Analysis of Socioeconomic Mobility in the US - Sophie Ryan

Introduction

Is the "American Dream" dead? As social and economic mobility in the United States continues to decline, it is important to consider the contributing factors. The "American Dream" offers a promise of the chance for children to do better than their parents. While this may have been a possibility at one point in time, the sentiment of young people today is that the dream is long gone. In Chetty et. al.'s "The fading American dream: Trends in absolute income mobility since 1940" (2017) it is reported that "rates of absolute mobility have fallen from approximately 90% for children born in 1940 to 50% for children born in the 1980s." As these rates continue to fall and unemployment skyrockets, researching the specific factors that contribute to better opportunities can help raise awareness about inequality and find ways to combat it.

Abstract

In order to understand the specific elements that create opportunities for improving quality of life in the United States, I chose to explore differences in economic and social factors between parents and children. What makes it easier or harder for people to climb the ladder? With a whole slew of executive orders being passed, including the revocation of Executive Order 11246 which ensured equal employment opportunities for women and minorities, I wanted to explore data that could shed light on this situation. My research will utilize regression models to investigate how the social and economic position of a parent affects that of the child, with respect to gender and race.

Data

My data will come from the 2022 GSS (General Social Survey). This is a personal interview survey designed to understand social characteristics, behaviors, and attitudes of all adults in the United States. The original data set includes 4,149 observations and 1,185 variables. The variables include a wide range of questions pertaining to demographics, social mobility, educational attainment, employment, family dynamics, religious and political beliefs, and more. I am focused specifically on how race, gender, and their interaction plays into social and economic mobility, so I selected a few variables that I believe will best represent this phenomenon. These variables provide information on the respondent, as well as the respondents' father and mother. These include educational attainment, occupational prestige, socioeconomic index, and standard of living. I believe these variables will provide valuable insight into social and economic mobility. I plan to compare these factors in male and female respondents for different races to see if there are any discrepancies.

Exploratory Analysis

The original data contained 4,149 observations and 1,185 variables. I narrowed the data down to 30 relevant variables and 4,046 observations, and eventually selected the 4 main variables I mentioned above.

Individual Variables

One limitation of this data is that only 3 race options are included. 1 denotes "white" with 2,641 respondents, 2 denotes "black" with 772 respondents, and 3 denotes "other" with 651 respondents. More valuable insights could be discovered if a wider list of ethnicities were included, however this can still help to uncover a broader pattern.

There are 1,885 males and 2,179 females in this data. Once again, it is limited in that other genders are excluded, however for the purpose of my analysis it will be sufficient.

I will now look at some summary statistics for variables of interest: education, socioeconomic index (SEI), occupational prestige, and standard of living. This can give a preliminary understanding of differences in mean scores for male, female, black, white, and "other" respondents. I will then create models that look at their interactions.

Education

The education variable ranges from 0 (no formal schooling) to 20 (8 or more years of college).

```
 Min. 1st Qu.  Median    Mean 3rd Qu.    Max.     NA's
 0.00   12.00   14.00   14.17   16.00   20.00      23
```

The mean level of education attained for the entire data set is 14.17, which equates to about 2 years of college.

Respondent's Educational Attainment by Sex

Sex	Minimum Education Attained	Maximum Education Attained	Mean Education Attained
Male	2	20	14.14949
Female	0	20	14.18404

Father's Educational Attainment by Sex

Sex	Minimum Education Attained	Maximum Education Attained	Mean Education Attained
Male	0	20	12.24930
Female	0	20	12.43224

Mother's Educational Attainment by Sex

Sex	Minimum Education Attained	Maximum Education Attained	Mean Education Attained
Male	0	20	12.38141
Female	0	20	12.38438

A first glimpse at the means don't reveal much difference between genders, however the mean is notably higher for respondents than for their mothers and fathers. On average, respondents completed about 2 years of college and their parents did not complete any college.

Respondent's Educational Attainment by Race

Race	Minimum Education Attained	Maximum Education Attained	Mean Education Attained
White	0	20	14.27328
Black	2	20	13.83833
Other	1	20	14.13064

Father's Educational Attainment by Race

Race	Minimum Education Attained	Maximum Education Attained	Mean Education Attained
White	0	20	12.63667
Black	0	20	11.46929
Other	0	20	11.84400

Mother's Educational Attainment by Race

| Race	Minimum Education Attained	Maximum Education Attained	Mean Education Attained
White	0	20	12.63834
Black	0	20	12.51156
Other	0	20	11.12681

Black and "other" race respondents have the lowest mean educational attainment, and once again the parents scored lower than children on the whole. The lowest mean education attained is 11.12 for mothers of race "other", followed by black and "other" race fathers. This shows that on average, these people did not complete highschool.

