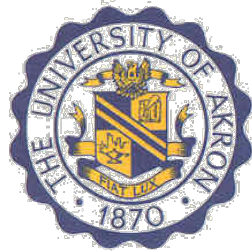*Senior Project*
Department of Economics

Impact of Household Structure and Race On The

Importance of Jail and College in Intergenerational

Mobility

Marissa Williams
August 2018

Advisors: Dr. Elizabeth Erickson
Dr. Michael Nelson

Abstract

This study focuses on sons who are born to single mothers and the determining factors that impact their intergenerational mobility compared to those who grew up in a two-parent household. More specifically, this paper looks at the differences between white and black sons and their ability to move up in income rank compared to where their parents stood in income ranking. It is determined that jail time is particularly important in the outcomes of black sons from both single and two-parent households in the bottom 20th percentile. White son's intergenerational mobility whose parents were in the same percentile are more likely to be impacted by attendance in college rather than jail. Thus it is determined that single parenthood does not impact differences in jail and college for those in the bottom quintile. However, jail and college can often be related, as someone who goes to jail is unlikely to attend college and vise versa. Comparatively, for those in top quintile, white sons who come from both single and two parent households do not see a difference in the unimportance of jail and college. Black sons who grew up in the top quintile by a single parent are impacted by college but not jail. Black sons who grew up in the top quintile by two parents are impacted by jail and not college. In conclusion, parental structure does not appear to have a strong effect on the importance of college and jail in intergenerational mobility, however racial differences exist.

Table of Contents

Statement of Research/Motivation

Single parenthood can impact a child in a number of different ways. Statistically, single parents have less income because there may be only one individual in the household earning money. This may in turn affect the kind of human capital investment that can be made in a child, the amount of time a parent may be able to spend with a child, and even the quality of education they can provide (Heckman, 2017). The childhood of an individual is often an important predictor of the success of a child. According to Heckman, early on development of a child is a critical time in which individuals learn both cognitive and character skills. As a result, a supportive childhood filled with stimulation and education can result in a stronger economy in the long run (Heckman, 2017). Single parenthood may lead to less attention and financial resources which in turn could impact a child's involvement in crime and their ability to go to college. Both crime and college are large factors in the income of an individual and their ability to rise above their parent(s) in income. However household structure may not be the reason why jail and college is important in determining child outcomes.

Jail and college can also impact the success of a child when it occurs in a two parent household. Jail can be detrimental to one's income due to loss of earnings, diminishing human capital, and the difficulty of finding work when absent from the workforce for a period of time after a conviction. Additionally, a criminal record can be detrimental when seeking employment, as a history of crime can be a deterrent for many employers. College on the other hand is related to a positive increase in earnings for an individual as when an individual invests more into their human capital they often have

more job prospects with higher wages. This paper will specifically focus on these two variables, household structure, and how they relate to the outcomes of an individual.

Intergenerational mobility looks at how an individual falls below or rises above their own parent's income. This is important because it is a way we can measure economic growth and inequality. This paper will specifically explore the differences in importance of jail and college in intergenerational mobility with a focus on sons who grew up in a single and two-parent households[1]. For the purposes of our analysis the data will be broken down by five separate quintiles so that we can capture the varying importance of jail and college for sons who came from different income levels. We will however specifically look at only the bottom and top quintiles because these individuals are less likely to experience relative mobility than those in the middle (Pew Research Center., 2011). This becomes more problematic for those in the bottom because rising out of poverty and achieving the American dream is hard. Additionally, we explore any racial differences that exist on whether college or jail is more important in terms of outcomes of sons. Overall the goal with the results of this research question is to propose feasible policy that would aid individuals who were born in the bottom quintile to rise in rankings.

---

[1] Data limitations preclude performing a similar analysis for daughters.

Motivation:Why Should Anyone Care About This?

It is suggested that single parenthood negatively impacts the ability for an individual to be successful in their adulthood. It is important to understand what kind of impact being raised by a single parent has on their offspring so that we can provide support if needed to those who may be feeling these adverse effects. If single parenthood truly has a negative impact on intergenerational mobility it may be important for policy makers to explore ways to support single mothers. If single parenthood is not a factor, then policy that changes income of the quintile may be a better method of increasing intergenerational ranking.

This paper serves to also explore how racial differences in both single and two-parent households might lead to varying effects in adulthood. Racial differences can further our understanding on why one demographic may see greater rates of the "American Dream" than others. It is important to identify these factors and in what quintile they are in so that policy can address the inequality among races. Jail and college may be two factors of particular concern because they both impact human capital which in turn may affect income. By assessing the important of jail and college and the differences that exist between race and household structure we may be able to implement policy that would help those who grow up in the bottom quintile rise above their parents.

Place of Topic in Existing Literature

Intergenerational mobility in economic terms is defined as the change in income standing throughout generations. Intergenerational mobility can be measured in two different ways. The first is absolute mobility- which is determined by an individual's real income in dollar amount compared to that of their parents. The issue with absolute mobility is that most individuals make more money than their parents in real terms after adjusting for inflation over time (Pew Research Center., 2011). When using this measure it appears that the American dream is quite feasible.

Chetty (2014) on the other hand approaches intergenerational mobility in relative terms. That is, he uses income distributions-rather than change over time-to compare how an individual measures up to their parents in income. One way that this can be explained is through the use of the ladder. If you were born at one point at the ladder relative mobility measures how far you moved up or down in adulthood compared to your parents. Using this measure in America we see that individuals in the bottom and the top rarely see much change in ranking. This is called "Stickiness in the Ends", because individuals who are born within this rank often are stuck there across many generations (Pew Research Center., 2011).

Relative mobility and absolute mobility are both important factors in measuring economic growth and sometimes can be related to one another. If an individual experiences a high amount of relative mobility than they are likely to also experience absolute mobility as well. However if an individual experiences a small amount of absolute mobility and everyone also experiences a similar amount of absolute mobility

than they would not move in very far in terms of relative mobility. Thus, although absolute mobility is important in assessing economic growth and intergenerational mobility, relative gives us a measure that more adequately captures how an individual rises in income compared to the rest of society, that is in inequality (Pew Research Center., 2011).

