need-based aid recipients, the median parental family income of children that are non-native English speakers is 40 percent less than their counterparts that are native English speakers. Surprisingly, the wages earned by non-native English speakers catch up almost entirely to native English speakers within 3 years after graduation. Their intergenerational rank moves from an average of 34 (parental) to 50 (child). Although our analysis is descriptive, our findings strongly suggest that postsecondary completion and financial aid are operating as intended to provide equitable economic opportunities for disadvantaged children. A caveat and important limitation of

[6] For examples, see a policy brief by the Migration Policy Institute (https://www.migrationpolicy.org/sites/default/files/publications/EL-factsheet2018-WashingtonState_Final.pdf) and a recent article by the Seattle Times (https://www.seattletimes.com/education-lab/central-washington-teachers-aim-to-better-reach-english-learners-come-fall/).

this finding is that not all people reach postsecondary graduation, and many barriers are likely to exist for people that are non-native English speakers.

Panel C displays summary statistics by degree type. These statistics show the composition and the trajectory of the children earning each type of degree. We compare children that earn bachelor's degrees to children that earn associate degrees. Two general patterns emerge. First, children that earn a bachelor's degree come from more economically advantaged backgrounds and they are more likely to move up in rank than children earning an associate degree. Second, Asian children are disproportionately earning more bachelor's degrees, while Hispanic children are disproportionately earning more associate degrees. Overall, the earnings premium for earning a bachelor's degree compared to an associate degree is consistent with prior research (e.g., Baum (2014)).

Panel D displays a breakdown of parental family income and child wages by race. Children from families in demographic categories with ranks below 50 collectively move up in rank, while children from families in categories with ranks above 50 move down. In a society moving towards more equitable opportunities (where family income or race does not predetermine a child's opportunities), we expect this trend. We are intentional in our language using "moving towards" because we still observe that URM postsecondary graduates earn less than their Non-URM peers.[7]

A crucial contribution of our work focuses on understanding the role of postsecondary education in improving the outcomes of children coming from the most economically disadvantaged backgrounds. In Table 2, we provide disaggregated summary statistics for children from families with income in the bottom quartile from our full analytic sample.[8] This table allows us to assess whether the economic outcomes for children improve once they graduate with an associate degree or a bachelor's degree.

Similar to Table 1, the first column of statistics reports the distribution of children in each demographic category. In the columns to the right, we report parental family income, the child's annual wage in the third year after graduation, and their rank among the full analytic sample. A striking pattern emerges across all subgroups. The expected wage rank for children across all subgroups jumps from the 12^{th} or 13^{th} percentile towards the ideal 50^{th} percentile.[9] This displays strong evidence that a postsecondary education is a great intergenerational economic equalizer. The primary difference across subgroups is that bachelor's degree earners make substantially more than associate degree earners. Nonetheless, children earning bachelor's or associate degrees make more in wages than their combined parental income by the third year after graduation.

[7] People that are Pacific Islanders are an exception. This may be due to small sample size.
[8] Our findings are very similar when we include an alternative cutoff that yields a broader sample. The alternative cutoff includes all children from families with income below Washington's household size adjusted median family income.
[9] In a world where every demographic group has equal opportunities and outcomes, we expect each group to have an income rank of 50.

Table 2: Economic Outcomes for Children from Families in the Bottom Quartile of Parental Family Income

		Median (2021 $'s)		Mean Rank (0-100)	
	n	Family Inc.	Child Wage	Family Inc.	Child Wage
All	11012	19327	30324	13	48
By Primary Language					
English	7412	18798	30162	12	48
Not English	3600	20351	30739	13	48
By Degree					
Associates	7037	19634	23848	13	40
Bachelors	3975	18758	45176	12	62
By Race					
Asian	2043	19639	35089	13	53
Black	694	15062	29474	11	46
Hispanic	1759	21846	29413	14	46
Native American	124	15796	23778	11	43
Pacific Islander	32	17523	38785	11	53
White	6052	19164	29506	12	47
Two or More	263	16541	30287	12	48
Other	45	20017	43597	12	61

Source: Authors' calculations using data from the Education Research and Data Center (ERDC).
Notes: This table presents the economic mobility of children from families with income in the lowest quartile of our analytic sample. The patterns are very similar when we select a sample of children from all families below the median income in the state (adjusted for family size). Child denotes the student that recently graduated from a postsecondary institution. Parental family income is self-reported family income from financial aid records and child wage is reported from Washington's unemployment insurance records on the third year after graduation. Values are in 2021 dollars. Ranks are generated from the full sample.

3 Transition Probabilities and Rank-on-Rank Regressions

Although the summary characteristics discussed in Section 2 are useful for understanding aggregate trends, they provide little information about the patterns that exist in subsegments of the population. For example, while Table 1 allows us to observe that on average Black postsecondary graduates substantially move up the economic rank relative to their parents, the statistics presented on the table do not allow us to infer whether Black postsecondary graduates from the most economically disadvantaged backgrounds move up in rank. To better understand the patterns of economic mobility, we implement two empirical methods. These include transition probabilities and rank-on-rank regression models.

3.1 Transition Probabilities

The first method we use to document detailed patterns of intergenerational mobility are transition probabilities. We use transition probabilities to understand the likelihood that children transition up, down, or stay in the same rank relative to their parents' economic rank. To compute these probabilities, we first organize children and parents into quartiles based on their wage and income from the full sample. The lowest quartile represents the 25 lowest percentile ranks (0-25) and the top quartile represents the 25 highest ranks (75-100) of need-based aid recipients in our sample (We report the quartile ranges for parental family income and child wages in Table 3). We then compute the probability that children with parents in the bottom quartile remain in the bottom quartile or go up to the top quartile. We also compute the probability that children from the top quartile either remain in the top quartile or fall to the bottom. In a fair society, we expect that transition probabilities for children from low-income families to be similar across demographic groups and that the probability they move up in rank should not be substantially different than the probability that children remain in top ranks relative to their parent's rank.