Education Plots

Education Attainment by Sex and Family Member
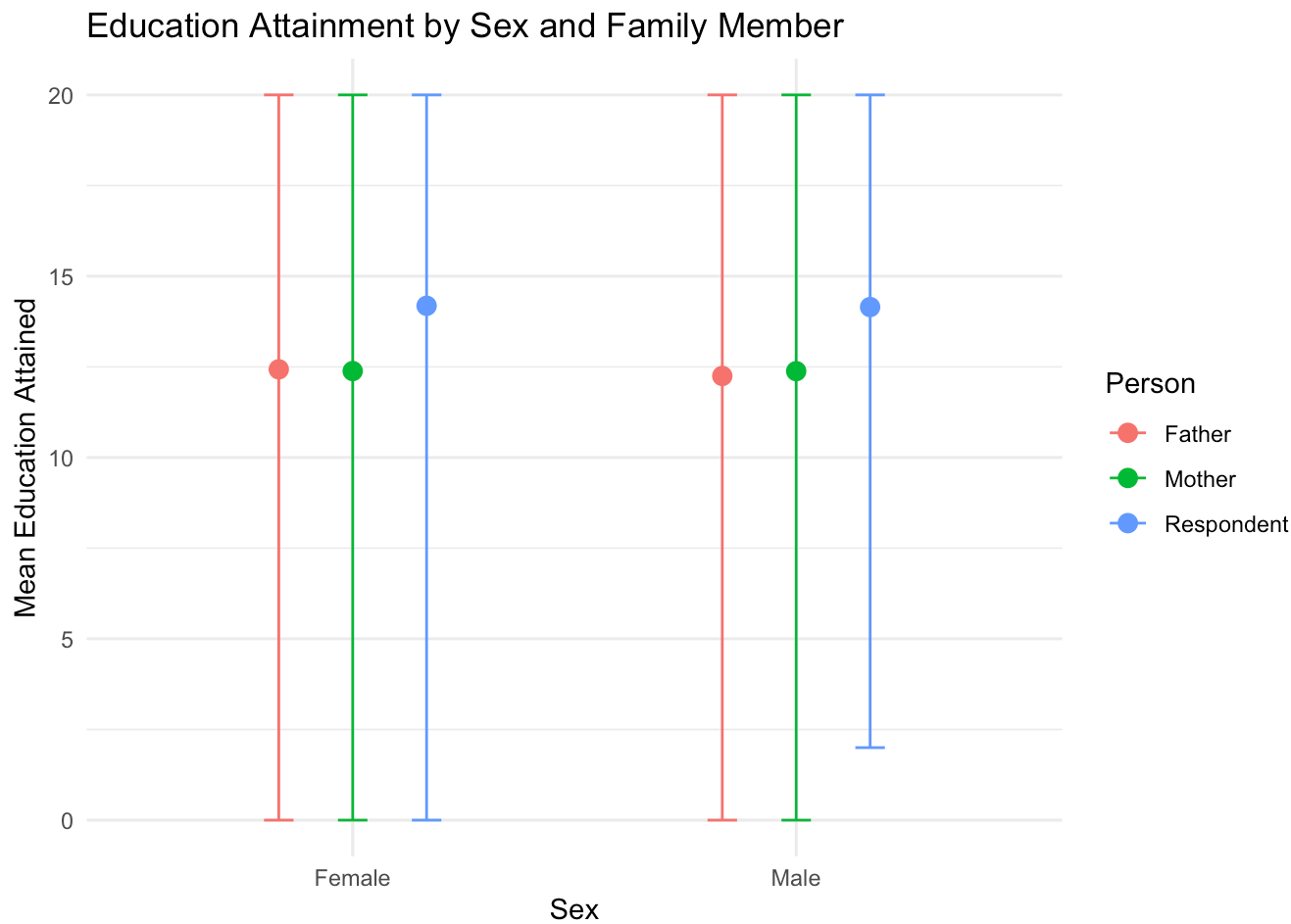
The plot visualizes how respondents average much more schooling than their parents.

Education Attainment by Race and Family Member
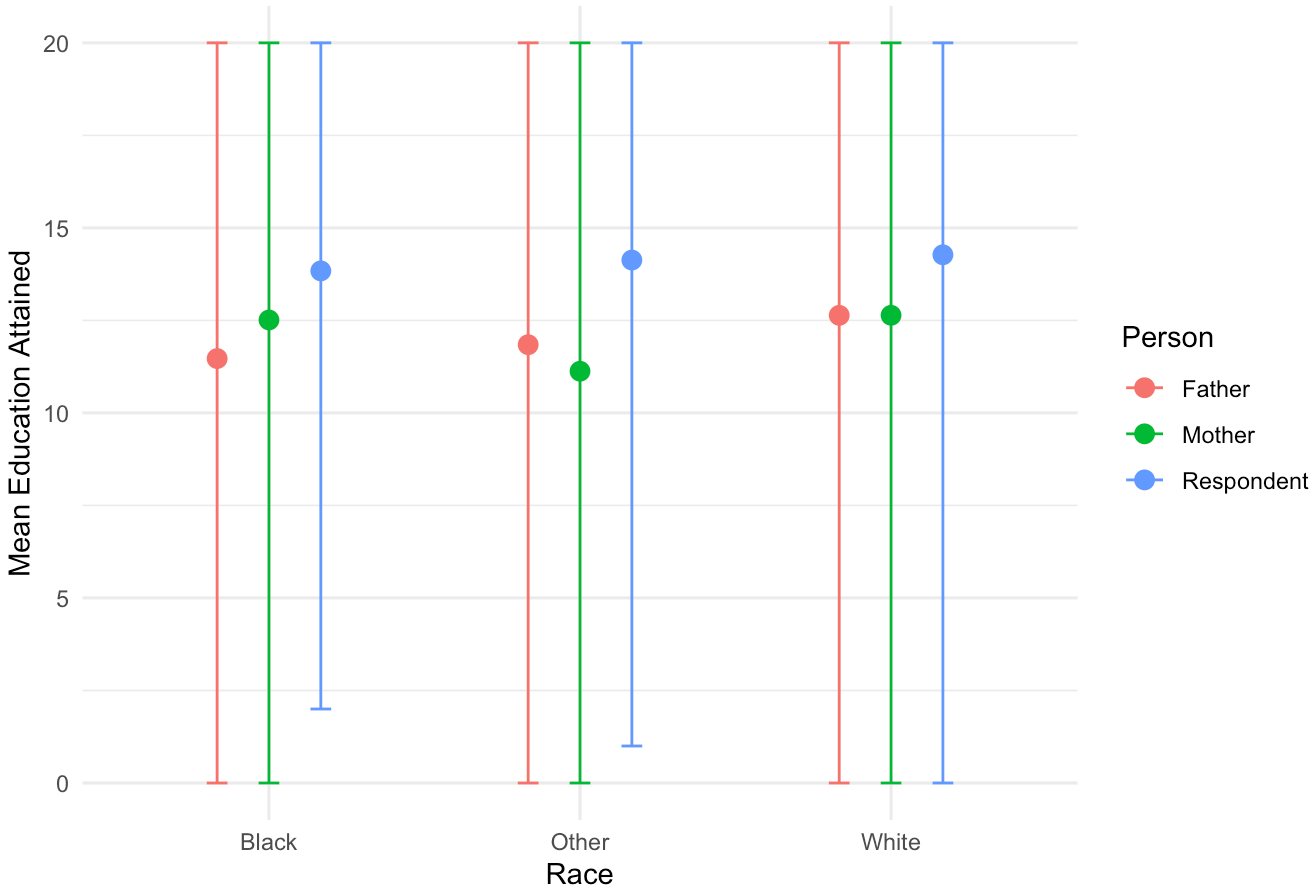
Respondents of all races have completed similar levels of schooling, however white mothers and fathers averaged more than non-white parents.