Chetty (2014) uses relative mobility to measure intergenerational mobility across generations by ranking parents by their income and then measuring the change in rank of their child. He explores the factors that could impact the change of income rank of a child. In his analysis, one of the most important factors is location. Chetty determines that areas where there is high relative mobility have the following locational characteristics: less segregation, smaller amounts of income inequality, better schools (specifically primary), larger amounts of social capital (measured through strength of social networks and community involvement), and a greater amount of family stability (Chetty, Hendren, Kline, & Saez, 2014). Family stability in this analysis was measured on a neighborhood scale, that is they measured how many single parents, divorced adults, and two parent households were in each neighborhood. They found that commuter zones (a geographical area similar to a metro area in which counties are aggregated; includes both rural and urban areas) that had high amounts of single parents/divorced adults saw a significant negative coefficient of -.66 in upward mobility of income ranking (Chetty, Hendren, Kline, & Saez, 2014).

In a later analysis, Chetty also looked at racial differences of single parenthood. Chetty found that absent fathers for a black low-income son can be especially detrimental to their future income. However Chetty and his colleagues find that the impact of father

presence is actually more likely to be driven by community characteristics. That is if a community has a low amount of black men (father figures) due to incarceration or mortality rates then black sons are likely to feel more negative effects as a result. Low income white sons do not appear to be impacted as much by father presence (Chetty, Hendren, Jones, & Porter, 2018). However, in exploring racial gaps between intergenerational mobility he finds that household structure does not have a large impact. This means that although single parenthood might negatively affect intergenerational mobility, it does little to explain the racial gaps in intergenerational mobility by household income (Chetty, Hendren, Jones, & Porter, 2018). Nonetheless, other research suggests that single parenthood is often connected to negative outcomes of children.

Sociologists and economists exploring the outcomes of children from single parent households often examine the emotional, educational, and even behavioral impact that such upbringing could have. Arguably parents provide two things: time investment and financial resources. Additionally they serve as role models for their children, in both their choices in education or character. With a single parent household, we can expect that there is less time devoted to a child due to job schedules and obligations. Mother-only families are also more likely to be in poverty due to lower earnings of women, lack of child care, and even absence of child support (Kalil, DeLeire, Jayakody & Chin 2001). Yet, according to Chetty et al 2018 parental marital status seems to have little impact on the intergenerational mobility gap (the difference between black and white sons in mobility using the same variables) between black and white sons (Chetty, Hendren, Jones, & Porter, 2018). This was concluded by researchers when they looked at the white-black intergenerational gap across all parental income. However when they did not

control for parental income (only household structure) they found that marital status is much more impactful in the white-black intergenerational gap of income ranking (Chetty, Hendren, Jones, & Porter, 2018). This could mean that parental income is a larger predictor of a child's income rank than household structure.

Other researchers have found that the amount of education a mother had is a strong predictor of child outcomes (Kearney & Levine, 2017). Chetty and his colleagues also find that parental education is particularly important in explaining intergenerational mobility, but their results also find that parental education does little to explain racial differences in intergenerational mobility among black and white sons (Chetty, Hendren, Jones, & Porter, 2018). This is interesting in terms of parental income as it is found that white women from lower income levels have more education than black women on average (Chetty, Hendren, Jones, & Porter, 2018). Nonetheless, this could in part explain the difference in importance of education for white sons who grew up with parents in the bottom of the income rank.

Black men on the other hand are more likely to be incarcerated than white men, which may be a factor in the lower rates of college attendance among black men. Incarceration could stifle intergenerational mobility because it prevents individuals from investing in their own human capital and/or deteriorate the human capital they have already incurred. Gary Becker's theory of human capital can help explain why an individual may make choices on crime during a lifetime. Becker in "Crime and Punishment: An Economic Approach" argues that criminals are rational human beings just like everyone else. That is, an individual will commit a crime if it means it will improve their well-being given the severity of punishment and the alternatives to income

(Becker, 1968). Thus, an individual, especially one who grew up in a low income rank may not find it beneficial to invest in their own human capital, but rather involve themselves in crime. Additionally, individuals who grow up in single parent households may find themselves with less resources than children who grow up in two parent households due to less financial support. This may in turn impact a child's decision to pursue higher education, go directly into the workforce, or even participate in crime (Becker, 1962)

Crime thus is a particular concern in our analysis as incarceration has a significant impact on the earnings of an individual. Incarceration can be related to negative labor outcomes for a number of reasons. One way is that incarceration may lead to more criminal activity due to the connections made inside the institutions. Additionally, former inmates may decide to continue to rely on illegal income. One economic argument is that if job prospects in a community are low than the appeal of crime becomes greater (Kearney & Levine, 2017). Black men might be particularly susceptible as overall black men are five to eight times more likely to be incarcerated during their lifetimes than whites (Western & Sirois, 2017). When black individuals are incarcerated their peanilites tend to be more severe than their white counterparts. Additionally, those who are incarcerated are more likely to come from poor minority areas. Blacks on average are estimated to have lower total earnings post incarceration than whites even when controlling for things such as health issues, human capital investment, and criminal involvement (Western & Sirois, 2017). This means jail could heavily influence the ability for black men to rise in income ranking.

When addressing the literature on intergenerational mobility it is important to acknowledge that an individual's income is influenced by their human capital. Both jail and college are two factors that are significantly related to human capital. Additionally, things like incarceration rates and college attendance may be affected by both the financial and emotional resources given to an individual during childhood. This investment may be a result of household structure, or even racial differences. Thus, it is important to focus on these factors that would improve intergenerational mobility for individuals, particularly at the bottom of the income ranking.

Discussion of Relevant Economic Theory That Will Inform the Empirical Model

Chetty's theory of intergenerational mobility examines the economic opportunity available to an individual given several factors throughout their life such as race, household structure, and where they grew up. Chetty theorizes that there are many different factors that impact a child's ability to rise above their parent and pursue the American dream. These factors include parental education, neighborhood of childhood, and ability (in terms of intelligence) (Chetty, Hendren, Jones, & Porter, 2018). Chetty's economic theory and model is heavily reliant on Becker and Tomes (1979). Becker and Tomes (1979) looked at inequality and intergenerational mobility as a product of human and nonhuman capital from their parents. They look at characteristics that have been inhertited by their parents such as race, ablity, and even "family reputation". They also look at the probability that a parent invests in their children and to what degree these investments look like.