Table 3: Quartile Range

Quartile	Parental Family Income	Child Wage
4 (Top)	Over 100,124	Over 51,069
3	Over 63,183 but not over 100,124	Over 31,929 but not over 51,069
2	Over 34,745 but not over 63,183	Over 31,927
1 (Bottom)	Not over 34,745	Not over 15,541

Source: Authors' calculations using data from the Education Research and Data Center (ERDC).
Notes: Child denotes the student that recently graduated from a postsecondary institution. Parental family income is self-reported family income from financial aid records and child wage is reported from Washington's unemployment insurance records on the third year after graduation. Values are in 2021 dollars. Quartiles (and corresponding ranks) are generated from the full sample.

3.2 Rank-on-Rank Regression Model (OLS)

The rank-on-rank model is a method used in a series of recent intergenerational mobility studies (e.g., Chetty et al., 2014; Davis & Mazumder, 2018). The model describes the relationship between a student's economic rank and their parents' economic rank. The key advantage of using ranks instead of direct measures of intergenerational elasticity is that it allows for more direct comparisons across the intercepts and slopes of subgroups (Mazumber, 2014).

We use ranks to estimate the rank-on-rank slope, β, with the following model:

$$Rank_{1i} = \alpha + \beta Rank_{0i} + \varepsilon_i \quad (1)$$

R_{1i} denotes the rank of student i's annual earnings during the third year after graduation and R_{0i} denotes the rank of student i's parental family income.

We document racial heterogeneity by estimating a fully interacted model with race, r, indicators. This model is described by:

$$Rank_{1ir} = \alpha_r + \beta_r Rank_{0ir} + \varepsilon_{ir} \quad (2)$$

where α_r and β_r are the parameters of interest describing race specific intercepts and rank-on-rank slopes. The intercept represents the race specific expected rank of a child's earnings if their parent(s) income rank is 0 (the bottom). The slope represents the rate of continuity in income rank between generations. A slope of 0 signifies no persistence and a slope of 1 signifies complete persistence.[10]

4 Results

4.1 Transition Probabilities

To understand the economic mobility of postsecondary graduates in Washington, we present conditional probability rates of children transitioning or not transitioning out of the same quartile rank as their parents. These rates are disaggregated by race and by whether a child is a native English speaker. We present the transition rates in Table 4. Both panels display the rates children transition from the lowest to highest, highest to lowest, or remain in the same income quartiles as their parents three years after graduating from a postsecondary institution.[11] Panel A reports the probabilities across race and ethnicity. The panel shows that children in all the URM racial groups are less likely to transition from the bottom quartile to the top quartile compared to their non-URM peers. Similarly, children in all the URM racial groups are less likely to remain in the top quartile than their non-URM peers. The consistency of disparity between URM and non-URM children from the same parental economic background strongly suggests that there are disparities in upward economic mobility opportunities for URM children.

A potential source of this disparity may be because of nativity of language. To examine this potential, we report their transition probability rates by language in Panel B of Table 4. The first two rows of this panel highlights that the earnings between native English and non-native English-speaking families converge to $32 thousand across generations after they earn a postsecondary degree. The transition probability measures also display that the patterns of economic mobility are nearly identical for native English and non-native English-speaking children. Children from both groups have close to a 73 percent probability of moving up from the bottom quartile. They also have a nearly identical probability of moving up to the top quartile from the bottom. This suggests that language is an unlikely channel affecting economic mobility differences across race. In the next two sections, we come to a similar conclusion using separate regression methods.

[10] When there is no intergenerational mobility, a child's rank is the same as their parents. A child with a rank of 1 will have parents with a rank of 1 (1,1), while a child with a rank of 100 will have parents with a rank of 100 (100,100). Consequently, the slope between these two points is 1. When parental income has no influence on child rank, the expected rank of children is 50 regardless of parental rank. The slope in this case is 0.

[11] In this section we focus on the bottom and top quartiles to understand whether opportunities are equal between these two groups.

Table 4: Income Disparities and Intergenerational Mobility by Race and Generation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: By Race	Asian	Black	Hispanic or Latino/a	Native American	Pacific Islander	White	Two or More	Other
Median Parental Family Income ($)	51152	44342	48066	55885	69221	71384	67061	64543
Median Income of Child ($)	35261	30857	30233	29797	34238	31838	27312	39867
P(child in Q1 | parent in Q1)	0.25	0.28	0.25	0.29	0.16	0.28	0.29	0.24
P(child in Q4 | parent in Q1)	0.30	0.18	0.17	0.18	0.19	0.22	0.22	0.44
P(child in Q1 | parent in Q4)	0.22	0.21	0.25	0.20	0.17	0.24	0.27	0.16
P(child in Q4 | parent in Q4)	0.33	0.27	0.26	0.29	0.23	0.31	0.29	0.29

Panel B: By Primary Language	English	Not English
Median Parental Family Income ($)	70981	44904
Median Income of Child ($)	31957	31810
P(child in Q1 | parent in Q1)	0.27	0.27
P(child in Q4 | parent in Q1)	0.22	0.23
P(child in Q1 | parent in Q4)	0.23	0.24
P(child in Q4 | parent in Q4)	0.31	0.29

Source: Authors' calculations using data from the Education Research and Data Center (ERDC).
Notes: Q denotes quartile and P represents the conditional probability. For example, P(child in Q1 | parent Q1) represents the probability that a child's earnings will be in the bottom quartile conditional on their parental family income being in the bottom quartile. To examine upward mobility, see the rows that correspond to P(child in Q4 | parent in Q1). Quartiles are generated from the full sample.

4.2 Rank-on-Rank Regressions

In Table 5, we present estimates of the rank-on-rank regression model on race and ethnicity as discussed in Section 3.2. The table includes each of the racial and ethnic categories included in our primary model as described by equation 2. The race specific intercept α_r describes the conditional expectation of a child born to the lowest-income parents. For example, Asian children born to parents at the 0 percentile in family income are expected to have an income rank at the 52nd percentile by the third year after postsecondary graduation. This is substantially higher than children that are Black, Hispanic, White, or multi-racial who are expected to be near the 45th percentile. The expected rank of Native American children is lowest at the 42nd percentile. We also overlay the intercepts and slopes on a plot of binned outcomes in Figure 1. The figures illustrate that the child's expected rank patterns are close to linear and are represented well by our linear rank-on-rank model.