Socioeconomic Index (SEI)

Socioeconomic Index scores are used to measure socioeconomic status. They are based on income, education, and occupational ratings. These scores come from the GSS Data Explorer, maintained by NORC at the University of Chicago. The scores in this data range from 10.60 to 92.80, with a mean of 48.69.

```
 Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
10.60   26.90   43.00   48.69   68.60   92.80     790
```

Respondent's SEI Score by Sex			
Sex	Minimum SEI Score	Maximum SEI Score	Mean SEI Score
Male	10.6	92.8	48.85301
Female	10.6	92.8	48.54425

Father's SEI Score by Sex

Sex	Minimum SEI Score	Maximum SEI Score	Mean SEI Score
Male	10.6	92.8	47.84617
Female	10.6	92.8	46.96281

Mother's SEI Score by Sex

Sex	Minimum SEI Score	Maximum SEI Score	Mean SEI Score
Male	9.0	92.8	43.18577
Female	10.6	92.8	41.59763

There does not appear to be too much variation in SEI between male and female respondents, however the mother's mean scores are much lower at 43 and 41 versus scores ranging from 46 to 48 for the respondent and the father. The highest mean score comes from male respondents.

Respondent's SEI Score by Race

Race	Minimum SEI Score	Maximum SEI Score	Mean SEI Score
White	10.6	92.8	50.51549
Black	10.6	92.8	41.77287
Other	10.6	92.8	46.61596

Father's SEI Score by Race

Race	Minimum SEI Score	Maximum SEI Score	Mean SEI Score
White	12.6	92.8	49.49777
Black	10.6	91.1	38.29739
Other	10.6	92.8	43.62778

Mother's SEI Score by Race

Race	Minimum SEI Score	Maximum SEI Score	Mean SEI Score
White	9.0	92.8	44.35973
Black	12.4	92.8	36.63473
Other	10.6	92.8	37.45520

Here we begin to see some major discrepancies in mean scores, with a difference of 9 points in mean scores between black and white respondents, and a difference of 11 points in mean scores between black and white fathers. The difference in black and white mother's scores is less drastic, however the means are much lower overall. The lowest mean score comes from black mothers at 36.6. White people consistently score higher means in all.
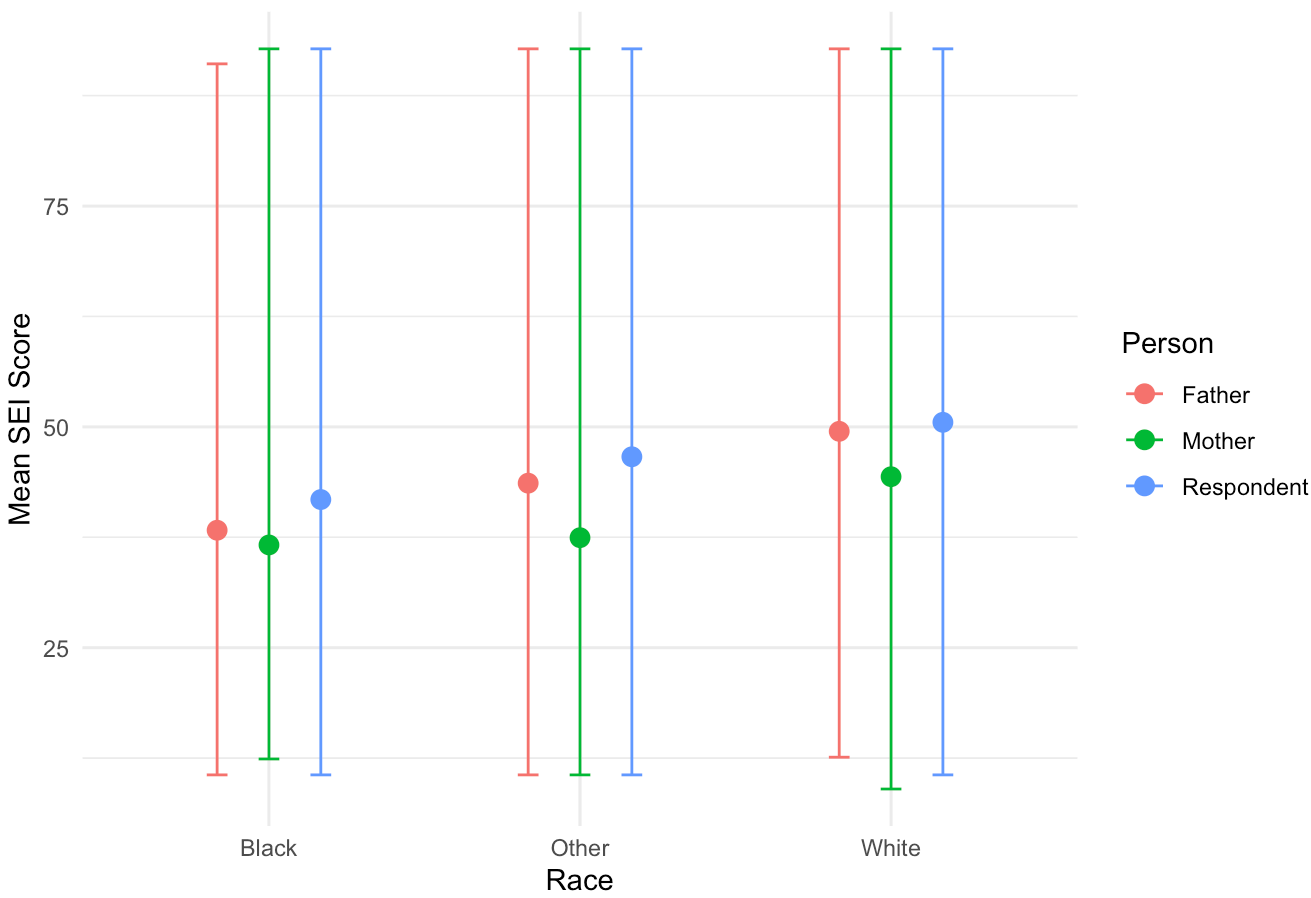
SEI Plots