This model will expand Chetty's research and analyze what makes education an important factor for low-income white sons and jail an important factor for low income black sons. We look at the extremes (top and bottom) because individuals born in these income ranks have less intergenerational mobility and human capital may one way to explain this.

For households (single or two-parent) in the bottom quintile we can expect the relationship below:

College

College may be a way for individuals to rise above parents

Kid Outcome

Change in Son's Income Ranking compared to that of their parent(s) income ranking.

Household Structure

Lack of Financial Resources

Parents likely to be more educated
Less crime in higher income neighborhood

Jail

Individuals more likely to involve themselves in crime if neighborhood has high crime rate. Lack of education/lower paying job prospects may affect involvement in crime.

Positive

Negative

Empirical Model

Empirical Framework

Chetty et al. (2018) intergenerational conceptual framwork builds upon Becker and

Tomes (1979) own steady state model. First it is assumed that the relationship between

children's mean income rank considering their parent's mean income rank is linear fo all

races. This linear function (1) incorporates both relative and absolute mobility:

$$y_{it} = \alpha_r + \beta_r y_{i,t-1} + \varepsilon_{it},$$

In this model, *i* represents a family, *t* represents a generation, *r* represents race, and y_{it}

represents the income percentile of an individual. $\alpha_r \in [0,1]$ measures the absolute rank

mobility for the mean rank of children whose parents have the lowest income rank of 0.

On the other hand, $\beta_r \in [0, 1]$ measures the rate of relative mobility, which as explained

in prior sections is the relationship between the mean percentile rank of children and their

parent's income ranks for a specific race. This model assumes that the parameters β_r and

α_r do not vary across generations.

To understand how this linear function of mean ranking works over generations (t), the

following function (2) is used:

$$\bar{y}_{r,t+s} = \alpha_r \frac{1 - \beta_r^s}{1 - \beta_r} + \beta_r^s \bar{y}_{rt}$$

As $s \to \infty, \beta_r^s \to 0$ if $\beta_r < 1$. This means the mean rank of individuals of a particular race

converges in the long run into a steady-state in which the following function (3) shows:

$$\bar{y}_{rt} = \bar{y}_{r,t-1} = \bar{y}_r^{SS} = \frac{\alpha_r}{1 - \beta_r}$$

We can use functions 2 and 3 to show that the differences between races over generations (t). We can use $\Delta \bar{y}_t = \bar{y}_{r1t} - \bar{y}_{r2t}$ to represent the difference between two races (in our case black and white) for a particular generation t. After establishing this, we must look at the racial interpretations of both relative and absolute mobility.

Both relative and absolute mobility that does vary race can be shown with: $\alpha_r = \alpha$ and $\beta_r = \beta$ for all r. Because there is no difference in race, the racial gap in mean ranks in the steady state is $\Delta \bar{y}^{SS} = 0$ because in the end all races converge to the same mean regardless of what their initial rank is. The rate at which this convergence occurs however is dependent on the rate of relative mobility β. Chetty et al (2018) find that racial disparities in income would fall quite rapidly across generations if relative mobility was constant for all races.

If constant relative mobility does not vary by race but absolute mobility does we have a situation in which: $\beta_r = \beta$ and $\Delta\alpha = \alpha_w - \alpha_b$. $\Delta\alpha$ represents the racial difference in absolute mobility, which we call intergenerational gap. In the steady-state the gap is shown by:

$$\Delta\bar{y}^{SS} = \frac{\Delta\alpha}{1 - \beta}$$

In this equation, the steady-state racial disparity is affected proportionally to the size of the intergenerational gap. Thus, reducing racial disparities in the long run would require reducing intergenerational gaps. The following function shows this relationship

over generations:

$$\Delta\bar{y}_{t+s} = (1 - \beta^s)\Delta\bar{y}^{SS} + \beta^s\Delta\bar{y}_t$$

Thus. the gap in generation t is given by a weighted average (determined by the rate of relative mobility) of the steady-state gap and current gap.

Nonetheless, in actuality both α_r and β_r vary by races. Thus steady-state disparities and rates of converges are determined by rates of relative and absolute mobility determined by race.

Model Used In Analysis

An OLS model was used to determine the relationship between the incomes of son's in relation to their parental household (single parent compared to two parent household). This model is formulated using Chetty et al (2018) family-level factors function:

$$y_{i,c} = \alpha + b_p y_{i,p} + b_w \text{white}_i + b_{wp}\text{white}_i \cdot y_{i,p} + \gamma X_i + \varepsilon_i,$$

Where $y_{i,c}$ is the child's individual income rank, $y_{i,p}$ is the parent's household income rank, white$_i$ representing if a child is white, and Xi representing a series of covariates. The goal of this model if to measure how various factors of X can cause differences in racial intergenerational gaps.

 The two models used for this paper is as follows and will be run for each race:

SON_RANK_1PARr=B0+B2PARENT_RANK+B3KID_MARRIEDr+B4KID_HOURS _r+B5KID_COLLEGEr+B6KID_JAILr+ e

SON_RANK_2PARr=B0+B2PARENT_RANK+B3KID_MARRIEDr+B4KID_HOURS

_r+B5KID_COLLEGEr+B6KID_JAILr+ e

Where subscripts:

r=race

This model is based on Chetty, Hendren, Jones, & Porter (2018) but includes both college and jail variables of sons. Chetty et al (2018) created their own data set, by using Census data and tax returns. Individuals were linked to their parents, and categorized by their parental income ranking. Thus there are only 100 observations, each observation representing a parental income percentile. For the purposes of Chetty's analysis, he looked at those who were in the bottom 25th percentile and the top 25th percentile, similar to what was done in this paper. For their paper the researchers focused on parental variables and used the following model[2]:

SON_RANKrg=B0+Parent_RANKB2+PARENT_EDUCATIONB3+PARENT_WEALT

HB4+e.