The slopes displayed in Table 5 can also be leveraged to calculate the expected percentile rank of children based on their parental family income. In a society with perfect and equal intergenerational mobility, the expected rank for a child would be the 50th percentile regardless of whether they are born to parents at the 0 percentile or the 100th percentile. If this pattern were to be plotted on a figure, the y-intercept would be 50 and the slope would be zero.

Table 5: Rank on Rank Estimates by Race and Ethnicity

	Intercept	Slope
	(1)	(2)
Asian	51.69	0.03
Black	45.91	0.05
Hispanic or Latino/a	45.46	0.05
Native American	41.94	0.12
Pacific Islander	54.50	-0.02
White	45.68	0.08
Two or More	44.32	0.06

Source: Authors' calculations using data from the Education Research and Data Center (ERDC).
Notes: The intercepts represent the predicted rank of children with parents in the lowest rank (0 out of 100) of reported family income. Flatter slopes (closer to zero) indicate greater opportunities for economic mobility (up or down). Families with other/unreported race are excluded from this regression analysis.

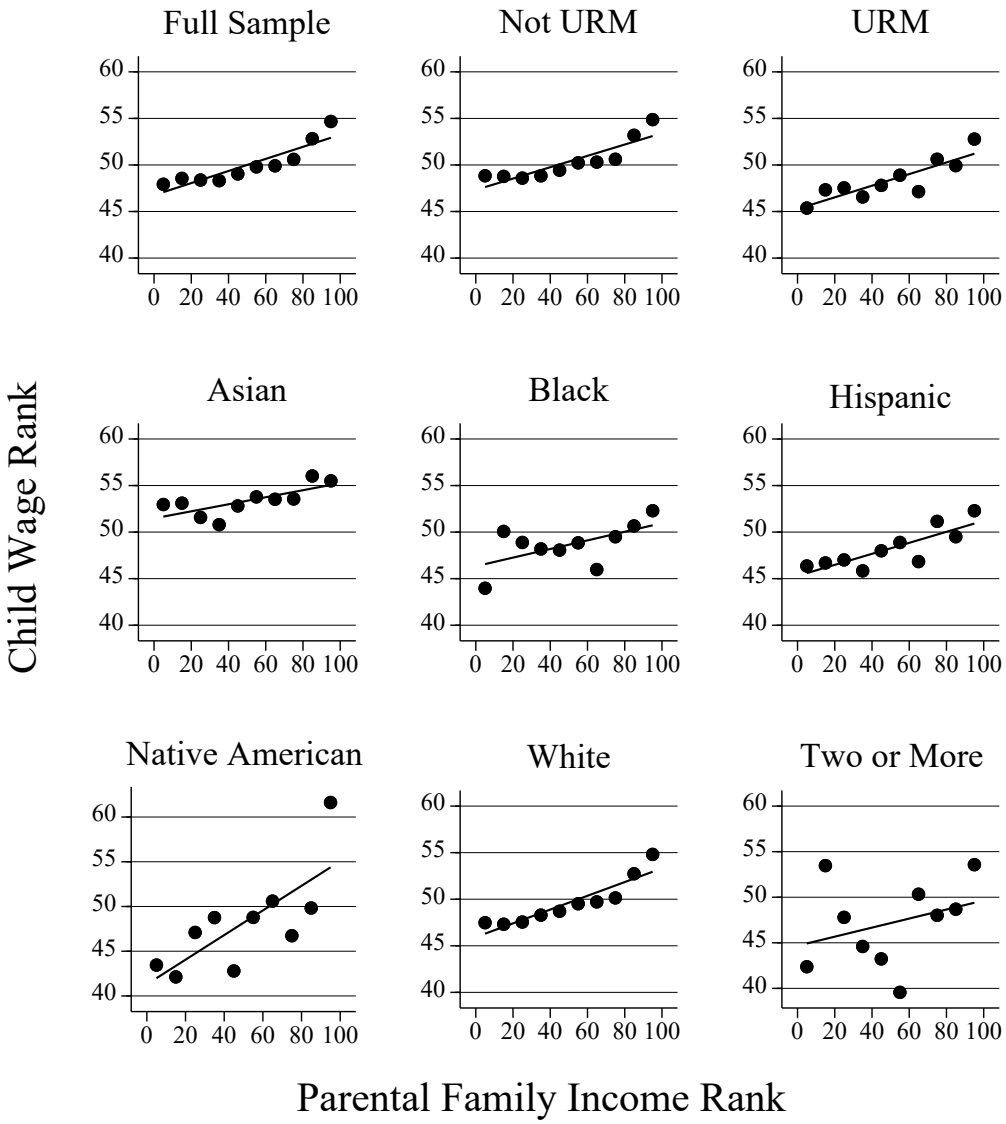
To illustrate how to compute conditional expectations using slopes and intercepts, we select Asian children and Native American children because they have the sharpest contrast. The estimated slope for Asian children is .03 (with an intercept of 52) while the slope for Native American children is .10 (with an intercept of 42). Asian children with parents at the top percentile (100) are expected to rank at the 55th percentile. This is computed by adding the intercept of 52 with the slope times 100 (52+.03*100). To compute the expected rank of Native American children with parents at the top percentile, the operation is 42 plus .12 times 100. Their expected rank is 54. The table shows that the intercepts and slope representing the conditional expectation for Native American children are the most concerning out of all the racial and ethnic groups due to lower overall wages earned and their lack of social mobility (downward or upward). Their slope is the steepest, while their intercept is substantially lower than all other groups.

We also present estimates using a rank-on-rank regression model comparing native English speakers to non-native English speakers on Table 6. The table displays that intergenerational economic mobility patterns are very similar and are essentially indistinguishable between native English speakers and non-native English speakers. Both the intercepts are close to 47 and the slopes are between .05 and .07. Similar to Figure 1, Figure 2 also displays that the rank-on-rank patterns are described well by a linear model. The figure illustrates the very similar patterns of mobility for both groups. Due to the potential that mobility rates may differentially affect Hispanic children and Asian children by native language, we also check for differential patterns by language and race.[12] These rank-on-rank regressions results are presented in our Appendix Figure A1. We find no evidence that patterns of mobility are affected by language nativity for either Hispanic or

[12] We select these two groups because Chinese and Spanish are the most common foreign languages spoken by non-White children.