Socioeconomic Index Scores by Sex and Family Member
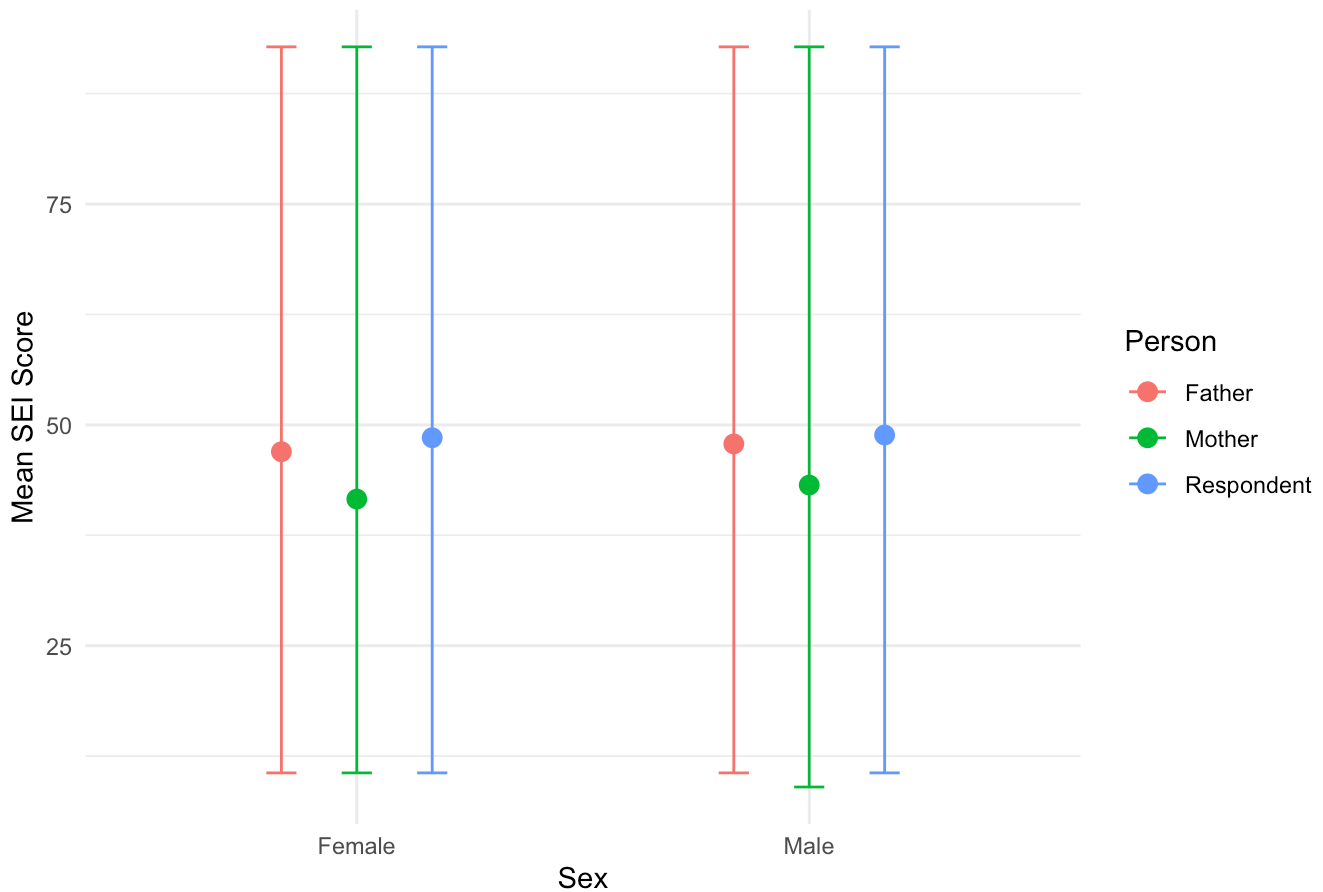
Mothers consistently score lowest on mean SEI, and respondents score highest.

Socioeconomic Index Scores by Race and Family Member

This plot clearly shows how white people score higher overall, and black people have the lowest means. Respondents score higher than their parents for all races.

Occupational Prestige

Occupational Prestige scores are also a measure created by the NORC. They range from 0 to 100 and reflect perceived importance of occupations based on average ratings of individuals asked to evaluate social standing of various jobs. In this data, the minimum score is 16.00, the mean is 44.97, and the maximum is 80.00.

```
  Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
 16.00   35.00   45.00   44.97   54.00   80.00     790
```

Respondent's Occupational Prestige Score by Sex

Sex	Minimum Prestige Score	Maximum Prestige Score	Mean Prestige Score
Male	16	80	44.88464
Female	16	80	45.05488

Fathers's Occupational Prestige Score by Sex

Sex	Minimum Prestige Score	Maximum Prestige Score	Mean Prestige Score
Male	20	80	45.07285
Female	20	80	44.72281

Mother's Occupational Prestige Score by Sex

Sex	Minimum Prestige Score	Maximum Prestige Score	Mean Prestige Score
Male	16	80	43.56580
Female	16	80	42.45111