Parent Wealth represents a multitude of variables such as: homeownership, mortgage payments, and how many cars they own.

---

[2] Prior to this paper's analysis the model used in Chetty et al 2018 was replicated with what data was available. Results were similar to what was found in Chetty's work.

The model used in this paper focuses on variables that deal with the son's outcomes in terms of education and jail. These child outcomes may be a result of parental factors which are accounted for in the Chetty model. I hypothesize that household structure will not make a difference in terms of the importance of child outcomes (college and jail). However, I do anticipate that I will see racial differences in the importance of college and jail-especially for those at different quantile levels.

Table 1:Variable Definitions

Variables	Expected Sign	Mean (Standard Deviation)
SON_RANK_1PAR_black	-	43.2961 (6.2139179)
SON_RANK_1PAR_white	-	54.3275 (6.2139179)
SON_RANK_2PAR_black	+	46.9261 (7.1248674)
SON_RANK_2PAR_white	+	56.5734 (7.1248674)
PARENT_RANK	+	50.5 (29.0114920)
KID_MARRIED_black	+	20.46024 (7.3479605)
KID_MARRIED_white	+	52.5987 (7.7375367)
KID_HOURS_black	+	27.4048 (4.7354636)
KID_HOURS_white	+	36.7472 (3.2097761)
KID_COLLEGE_black	+	50.1798 (16.036782)
KID_COLLEGE_white	+	57.1798 (16.6494494)
KID_JAIL_black	-	7.78985 (4.5230609)
KID_JAIL_white	-	1.9967890 (1.5447953)

*All variables and variable descriptions came directly from the data used in "Race and Economic Opportunity in the United States: An Intergenerational Perspective" Online Data Table 1

This model will be run four times to account of the two races and two household structures. We can expect the same signs for each variable, however the parameter estimates are likely to be different.

SON_RANK_1PAR_(race): Mean child individual income rank for children with single parents; by race and gender. The expected sign of this variable is negative because being raised by a single parent might mean they had less resources and attention.

SON_RANK_2PAR_(race): Mean child individual income rank for children who grew up in a two parent household; by race and gender. The expected sign for this variable is positive because if an individual has two parents they may have grown up with more resources to support their development and had received more education.

PARENT_RANK:Parent household income rank. The expected sign for this variable is positive as the higher a parent's income is the higher the son's income is likely to be.

KID_MARRIED_(race): Percentage of children married by race. Child's marital status is defined based on the marital status used when filing his or her 2015 tax return. The expected sign for this variable is positive as an individual that is married is likely to have a higher household income because there is the possibility of two earners.

KID_HOURS_(race):Mean number of weekly working hours over the past year by race and gender. Hours of work are measured in the ACS for children sampled at age 30 or older. They are defined as total annual hours of work divided by 51 and are coded as zero for those who do not work. The expected sign for this variable is positive as an increase in hours worked would lead to higher income ranking.

KID_COLLEGE_(race):Percentage of children with college attendance by race and gender College attendance is defined as having obtained "at least some college credit" at age 20 or older according to the 2005-2015 ACS. The expected sign of this variable is

positive because if an individual is attending college they are likely to have a higher income.

KID_JAIL_(race):Percentage of children incarcerated by race and gender. Incarceration is defined as being incarcerated on April 1, 2010 using data from the 2010 Census short form. The expected sign of this variable is negative because incarceration negatively impacts wages and job prospects.

Data Source and Description:

Online Data Table 1:National Statistics by Parent Income Percentile, Gender, and Race

This data set was taken from The Equality of Opportunity Project's website. This data set contains statistics about various outcomes by parent income percentile, child's gender and race for children born in years 1978-83. The sample size included 20 million children. The data on the children's income comes from their mean household income in 2014-15 when they are in their mid-thirties. Parental income is measured from mean household income between 1994-2000 when the child cohort was between 11 and 12. The data set is organized by parental income ranking, making for 100 observations each one representative of parental income rank. This data set also breaks down information in terms of race and gender, however not all variables are available for both genders. Due to this limitation it was not possible to run this analysis for daughters.

Model Estimation and Hypothesis Testing

H0: SON_RANK_1PAR_(race) & SON_RANK_2PAR_(race) = 0

Household structure does not impact the importance of jail and college in

intergenerational mobility.

H1:SON_RANK_1PAR_(race) & SON_RANK_2PAR_(race) ≠ 0

Household structure does impact the importance of jail and college in intergenerational

mobility.

An ordinary least squares (OLS) model was used to estimate the relationship. This is

because it is expected that parental household income (regardless of household structure)

and child income has a linear relationship.

Interpretation of Results:

All of the results of the analysis are included in Appendices A-B. In each appendix the results are shown for single and two-parent household for each race. These results show the five variations of the models that was run. The first three were run in order to replicate the model used in Chetty et al (2018). Jail and college variables in some cases (dependent on race/household structure) improved the explanatory power of the model. Theoretically jail and college were added to incorporate human capital decisions in an individual and capture the impact on income.

Following the empirical framework of Chetty et al (2018) that was stated in the previous sections, we can interpret both the intercept and the slope to give us insight into the relationship between parental and child income ranking. The slopes (β_r) gives us the relative mobility and the intercepts (α_r) gives us the average percentile that children reach given their parental income ranking. We can compare these values at the bottom 20th percentile to find differences associated with household structure and examine differences across race.

The coefficient for parent_rank (β_r) for black sons in the bottom 20th percentile who grew up with one parent is 0.036, thus we find that a 10 percentile increase in parents' rank is associated with a 0.36 percentile increase in children's rank on average. The intercept for black sons' with one parent in the bottom 20th percentile is 27.25, meaning that a black son born to the lowest-income two-parent household is likely to reach the 27.25 percentile on average. The coefficient for parent_rank (β_r) for black sons in the bottom 20th percentile who grew up with two parents is 0.12, thus we find that a 10 percentile increase in parents' rank is associated with a 1.2 percentile increase in

children's rank on average. The intercept for black sons' with two parents in the bottom 20th percentile is 42.57, meaning that a black son born to the lowest-income two-parent household is likely to reach the 42.57 percentile on average. Thus we can assume that a black son born to the bottom 20th percentile is better off on average if they grow up in a two parent household.