Asian families. This suggests that the primary channel affecting intergenerational mobility by race is unlikely to occur by language.

Figure 1: Mobility by Race & Ethnicity



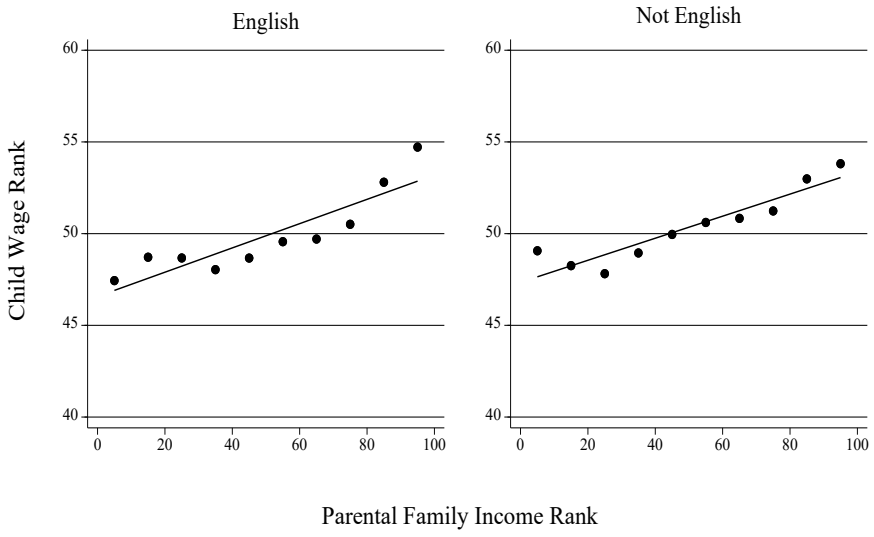
Source: Authors' calculations using data from the Education Research and Data Center (ERDC).

Table 6: Rank on Rank Estimates by Primary Language

	Intercept	Slope
	(1)	(2)
English	46.35	0.07
Not English	47.56	0.05

Source: Authors' calculations using data from the Education Research and Data Center (ERDC).
Notes: The intercepts represent the predicted rank of children with parents in the lowest rank (0 out of 100) of reported family income. Flatter slopes (closer to zero) indicate greater opportunities for economic mobility (up or down).

Figure 2: Intergenerational Mobility by Primary Language



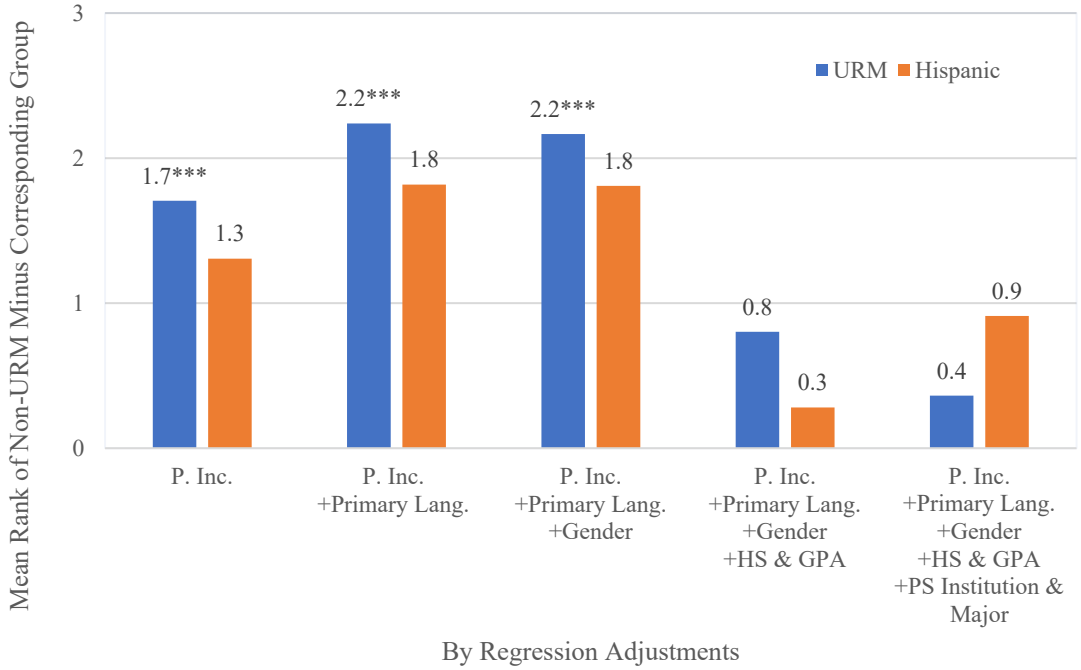
Source: Authors' calculations using data from the Education Research and Data Center (ERDC).

4.3 Focusing on the Underrepresented Population

In Section 4.1 we presented evidence that children in all racial and ethnic groups in the URM category are less likely to move up to the top quartile from the bottom quartile compared to their non-URM peers. In order to better understand the factors that are contributing to these differences in upward mobility, we study the URM wage rank gap of children from the bottom quartile of parental family income. The wage rank gap is the difference in wage rank between URM and non-URM children after they graduate from a postsecondary institution. We conduct a regression analysis that sequentially adds a richer set of control variables that have the potential to explain why this gap exists. Figure 3 displays the wage rank gap between Non-URM (Asian & White

children) and URM children as each control is added. We also display the gap between Non-URM and Hispanic children separately.[13]

Figure 3: Racial Gaps in Wage Rank for Children from the Lowest Quartile of Parental Family Income



Source: Authors' calculations using data from the Education Research and Data Center (ERDC).
Notes: PS Institution denotes postsecondary institution. URM denotes people that are American Indian, Alaska Native, Black, African American, Hispanic, Native Hawaiian, and Other Pacific Islanders. Non-URM denotes people that are Asian or White. Each bar represents a corresponding regression adjusted rank gap estimate. *** p<0.01, ** p<0.05, * p<0.1.