A pattern is beginning to emerge here, where the mother's score are consistently lower than the father and respondents of either gender.
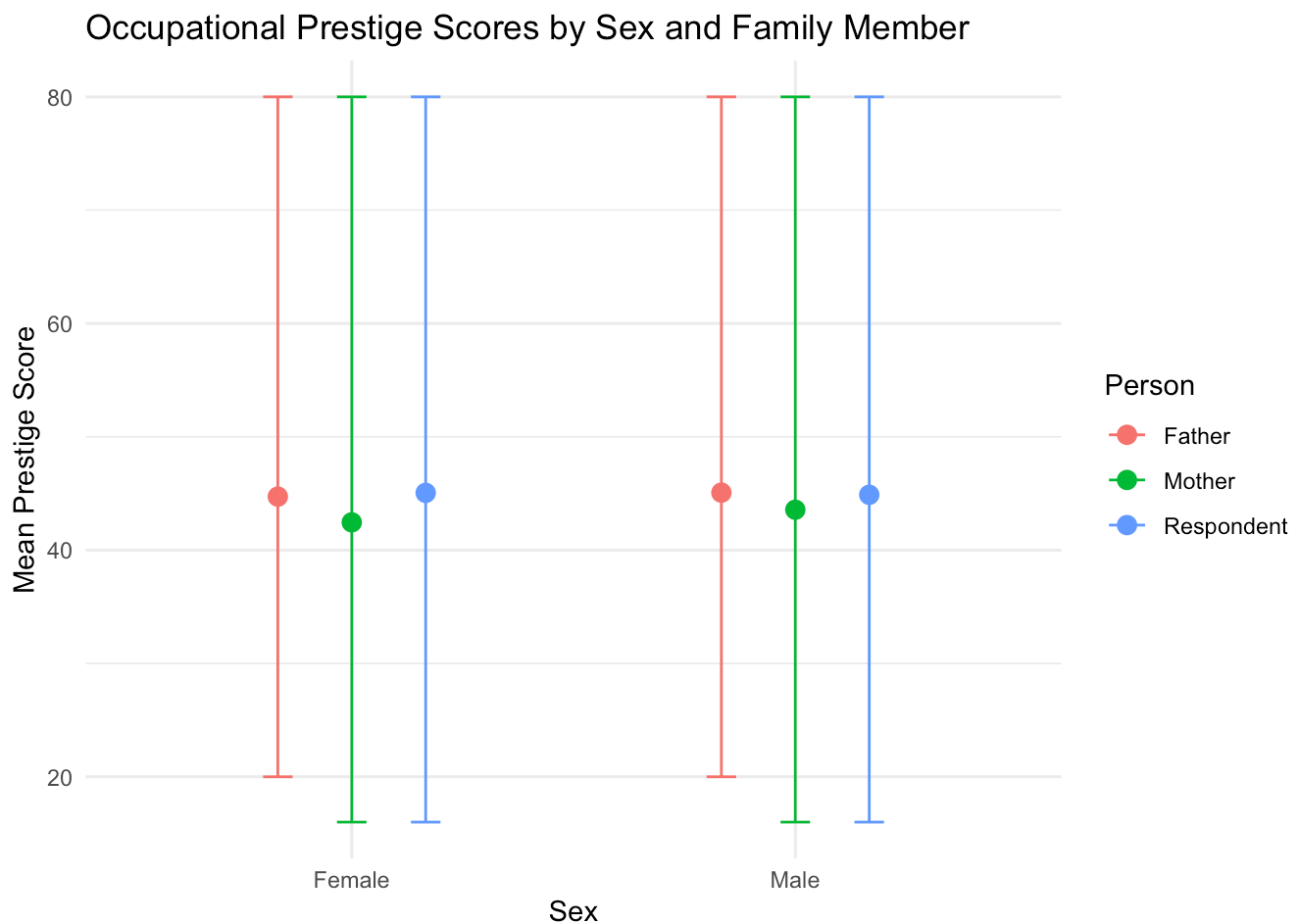
Respondent's Occupational Prestige Score by Race

Race	Minimum Prestige Score	Maximum Prestige Score	Mean Prestige Score
White	16	80	45.86944
Black	17	80	42.03488
Other	16	80	43.34043

Father's Occupational Prestige Score by Race

Race	Minimum Prestige Score	Maximum Prestige Score	Mean Prestige Score
White	21	80	45.88641
Black	20	74	40.83188
Other	20	80	42.87654

Mother's Occupational Prestige Score by Race

| Race	Minimum Prestige Score	Maximum Prestige Score	Mean Prestige Score
White	16	80	43.82383
Black	16	80	40.86713
Other	16	80	40.33200

Mean Occupational Prestige scores are higher on the whole for white people, particularly for the respondent and father. They are lowest for black fathers, as well as black and "other" race mothers. Black fathers also have the lowest maximum score at 74.

Prestige Plots

Occupational Prestige Scores by Sex and Family Member

These scores are slightly more consistent, however mothers still score the lowest.

Occupational Prestige Scores by Race and Family Member
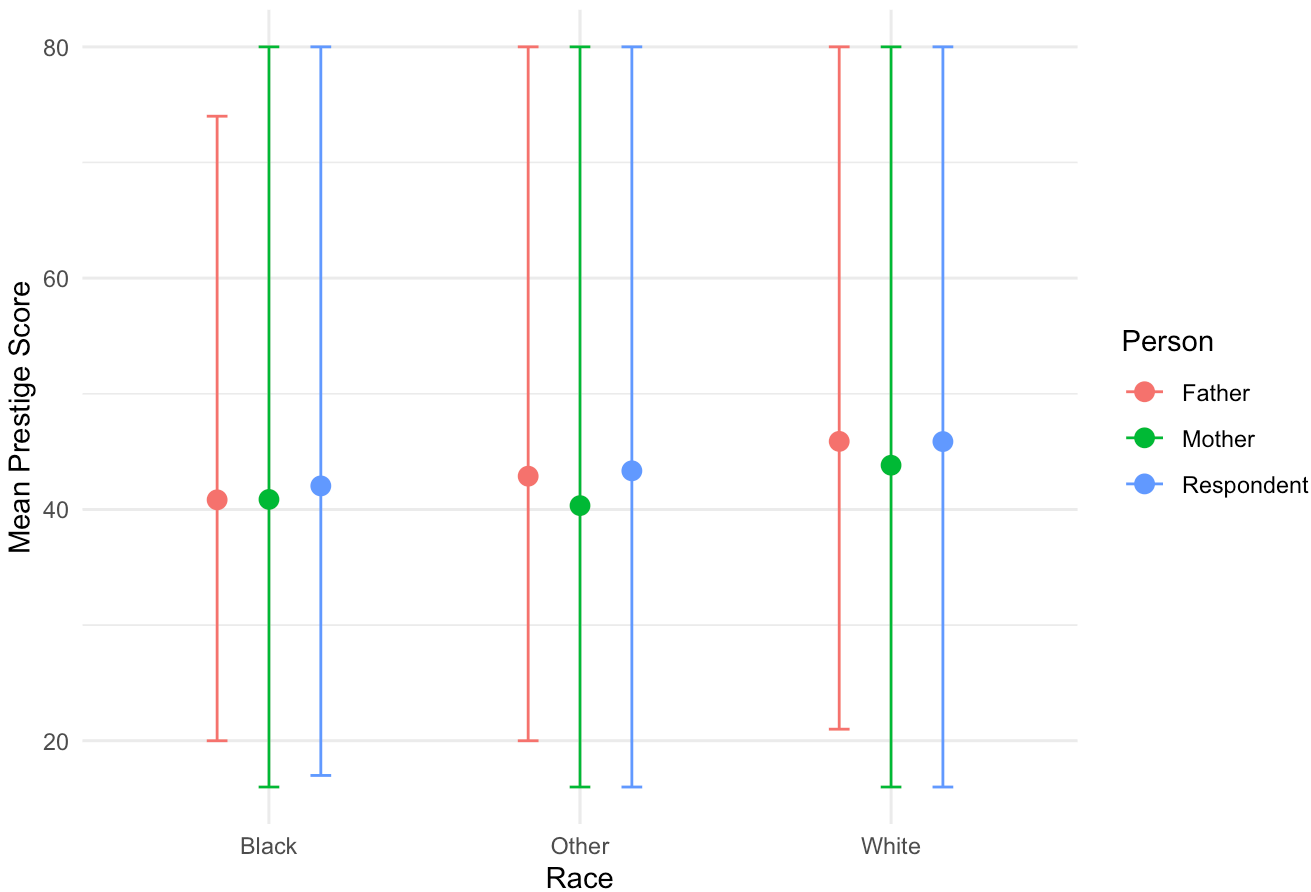
White people show higher mean prestige scores overall. There is a smaller difference between black mothers and fathers than that of other races, but the means are lower.