The coefficient for parent_rank (β_r) for white sons in the bottom 20th percentile who grew up with one parent is -0.34, thus we find that a 10 percentile increase in parents' rank is associated with a 3.4 percentile decrease in children's rank on average. This may mean that 10 percentile increase in parental income is not enough to help a child rise above their parent. The intercept for white sons' with one parent in the bottom 20th percentile is 11.96, meaning that a white son born to the lowest-income one parent household is likely to reach the 11. 96 percentile on average. The coefficient for parent_rank (β_r) for white sons in the bottom 20th percentile who grew up with two parents is -0.003 thus we find that a 10 percentile increase in parents' rank is associated with a 0.03 percentile decrease in children's rank on average. The intercept for white sons' with two parent in the bottom 20th percentile is 19.24, meaning that a white son born to the lowest-income two-parent household is likely to reach the 19.24 percentile on average. Like that of black sons born to two parents, on average white sons are better off on average with two parents.

Our results show that overall there is a racial difference in the importance of jail and college in intergenerational mobility. Household structure among races however appears to be unrelated to the importance of jail and college. Overall however household structure does impact intergenerational mobility of sons. We measure the differences of

intergenerational mobility by plugging in the coefficients and getting the y estimates. For the purposes of our analysis we will look at both the white-black intergenerational gap (the difference between black sons and white sons outcomes (y)) and the single-two parent intergenerational gap (the difference between sons raised by one parent and sons raised by two parents (y)).

Shown in Appendix A are the results for the bottom quintile where we find that jail is negatively related and significant for black sons of both single and two-parent households in terms of mobility. For white sons in the bottom quintile jail is not significant but college is. With just looking at the significant of the variables, household structure for the bottom quintile does not have an impact on the importance of college and jail in intergenerational mobility. However there are racial differences in what is important in determining intergenerational mobility. One reason why black sons may be proportionally more affected by jail is due to the high rates of incarceration. Additionally although it is less clear from our data, college might be more significant for white sons due to their mother's own educational experience or even the neighborhood they grew up in.

When we plug in all of the coefficients for a black son with a single parent we get a value of 27.83 percentiles When we plug in all of the coefficients for a black son with two parents we get a value of 42.49 percentiles. The single-two parent household gap for black sons thus is 14.66 percentiles (the difference between 27.83 percentiles from 42.49 percentiles). When we plug in all of the coefficients for a white son with a single parent we get a value of 12.2 percentiles. When we plug in all of the coefficients for a white son with two parents we get a value of 19.68 percentiles. The single-two parent household

gap for white sons is 7.48 percentiles. The black-white intergenerational gap for sons raised by single parents in the bottom quintile is 15.63 percentiles. The black-white intergenerational gap for sons raised by two parents in the bottom quintile is 22.81 percentiles. This means that the racial gap is greater for sons raised by two parents than single parents.

Located in Appendix B we have the highest income quintile, where we once again examine the results of our regression. For black sons who grew up in a single parent household, college is a positive significant predictor of intergenerational mobility. For a black son who grew up in a two parent household jail is a negative significant predictor of intergenerational mobility while college is not significant. White sons' mobility on the other hand is not impacted by jail or college at this quintile level as neither variables are significant. Jail may not be significant because white men on average are incarcerated at lower rates than black men. Additionally, those who may go to jail in this quintile come from very wealthy families where high profile lawyers are equipped to shorten the sentence. College may also not be significant because of the inherited wealth in the family. Thus college attendance may not have a large impact on the wealth of an individual.

The household structure gap for individuals in the highest quintile is quite dramatic. When we plug in all of the coefficients for a black son with a single parent we get a value of -22.12 percentiles. When we plug in all of the coefficients for a white sone with a single parent we get a value of 39.44 percentiles. For black sons in the highest quintile we get a single-two parent intergenerational gap of 61.56 percentiles (the difference between -22.12 and 39.44). When we plug in all of the coefficients for a white

son with a single parent we get a value of -46.31 percentiles. When we plug in all of the

coefficients for a white son with two parents we get a value -77.97 percentiles. For white

sons in the highest quintile we get a single-two parent intergnerational gap of -31.66

percentiles (the difference between -46.31 and -77.97). Although these gaps are

extremely significant, the white son gap is nearly half of that of black sons. This could

mean that in the top quintile household structure may be more important for black

individuals. In terms of the black-white intergenerational gaps we see also see

differences. For individuals who were raised by single parents the black-white

intergenerational gap is 24.19 percentiles (the difference between -22.12 and -46.31). For

individuals who were raised by two parents the black-white intergenerational gap is

117.41 percentiles. This gap is extremely large and may have something to do with the

significantly lower amount of black individuals who are in the top quintile.

Overall we can use our adjusted r^2 to find if jail and college added explanatory

power to our regression. As shown in Appendix B, for the bottom quintile our adjusted r^2

value is very close to one for all regressions. This means that including these two

variables explains in part the relationship between parental income rank and change in

son's income ranking. In Appendix C, for the top quintile our adjusted r^2

value is much weaker for black son who grew up with a one parent, which has a value of

0.57. Thus, it can be assumed that we are not capturing an important variable in

explaining the change of rank of a son with a single mother. The rest of the adjusted

adjusted r^2 values for the top quintile are close to 1.

Conclusion and Policy Recommendations:

In conclusion, household structure does not appear to impact the importance of jail and college in intergenerational mobility among quintiles, especially for those at the bottom. Instead overall household income of parents appear to be a greater predictor of a son's outcome. For those who grew up with parent(s) in the lowest quintile, jail (for black sons) and college (for white sons) appear to be very important. The differences in results for intergenerational gaps compared to Chetty et al (2018) are most likely attributed to the impact of jail and college. These two factors heavily influence an individual's human capital, thus will in turn affect their income. In order to get individuals into higher income ranking it is important to encourage more individuals to go to college and discourage crime. Since household income as a whole (regardless of structure) is a large factor in determining the mobility of an individual it is important to raise individuals into the next income ranking. One way to get those stuck in the bottom out may be through pushing them into the next income quintile through policy.