The left most set of bars displays the gap when parental income is used as the only control. This displays that URM children born to parents in the lowest quartile rank of income are expected to rank 1.7 points (out of 100) less than non-URM children. The gap is larger for the URM group overall compared to Hispanic children. The difference implicitly displays that non-Hispanic children from less represented groups (Black, Native American and Pacific Islander) experience a greater disparity. The second set of bars display that nativity of language does not explain or reduce any of the gap. In the third set of bars, we observe gender does not explain any of the gap. In the fourth set of bars, we add the child's high school attended and their high school GPA as controls. This has a substantial effect on reducing the overall URM gap. This reduction appears to be primarily driven by Hispanic children. In our final set of bars, we add the postsecondary institution attended, degree earned, and the major as the final set of controls. While this substantially reduces

[13] The small sample sizes of other minority groups do not allow us to separate them out. Hispanic children account for 68% of this URM sample.

the gap between URM and non-URM children, this explains very little of the wage rank gap experienced by the Hispanic children overall.

Our findings display that student characteristics and factors correlated with the high school attended and high school performance explain most of the wage disparity for Hispanic children. Alternatively, for non-Hispanic URM children (who account for only 32 percent of the URM population), student characteristics and factors correlated with the high school attended and high school performance do not explain most of the wage disparity. For Non-Hispanic URM children, the postsecondary institution, degree, and major explains a substantial amount of the remaining gap.

These findings suggest that additional support and equity-minded improvements in local communities and K-12 education can largely address the challenge of improving the upward mobility of Hispanic children. One solution that may be fruitful is addressing the inequity in access to effective and qualified teachers. Recent research has shown that effective teachers continue to sort away from schools and/or classrooms (within schools) with higher proportions of URM students (James & Wykcoff, 2022; Goldhaber, Quince, & Theobald, 2018; Kalogrides & Loeb, 2013). These inequities may be even more pronounced in in-demand subjects such as math and science.

For non-Hispanic URM children, the challenge appears to be more than just improving local communities and K-12 education.[14] Factors correlated with the postsecondary institution attended and degree earned has a substantial impact on non-Hispanic URM children. This suggests that improving the trajectory (and completion rates) of the types of degrees earned by non-Hispanic URM children may be a fruitful point of focus for future policy innovations and research. These trajectories may be altered by improving the transition from high school into competitive and lucrative majors. Potential solutions include increased access to small learning communities in large postsecondary STEM lecture courses (Solanki, McPartlan, Xu & Sato, 2019) and increased access to STEM summer programs at universities for promising high school students (Cohodes, Ho & Robles, 2022). Using a randomized control trial, Cohodes et al. (2022) find that a 6-week STEM summer program at an elite technical university increased four-year graduations with a STEM degree by 33 percent.

5 Industries Supporting Upward Mobility

UI records also allow us to observe the industries employing the adult children in our study. We leverage this information to better understand and identify the industries responsible for hiring upward movers, both in aggregate form and by disaggregating across type of degrees (associate or bachelor's) earned and by demographic subgroups.

We present two types of analysis related to industries. First, we identify the proportion of all upward movers entering each industry classified by the first two digits of the assigned North

[14] Our controls using high schools implicitly control for the community where the high school is located.

American Industry Classification System (NAICS) code. We define upward movers based on whether a child enters the top quartile rank in wage earnings if they are from families with parental incomes in the bottom quartile.[15] This allows us to identify the industries that account for most of the upward mobility for the children from families with lowest income in the state. The caveat in using this first method is that industries employing the most high-wage workers may employ the most upward movers due to sheer size. In order to better identify industries that contribute to better overall intergenerational mobility (in relation to other industries), our second approach compares the industry participation rates of upward movers (from the bottom quartile to the top quartile) to the participation rates of children remaining in the top (from the top quartile to the top quartile). In a world with equal opportunities and preferences, our analysis would show that the difference in participation rates between children that are upward movers and children remaining in the top should be close to zero.

In Table 7, we display the proportion of upward movers (from the bottom quartile to the top quartile) by industry. The name of the industry and the corresponding NAICS code are presented in the left-most column. In the 2nd column, we display the participation rates of all children that are upward movers by industry. The sum across the column is, by definition, 100%. This column displays that the professional, scientific, and technical service industry accounts for 15% of all upward movers. They are followed by the health care and social assistance (13%), and manufacturing industries (10%). The remaining columns disaggregate participation rates by degrees earned, URM status, and by whether English is a native language for the upward mover. Many of the findings are unsurprising given traditional education requirements for certain occupations. The professional, scientific and technical services, educational services, and information industries are more likely to be a bachelor's degree holder compared to an associate degree holder. The only three industries which account for more upward movers with more associate degree holders than bachelor's degree holders are healthcare and social assistance, manufacturing, and accommodation and food services.[16] When observing patterns by race, we observe that URM children are substantially more likely to be upward movers than non-URM children in educational services, healthcare and social assistance, and public administration. On the rightmost columns, we observe that the only industry with substantial differences in hiring upward movers by language nativity is healthcare and social assistance, where non-native English speakers are substantially more likely to enter the field than native English speakers.

[15] These are the same quartiles used throughout our study. They are generated from a full analytic sample of need-based aid recipients that have graduated from public Washington high schools and colleges.

[16] Stevens, Kurlaender, & Grosz (2019) have also documented large wage premiums for associate degree holders in the health care field across California Community Colleges.