Standard of Living

Two ordinal variables in this data, "parsol" and "kidssol" estimate standard of living of the respondent compared to their parents, and standard of living of the respondents' child compared to them. It ranges from 1 ("much better") to 5 ("much worse").

```
  Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
 1.000   1.000   2.000   2.364   3.000   5.000      24

  Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
 1.000   1.000   2.000   2.401   3.000   5.000
```

The mean score for respondents standard of living is 2.433, and the mean score for their children is 2.401, slightly better. It's important to note that this is self-report perception, and could contain some bias.

Parent Standard of Living Score by Sex

Sex	Minimum SOL Score	Maximum SOL Score	Mean SOL Score
Male	1	5	2.373333

Parent Standard of Living Score by Sex

Sex	Minimum SOL Score	Maximum SOL Score	Mean SOL Score
Female	1	5	2.357009

Respondent's Child Standard of Living Score by Sex

Sex	Minimum SOL Score	Maximum SOL Score	Mean SOL Score
Male	1	5	2.445415
Female	1	5	2.364791

Here we do not see much difference between gender for respondents, however females report the lowest mean (indicating a better standard) for their children at 2.36. The "worst" score is reported for female respondents, and male's children at a score of 2.44 for both.
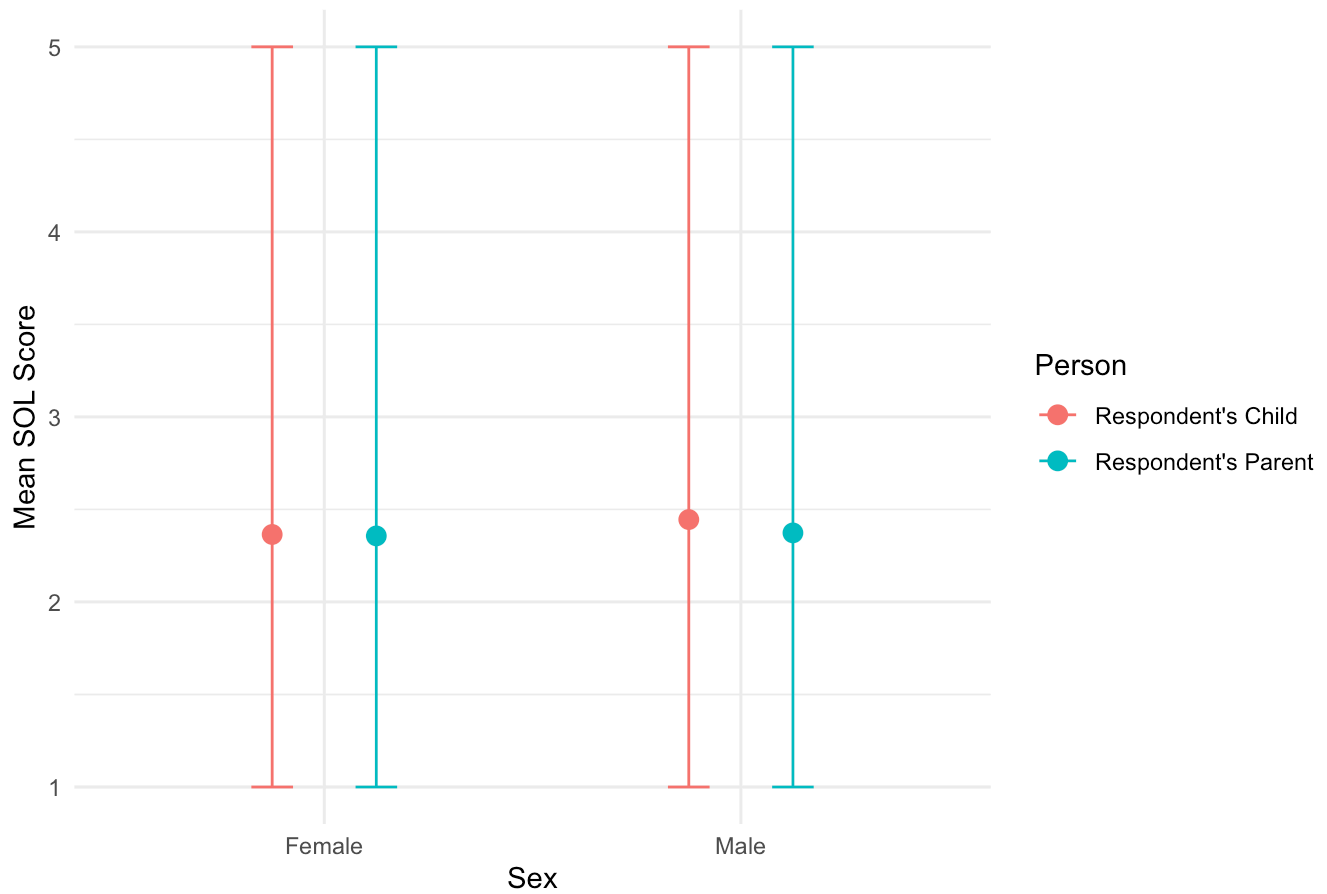
Parent Standard of Living Score by Race

Race	Minimum SOL Score	Maximum SOL Score	Mean SOL Score
White	1	5	2.452888
Black	1	5	2.212435
Other	1	5	2.149254

Respondent's Child Standard of Living Score by Race

| Race	Minimum SOL Score	Maximum SOL Score	Mean SOL Score
White	1	5	2.574815
Black	1	5	2.040816
Other	1	5	2.065217

The highest mean score is 2.57 for white children of respondents, indicating a perceived worse standard of living, and the lowest (best) mean is 2.04 for respondents black children.