This could be done is by expanding the EITC (Earned Income Tax Credit). The Earning Income Tax Credit provides a tax incentive for individuals of low-income standing, specifically ones with children. If this tax credit is enough to bump parents into the next income bracket we will find that jail is no longer significant factor in intergenerational mobility for black sons. In terms of racial gaps, it may be important to specifically work on prison reform so that incarceration does not have as drastic lasting effects on income. Additionally, it is clear that there is some racial disparities between imprisonment, thus policy that could improve the marginalization of black individuals may also be beneficial.

Limitations

It is also important to acknowledge several different limitations to the study. One is that the jail variable only tells us that an individual was incarcerated. It does not explain what kind of crime they served time for or how long their sentence was. Both of these things can impact re-entry into the workforce as well as jobs available to them. Additionally the college variable does not tell us the highest level of educational attainment-which would also impact the son's outcomes. These limitations were likely to have affected our results.

References

Alexander, K., Entwisle, D., & Olson, L. (2014). *Long Shadow, The: Family*

    Background, Disadvantaged Urban Youth, and the Transition to Adulthood.

    Russell Sage Foundation. Retrieved from

    http://www.jstor.org/stable/10.7758/9781610448239

Becker, G. (1962). Investment in Human Beings: Investment in Human Capital: A

    Theoretical Analysis *The Journal of Political Economy Vol. LXX, No. 5, Part 2.*

    (p. 9 - 49)

Becker, G. S. (1968). *Crime and Punishment: An Economic Approach. The Economic*

    Dimensions of Crime,13-68. doi:10.1007/978-1-349-62853-7_2

Becker, G. S., & Tomes, N. (1979). An Equilibrium Theory of the Distribution of Income

    and Intergenerational Mobility. *Journal of Political Economy,87*(6), 1153-1189.

    doi:10.1086/260831

Chetty, R., Hendren, N., Jones, M., & Porter, S. (2018). Race and Economic Opportunity

    in the United States: An Intergenerational Perspective. doi:10.3386/w24441

Chetty, R., Hendren, N., Kline, P., & Saez, E. (2014). Where is the Land of Opportunity?

    The Geography of Intergenerational Mobility in the United States.

    doi:10.3386/w19843

Heckman, J. J. (2017). Invest in Early Childhood Development: Reduce Deficits,

    Strengthen the Economy. Retrieved July 17, 2018, from

    https://heckmanequation.org/resource/invest-in-early-childhood-development-

    reduce-deficits-strengthen-the-economy/.

Holzer, H. J. (2007). Collateral Costs: The Effects of Incarceration on the Employment and Earnings of Young Workers. *IZA*. Retrieved July 17, 2018, from http://repec.iza.org/dp3118.pdf

Kalil, A., DeLeire, T., Jayakody, R., & Chin, M. (2001). *Living arrangements of single-mother families: Variations, transitions, and child development outcomes* Harris School of Public Policy Studies, University of Chicago, Working Papers: 0120. Retrieved from http://ezproxy.uakron.edu:2048/login?url=https://search-proquest-com.ezproxy.uakron.edu:2443/docview/56790971?accountid=14471

Kearney, M., & Levine, P. (2017). The Economics of Non-Marital Childbearing and The "Marriage Premium for Children". *NBER Working Paper No. 23230*. doi:10.3386/w23230

Pew Research Center. (2011). Economic Mobility and the American Dream. Retrieved from http://www.pewtrusts.org/en/research-and-analysis/video/2011/economic-mobility-and-the-american-dream

Western, B., & Sirois, C. (2017). Racial Inequality in Employment and Earnings after Incarceration. *Harvard*. Retrieved July 9, 2018.

Appendix A: Quintiles 1-20

Dependent Variable:Black Son Who Grew Up With One Parent

Regressor		1	2	3	4	5
par_pctile		0.39247***	0.03606	0.02811	0.04262	0.03613
		(0.02267)	(0.04614)	(0.04673)	(0.03739)	(0.03904)
kid_married_black_pooled			1.91203***	1.77454***	0.78239**	0.80620**
			(0.24071)	(.27547)	(.37799)	(.38551)
kid_hours_black_male				0.11648	0.09543	0.07298
				(0.11397)	(0.09076)	(0.09729)
kid_jail_black_male					-0.4206***	-0.38697***
					(0.13077)	(0.14092)
kid_college_black_male						0.05564
						(0.07676)
Intercept		20.27653***	11.66024***	10.92315***	29.13754***	27.25194***
		(.27153)	(2.34716)	(2.45253)	(5.98435)	(6.61424)
Summary Statistics						
SER(RMSE)		0.58453	0.27710	0.27674	0.21980	0.22336
Adjusted R^2		0.9402	0.9866	0.9866	0.9915	0.9913
n		20	20	20	20	20

The standard error is given in parenthesis. The individual coefficient is statistically
Significant at the *10% level **5% level or ***1% signficant level using a two-sided test

Dependent Variable:White Son Who Grew Up With One Parent

Regressor		1	2	3	4	5
par_pctile		.42920***	-0.02993	0.00901	-0.01202	-0.03430
		(0.02277)	(0.06318)	(0.06383)	(0.06851)	0.06261
kid_married_white_pooled			1.05439***	0.80187**	0.68019***	0.52863**
			(0.08318)	(0.19853)	(0.24259)	(0.22996)
kid_hours_white_male				0.27051	0.19136*	0.21032
				(0.15598)	(0.18071)	(0.16304)
kid_jail_white_male					-0.61921	-0.64485
					(0.69945)	(0.63021)
kid_college_white_male						0.17926**
						(0.08466)
Intercept		29.05695***	0.59098	1.97459	12.52636	11.96152
		(0.27271)	(5.20813)	(4.98960)	(12.93452)	(11.65508)
Summary Statistics						
SER(RMSE)		0.58706	0.29437	0.27839	0.28029	.25250
Adjusted R^2		0.9491	.9872	.9886	.9884	.9906
n		20	20	20	20	20

The standard error is given in parenthesis. The individual coefficient is statistically
Significant at the *10% level **5% level or ***1% signficant level using a two-sided test