Table 7: Industry Participation Rates of Children that Transition from the Bottom Quartile to the Top (By Sub-Group)

Industry (NAICS Code)	All (%)	Degree (%)		Race/Ethnicity (%)		Primary Lang. (%)	
		Assoc.	Bach.	URM	Not URM	Eng.	Not Eng.
Agriculture, Forestry, Fishing and Hunting (11)	0.6	-	-	-	-	-	-
Utilities (22)	0.7	-	-	-	-	-	-
Construction (23)	3.8	5.5	2.9	3.7	3.9	4.1	3.1
Manufacturing (31,32,33)	10.6	11.7	10.0	9.5	11.0	11.0	9.7
Wholesale Trade (42)	4.0	4.3	3.8	2.6	4.2	4.0	4.1
Retail Trade (44,45)	8.1	7.0	8.7	7.9	8.1	8.2	7.9
Transportation and Warehousing (48,49)	2.4	2.8	2.3	3.5	2.2	2.2	3.0
Information (51)	8.8	5.4	10.5	5.9	9.3	8.8	8.7
Finance and Insurance (52)	5.6	4.3	6.2	4.4	5.9	5.5	5.8
Real Estate Rental and Leasing (53)	2.0	1.4	2.2	-	-	2.1	1.6
Professional, Scientific, and Technical Svc. (54)	15.0	9.5	17.8	9.2	16.3	14.7	15.6
Management of Companies and Enterprises (55)	0.6	-	-	-	-	-	-
Admin/Supp: Waste Mgt. and Remediation (56)	5.8	7.8	4.7	6.4	5.7	6.0	5.3
Educational Services (61)	9.9	5.7	12.0	15.2	8.5	9.6	10.3
Health Care and Social Assistance (62)	12.9	21.4	8.6	15.4	12.6	10.9	17.0
Arts, Entertainment, and Recreation (71)	0.5	-	-	-	-	-	-
Accommodation and Food Services (72)	1.9	2.9	1.4	-	-	2.1	1.4
Other Services, except Public Admin (81)	1.1	-	-	-	-	-	-
Public Administration (92)	5.8	5.7	5.8	7.9	5.3	6.5	4.3
Total Percent	*100*	*100*	*100*	*100*	*100*	*100*	*100*
Total Children (n)	2454	830	1624	455	1922	1641	813

Source: Authors' calculations using data from the Education Research and Data Center (ERDC).
Notes: Small cell sizes are censored. URM denotes people that are Black, Hispanic, Native American, or Pacific-Islander. Non-URM denotes people that are Asian or White. Quartiles are calculated from the full analytic sample.

Next, we turn to Table 8 in order to display differential industry participation rates by comparing the rates of participation of bottom to top quartile movers with top to top quartile stayers. Key takeaways emerge from this table. First, the health care and social assistance industry disproportionately accounts for more upward movers than stayers. This trend is also substantial for children that are URM and non-native English speakers. We also find that upwards movers are substantially less likely to participate in the educational services industry. This is entirely driven by non-URM children. Non-URM children from families in the bottom quartile of income are substantially less likely to enter the top quartile in wages compared to their non-URM peers from families in the top quartile of income. When we turn our attention to professional, scientific, and technical services (in aggregate) we find only a small differential in participation rates between upward movers than stayers. This pattern does not hold when we focus on URM children. Our

findings suggest it may be more challenging for the most economically disadvantaged URM children to enter this industry as a high wage earner. A similar pattern also appears in the manufacturing sector. Previously in Section 4, we uncovered that the upward mobility gaps for URM children were substantially explained by factors correlated with the high school attended (e.g., location, quality of school, etc.) and high school academic performance. It is likely that these same factors contribute to this pattern.

Table 8: Differences in Industry Participation Rates between Children Transitioning from the Bottom Quartile to Top and Children that Transition from The Top Quartile to the Top Quartile (By Subgroup)

Industry (NAICS Code)	All (%)	Degree (%)		Race/Ethnicity (%)		Primary Lang. (%)	
		Assoc.	Bach.	URM	Not URM	Eng.	Not Eng.
Agriculture, Forestry, Fishing and Hunting (11)	0.1	-	-	-	-	-	-
Utilities (22)	-0.1	-	-	-	-	-	-
Construction (23)	-0.3	0.1	-0.9	-0.8	-0.2	-	-
Manufacturing (31,32,33)	-0.4	1.1	-1.0	-4.5	0.3	0.3	-4.4
Wholesale Trade (42)	0.6	0.9	0.5	-	-	-	-
Retail Trade (44,45)	0.7	-1.6	1.5	0.9	0.6	0.8	0.6
Transportation and Warehousing (48,49)	0.3	0.3	0.3	-	-	-	-
Information (51)	0.9	1.8	1.8	-0.7	1.4	1.1	-1.8
Finance and Insurance (52)	0.0	-0.9	0.6	-	-	-0.2	1.7
Real Estate Rental and Leasing (53)	-0.2	-0.9	0.1	-	-	-	-
Professional, Scientific, and Technical Svc. (54)	-1.1	0.2	0.4	-7.2	0.2	-1.7	3.5
Management of Companies and Enterprises (55)	0.2	-	-	-	-	-	-
Admin/Supp: Waste Mgt. and Remediation (56)	0.1	0.8	-0.7	1.0	-0.1	0.7	-6.0
Educational Services (61)	-3.9	-1.4	-3.1	1.6	-5.3	-4.1	-4.6
Health Care and Social Assistance (62)	3.5	2.2	1.0	7.2	3.2	1.4	8.1
Arts, Entertainment, and Recreation (71)	-0.1	-	-	-	-	-	-
Accommodation and Food Services (72)	-0.3	-0.3	-0.6	-	-	-	-
Other Services, except Public Admin (81)	-0.3	-	-	-	-	-	-
Public Administration (92)	0.2	-3.0	0.9	0.5	0.0	-	-
Total Percent	*0*	*0*	*0*	*0*	*0*	*0*	*0*

Source: Authors' calculations using data from the Education Research and Data Center (ERDC).
Notes: The following operation calculates the differences. (Bottom to Top Rate) - (Top to Top Rate). Industries with small cell sizes are censored. URM denotes people that are American Indian, Alaska Native, Black, African American, Hispanic, Native Hawaiian, and Other Pacific Islanders. Non-URM denotes people that are Asian or White. Industries with small cell sizes are censored. Raw counts used to construct this table are presented in the appendix Table A1 and Table A2.

6 Discussion of Findings

We explore the patterns of intergenerational economic mobility of Washingtonians graduating from public high schools and postsecondary institutions by linking financial aid records with administrative earning records. The findings are very promising. All racial groups (and non-native English speakers) with parental family income ranks below the 50th percentile move up in rank

after they graduate from a postsecondary institution and enter the labor market. This strongly suggests that public postsecondary institutions and financial aid in Washington provide an important lever in addressing economic disparities that exist for historically disadvantaged populations.