SOL Plots

Standard of Living Scores by Sex

The plot shows how the best standard of living scores are for children of female respondents.

Standard of Living Scores by Race
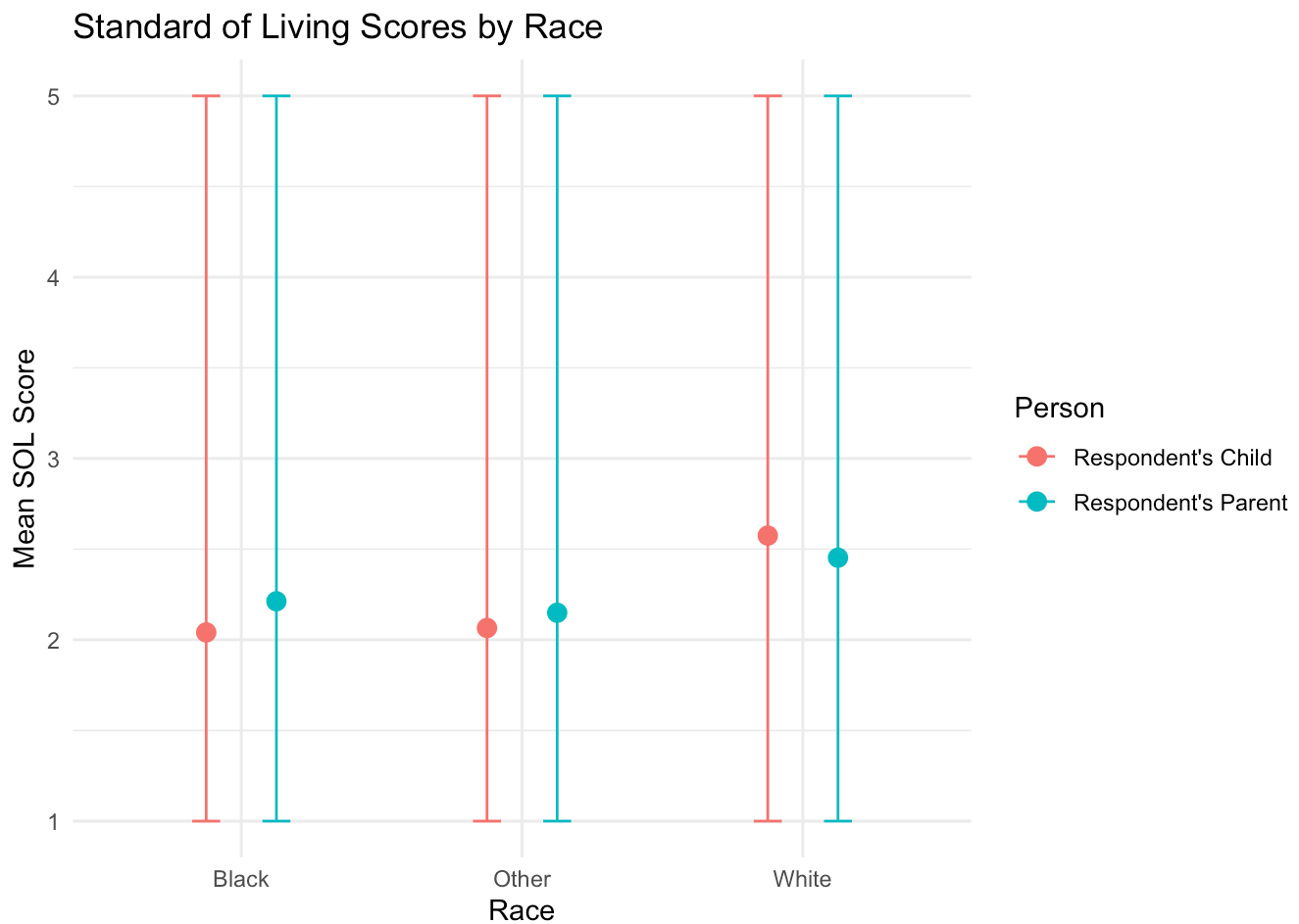
I think it's very interesting that white respondents report worse standards of living, for both themselves and their children, despite performing better on previous metrics. It's important to note how this is personal perception, which is why it's necessary to consider other measures.

Results

DAG's

DAGs (Directed Acyclic Graphs) give an idea of causal relationships between variables. I've created some DAGs based on what I observed in exploratory analysis and my assumptions about the data.