Dependent Variable:Black Son Who Grew Up With Two Parents

Regressor		1	2	3	4	5
par_pctile		0.32439***	0.08959	0.09142	0.10399	0.12016
		(0.02114)	(0.07278)	(0.07603)	(0.07438)	(0.07683)
kid_married_black_pooled			1.25962***	1.29131***	0.43189	0.37259
			(0.37970)	(0.44820)	(0.75195)	(0.75871)
kid_hours_black_male				-0.02685	-0.04508	0.01083
				(0.18544)	(0.18056)	(0.19148)
kid_jail_black_male					-0.36464*	-0.44929*
					(0.26016)	(0.27734)
kid_college_black_male						-0.13859
						(0.15106)
Intercept		34.19089***	21.92671***	22.09661***	37.87421***	42.57071***
		(0.25327)	(3.70245)	(3.99035)	(11.90508)	(13.01725)
Summary Statistics						
SER(RMSE)		0.54521	0.43710	0.45026	0.43727	0.43960
Adjusted R^2		0.9250	0.9518	0.9489	0.9518	0.9513
n		20	20	20	20	20

The standard error is given in parenthesis. The individual coefficient is statistically
Significant at the *10% level **5% level or ***1% signficant level using a two-sided test

Dependent Variable:White Son Who Grew Up With Two Parents

Regressor		1	2	3	4	5
par_pctile		0.33209***	0.01631	0.02414	0.01635	-0.00315
		(0.01565)	(0.04342)	(0.04749)	(0.05196)	(0.04491)
kid_married_white_pooled			0.72518***	0.67445***	0.62936***	0.49678***
			(0.09808)	(0.14771)	(0.18399)	(0.16493)
kid_hours_white_male				0.05435	0.02502	0.04161
				(0.11605)	(0.13706)	(0.11694)
kid_jail_white_male					-0.22942	-0.25185
					(0.53050)	(0.45200)
kid_college_white_male						0.15682***
						(0.06072)
Intercept		42.00405***	15.54812***	15.82609***	19.73562**	19.24152**
		(0.18763)	(3.57930)	(3.71219)	(9.81032)	(8.35927)
Summary Statistics						
SER(RMSE)		0.40369	0.20231	0.20712	0.21259	0.18110
Adjusted R^2		0.9594	0.9898	0.9893	0.9887	0.9918
n		20	20	20	20	20

The standard error is given in parenthesis. The individual coefficient is statistically
Significant at the *10% level **5% level or ***1% signficant level using a two-sided test

Appendix B: Quintiles 80-100

Dependent Variable:Black Son Who Grew Up With One Parent

Regressor		1	2	3	4	5
par_pctile		0.27526***	0.77971***	0.57769**	0.066751**	0.42293
		(0.09837)	(0.22545)	(0.21775)	(0.29706)	(0.31763)
kid_married_black_pooled			-0.71818***	-0.75246***	-0.79459***	-0.84068***
			(0.29597)	(0.26323)	(0.28450)	(0.27073)
kid_hours_black_male				0.79338**	0.91184**	0.91747***
				(0.33645)	(0.43106)	(0.40805)
kid_jail_black_male					0.93847	2.16395
					(2.104671)	(2.07395)
kid_college_black_male						0.37610*
						(0.22716)
Intercept		26.64668***	3.58493	-3.88175	-17.33680	-25.15949
		(8.92077)	(12.3676)	(11.42770)	(31.69825)	(30.28097)
Summary Statistics						
SER(RMSE)		2.53679	2.24966	1.99761	2.04881	1.93935
Adjusted R^2		0.2644	0.4215	0.5439	0.5202	0.5701
n		20	20	20	20	20

The standard error is given in parenthesis. The individual coefficient is statistically
significant at the *10% level **5% level or ***1% signficant level using a two-sided test

Dependent Variable:White Son Who Grew Up With One Parent

Regressor		1	2	3	4	5
par_pctile		0.35905***	-0.23451	-0.08517	-0.22598	-0.23661
		(0.03114)	(0.21522)	(0.21706)	(0.28539)	(0.67035)
kid_married_white_pooled			2.89148***	1.05859	1.24729	1.24795
			(1.04042)	(1.39057)	(1.42932)	(1.47994)
kid_hours_white_male				1.41448*	1.29785*	1.29841*
				(0.76612)	(0.79043)	(0.81878)
kid_jail_white_male					-5.12047	-5.12862
					6.61850	(0.66458)
kid_college_white_male						0.01175
						(0.66458)
Intercept		31.54092***	-94.57501**	-51.42688	-43.44098	-43.50782
		(2.82403)	(45.44339)	(48.52810)	(50.22084)	(52.12027)
Summary Statistics						
SER(RMSE)		0.80307	0.68522	0.64129	0.64949	0.67228
Adjusted R^2		0.8741	0.9083	0.9197	0.9177	0.9118
n		20	20	20	20	20

The standard error is given in parenthesis. The individual coefficient is statistically
significant at the *10% level **5% level or ***1% signficant level using a two-sided test

Dependent Variable:Black Son Who Grew Up With Two Parents

Regressor		1	2	3	4	5
par_pctile		0.61245***	0.22481***	0.21356***	0.08237	0.13214*
		(0.04400)	(0.05742)	(0.06398)	(0.07132)	(007834)
kid_married_black_pooled			0.55188***	0.54991***	0.60999***	0.61937***
			(0.07538)	(0.07735)	(0.06831)	(0.06677)
kid_hours_black_male				0.04419	-0.12883	-0.12998
				(0.09886)	(0.10350)	(0.10064)
kid_jail_black_male					-1.37076***	-1.62011***
					(0.49141)	(0.51150)
kid_college_black_male						-0.07652
						(0.05603)
Intercept		1.96617	19.68780***	19.27189***	38.92477***	40.51646***
		(3.99040)	(2.14955)	(3.35787)	(7.58662)	(7.46823)
Summary Statistics						
SER(RMSE)		1.13475	0.57299	0.58697	0.49191	0.47830
Adjusted R^2		0.9103	0.9771	0.9760	0.9831	0.9841
n		20	20	20	20	20

The standard error is given in parenthesis. The individual coefficient is statistically
significant at the *10% level **5% level or ***1% signficant level using a two-sided test