Although our findings are generally positive, we identify a concerning disparity that is consistent across all racial subgroups in the URM category. There appears to be an opportunity ceiling for URM children. Children of all races and ethnicities in the URM category are less likely to make it to the top quartile in wages earned regardless of whether they come from families with parents in the highest income quartile or the lowest income quartile. The striking consistency across race and quartiles of parental family income suggests there are still widespread and systemic barriers to equitable economic opportunities. Since our analytic sample only comprises need-based aid recipients (42% of the overall population graduating from public high schools and postsecondary institutions in Washington), this ceiling may be more severe if we included children that do not receive aid (a population whose family income we cannot observe). A similar phenomenon has been documented in multiple studies over time, especially for Black and Native American families (e.g., Duncan, 1968; Chetty et al., 2020). This suggests that while increasing postsecondary educational attainment is a crucial lever in reducing inequities in the labor market, it is alone unlikely to eliminate it.

We also document two separate trends when we disaggregate our URM vs. non-URM wage gap analysis. 76 percent of the wage gap between URM and non-URM children from the lowest quartile of parental family income can be explained by demographic characteristics and observable elements related to human capital accumulation. These elements include high school attended, high school GPA, postsecondary institution attended, degree attained, and major. For Hispanic children, pre-postsecondary factors explain most of the gap. This suggests that much of the opportunity gaps for Hispanic children can be addressed by improving the environment of communities they live in and the K-12 public schools they attend.

For other URM children, this is not the case. Postsecondary related factors such as postsecondary institution attended, degree earned, and field of study are an important component in reducing the wage disparity for non-Hispanic URM children. Overall, this suggests that economic inequalities for Black, Native American, and Pacific Islander children extend beyond localized factors (e.g., neighborhoods, community schools, and families). A potential source for these differential inequalities may be that Black, Native American, and Pacific Islanders may be marginalized because they make up a small proportion of the people graduating from Washington's postsecondary institutions and high wage occupations. Potential solutions include increased access to small learning communities in large postsecondary STEM lecture courses (Solanki et al., 2019) and increased access to STEM summer programs at universities for promising high school students (Cohodes et al., 2022). Both these programs have the potential to improve a sense of belonging in fields where people are numerically underrepresented by race.

While labor market discrimination is likely to contribute to some of the wage gap between URM and non-URM postsecondary graduates, we believe there are more factors that should be

investigated.[17] In our industry analysis, we observe that upward moving URM children are much more likely to enter healthcare and social assistance, while much less likely to enter manufacturing and professional, scientific, and technical service industries than their non-URM peers. While these findings do not allow us to prescribe that it is better for URM people to target entry into specific industries, it identifies focal industries for future studies. A better understanding of training (including K-12 and postsecondary programs), workplaces, and recruitment are needed to determine best practices. It is likely that the most effective initiatives will enhance the continuum that connects a child's academic career to employment (Washington STEM Education Innovation Alliance, 2022). This knowledge would be helpful for both policy makers and people that are planning their career paths.

We are also cognizant that we study a large but select population of people that receives need-based aid who graduate from public postsecondary institutions in Washington.[18,19] There are substantial differences in the rates that students enroll and/or complete postsecondary education by race (Kwakye, Kibort-Crocker & Pasion, 2020). The path towards completing a postsecondary education is complex and involves many challenges that our report does not address. Future research should continue to investigate policies and practices that address the inequities in skill formation, access to training and jobs, and the transitional outcomes for what occurs to students soon after they graduate from a postsecondary institution.

[17] For a review of literature on labor market discrimination, see Neumark (2018).

[18] Currently, our data only allows us to observe parental income for children that receive aid. As Washington's longitudinal data system expands, we hope that ERDC's data system will eventually allow us to observe UI wage records for all parents of children in our educational system.

[19] The quality of data for apprenticeships and professional certificates is also limited but improving. We expect future work to investigate these paths toward economic mobility as well.

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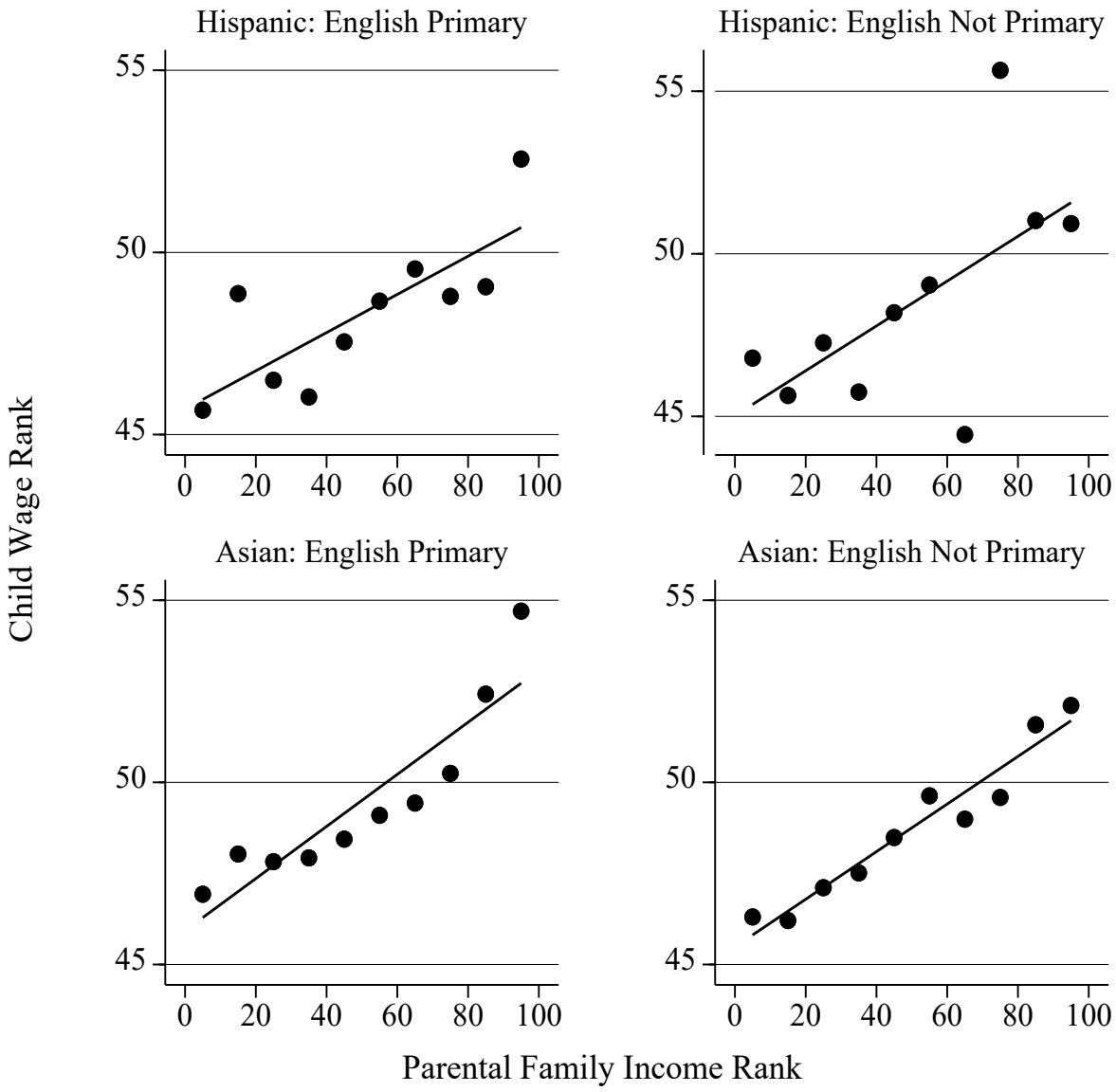
Appendix Figures and Tables