Dependent Variable:White Son Who Grew Up With a Two Parents

Regressor		1	2	3	4	5
par_pctile		0.48078***	-0.21081*	-0.07195	-0.14111	-0.18060
		(0.02536)	(0.12685)	(0.10572)	(0.13895)	(0.32616)
kid_married_white_pooled			3.36905***	1.66484***	1.75752***	1.75997***
			(0.61321)	(0.67726)	(0.69589)	(0.72008)
kid_hours_white_male				1.31517***	1.25788***	1.25996***
				(0.37313)	(0.38484)	(0.39838)
kid_jail_white_male					-2.51496	-2.54522
					(3.22235)	(3.34082)
kid_college_white_male						0.04362
						(0.32336)
Intercept		24.84323*'	-122.10214	-81.98346*	-78.06112*	-78.30929***
		(2.29941)	(26.78374)	(23.63489)	(24.45102)	(25.35961)
Summary Statistics						
SER(RMSE)		0.65388	0.40386	0.31233	0.31622	0.32711
Adjusted R^2		0.9497	0.9808	0.9885	0.9882	0.9874
n		20	20	20	20	20

The standard error is given in parenthesis. The individual coefficient is statistically
significant at the *10% level **5% level or ***1% signficant level using a two-sided test

Dependent Variable:White Son Who Grew Up With a Two Parents					
Regressor	1	2	3	4	5
par_pctile	0.48078***	-0.21081*	-0.07195	-0.14111	-0.18060
	(0.02536)	(0.12685)	(0.10572)	(0.13895)	(0.32616)
kid_married_white_pooled		3.36905***	1.66484***	1.75752***	1.75997***
		(0.61321)	(0.67726)	(0.69589)	(0.72008)
kid_hours_white_male			1.31517***	1.25788***	1.25996***
			(0.37313)	(0.38484)	(0.39838)
kid_jail_white_male				-2.51496	-2.54522
				(3.22235)	(3.34082)
kid_college_white_male					0.04362
					(0.32336)
Intercept	24.84323**	-122.10214	-81.98346*	-78.06112*	-78.30929***
	(2.29941)	(26.78374)	(23.63489)	(24.45102)	(25.35961)
Summary Statistics					
SER(RMSE)	0.65388	0.40386	0.31233	0.31622	0.32711
Adjusted R^2	0.9497	0.9808	0.9885	0.9882	0.9874
n	20	20	20	20	20

The standard error is given in parenthesis. The individual coefficient is statistically significant at the *10% level **5% level or ***1% signficant level using a two-sided test

SAS Programming:

data one;

set marissa;

if par_pctile>20 then delete;

run;

data two;

set one;

proc reg;

model kir_1par_black_male=par_pctile;

model kir_1par_black_male=par_pctile kid_married_black_pooled;

model kir_1par_black_male=par_pctile kid_married_black_pooled

kid_hours_black_male;

```
model kir_1par_black_male=par_pctile kid_married_black_pooled

kid_hours_black_male kid_jail_black_male;

model kir_1par_black_male=par_pctile kid_married_black_pooled

kid_hours_black_male kid_jail_black_male kid_college_black_male;

Run;

data one;

set marissa;

if par_pctile>20 then delete;

run;

data two;

set one;

proc reg;

model kir_1par_white_male=par_pctile;

model kir_1par_white_male=par_pctile kid_married_white_pooled;

model kir_1par_white_male=par_pctile kid_married_white_pooled

kid_hours_white_male;

model kir_1par_white_male=par_pctile kid_married_white_pooled

kid_hours_white_male kid_jail_white_male;

model kir_1par_white_male=par_pctile kid_married_white_pooled

kid_hours_white_male kid_jail_white_male kid_college_white_male;

run;


data one;
```

```
set marissa;

if par_pctile>20 then delete;

run;

data two;

set one;

proc reg;

model kir_2par_black_male=par_pctile;

model kir_2par_black_male=par_pctile kid_married_black_pooled;

model kir_2par_black_male=par_pctile kid_married_black_pooled

kid_hours_black_male;

model kir_2par_black_male=par_pctile kid_married_black_pooled

kid_hours_black_male kid_jail_black_male;

model kir_2par_black_male=par_pctile kid_married_black_pooled

kid_hours_black_male kid_jail_black_male kid_college_black_male;

run;

data one;

set marissa;

if par_pctile<21 then delete;

if par_pctile>40 then delete;

run;

data two;

set one;

proc reg;
```

```
model kir_1par_black_male=par_pctile;

model kir_1par_black_male=par_pctile kid_married_black_pooled;

model kir_1par_black_male=par_pctile kid_married_black_pooled

kid_hours_black_male;

model kir_1par_black_male=par_pctile kid_married_black_pooled

kid_hours_black_male kid_jail_black_male;

model kir_1par_black_male=par_pctile kid_married_black_pooled

kid_hours_black_male kid_jail_black_male kid_college_black_male;

Run;
```
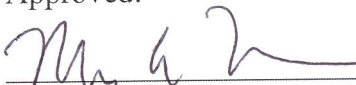
Impact of Household Structure and Race on the Importance of Jail and College in
Intergenerational Mobility
Marissa Williams
Department of Economics
Honors Research Project
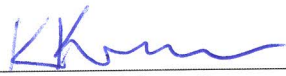
Submitted to

The Honors College

Approved: Accepted:

_____Date 1 Aug 2018   _____ Date 1 Aug 2018
Honors Project Sponsor (signed)   Department Head (signed)

Michael Nelson   Michael Nelson
Honors Project Sponsor (printed)   Department Head (printed)
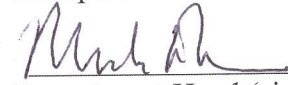
           (by M. Nelson)   (by. M Nelson
E ERICKSON   Date 1 Aug 2018   E. ERICKSON Date 1 Aug 2018
Reader (signed)   Honors Faculty Advisor (signed)

Elizabeth ERICKSON   ELIZABETH ERICKSON
Reader (printed)   Honors Faculty Advisor (printed)

_____Date 8/3/18   _____ Date _____
Reader (signed)   Dean, Honors College

Kara Kvaran
Reader (printed)