Figure A1: Intergenerational Mobility by Race & Language



Source: Authors' calculations using data from the Education Research and Data Center (ERDC).
Notes: We report on Hispanic and Asian people by language because their race/ethnicity account for most of the non-native English speakers in our sample.

Table A1: Number of Children that Transition from the Bottom Quartile to the Top By Industry & Subgroup

Industry (NAICS Code)	All	Degree		Race/Ethnicity		Primary Lang.	
		Assoc.	Bach.	URM	Not URM	Eng.	Not Eng.
Agriculture, Forestry, Fishing and Hunting (11)	14	-	-	-	-	-	-
Utilities (22)	18	-	-	-	-	-	-
Construction (23)	93	46	47	17	74	68	25
Manufacturing (31,32,33)	260	97	163	43	211	181	79
Wholesale Trade (42)	98	36	62	12	81	65	33
Retail Trade (44,45)	199	58	141	36	155	135	64
Transportation and Warehousing (48,49)	60	23	37	16	42	36	24
Information (51)	215	45	170	27	179	144	71
Finance and Insurance (52)	137	36	101	20	113	90	47
Real Estate Rental and Leasing (53)	48	12	36	-	-	35	13
Professional, Scientific, and Technical Svc. (54)	368	79	289	42	313	241	127
Management of Companies and Enterprises (55)	14	-	-	-	-	-	-
Admin/Supp: Waste Mgt. and Remediation (56)	142	65	77	29	109	99	43
Educational Services (61)	242	47	195	69	163	158	84
Health Care and Social Assistance (62)	317	178	139	70	242	179	138
Arts, Entertainment, and Recreation (71)	13	-	-	-	-	-	-
Accommodation and Food Services (72)	46	24	22	-	-	35	11
Other Services, except Public Admin (81)	28	-	-	-	-	-	-
Public Administration (92)	142	47	95	36	102	107	35
Total Children (n)	*2454*	*830*	*1624*	*455*	*1922*	*1641*	*813*

Source: Authors' calculations using data from the Education Research and Data Center (ERDC).
Notes: Small cell sizes are censored. URM denotes people that are Black, Hispanic, Native American, or Pacific-Islander. Non-URM denotes people that are Asian or white. The transition analysis is based on parental family income rank and child income rank after postsecondary graduation.

Table A2: Number of Children that Transition from the Top Quartile to the Top by Industry & Subgroup

Industry (NAICS Code)	All	Degree		Race/Ethnicity		Primary Lang.	
		Assoc.	Bach.	URM	Not URM	Eng.	Not Eng.
Agriculture, Forestry, Fishing and Hunting (11)	15	-	-	-	-	-	-
Utilities (22)	29	-	-	-	-	-	-
Construction (23)	139	30	109	11	126	-	-
Manufacturing (31,32,33)	375	59	316	34	330	340	35
Wholesale Trade (42)	115	19	96	-	-	-	-
Retail Trade (44,45)	253	48	205	17	229	235	18
Transportation and Warehousing (48,49)	72	14	58	-	-	-	-
Information (51)	269	20	249	16	244	243	26
Finance and Insurance (52)	190	29	161	-	-	180	10
Real Estate Rental and Leasing (53)	75	13	62	-	-	-	-
Professional, Scientific, and Technical Svc. (54)	549	52	497	40	496	519	30
Management of Companies and Enterprises (55)	12	-	-	-	-	-	-
Admin/Supp: Waste Mgt. and Remediation (56)	196	39	157	13	177	168	28
Educational Services (61)	472	39	433	33	425	435	37
Health Care and Social Assistance (62)	323	107	216	20	290	301	22
Arts, Entertainment, and Recreation (71)	23	-	-	-	-	-	-
Accommodation and Food Services (72)	73	18	55	-	-	-	-
Other Services, except Public Admin (81)	49	-	-	-	-	-	-
Public Administration (92)	190	48	142	18	164	-	-
Total Children (n)	*3419*	*556*	*2863*	*243*	*3078*	*3171*	*248*

Source: Authors' calculations using data from the Education Research and Data Center (ERDC).
Notes: Small cell sizes are censored. URM denotes people that are Black, Hispanic, Native American, or Pacific-Islander. Non-URM denotes people that are Asian or White. The transition analysis is based on parental family income rank and child income rank after postsecondary graduation.