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your own.
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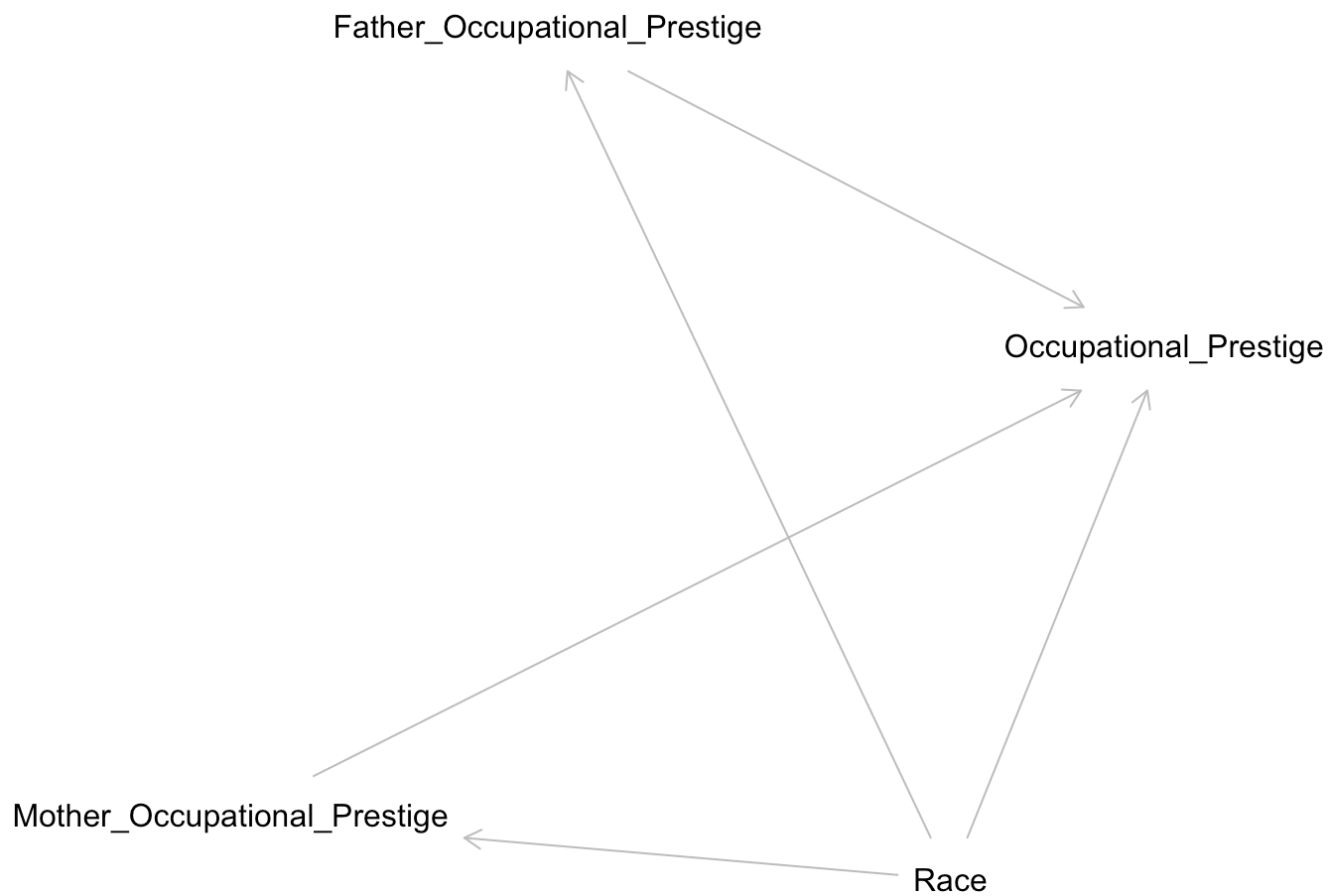
Education

Mothers_Education

Fathers_Education

Race

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Father_Socioeconomic_Index

Race

Mother_Socioeconomic_Index

Socioeconomic_Index

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Father_Occupational_Prestige

Occupational_Prestige

Mother_Occupational_Prestige

Race

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Childs_StandardofLiving ← Race

Sex

StandardofLiving
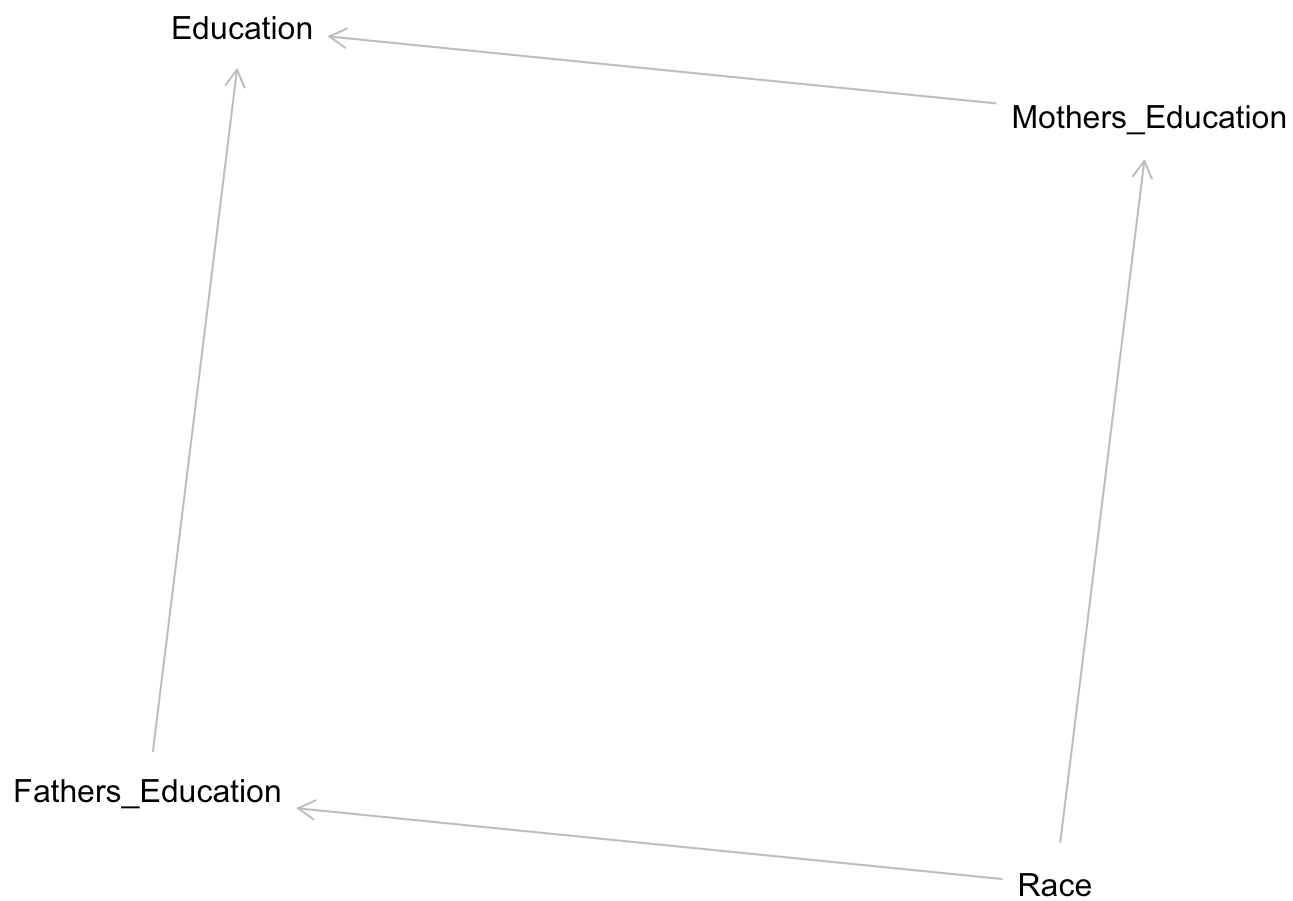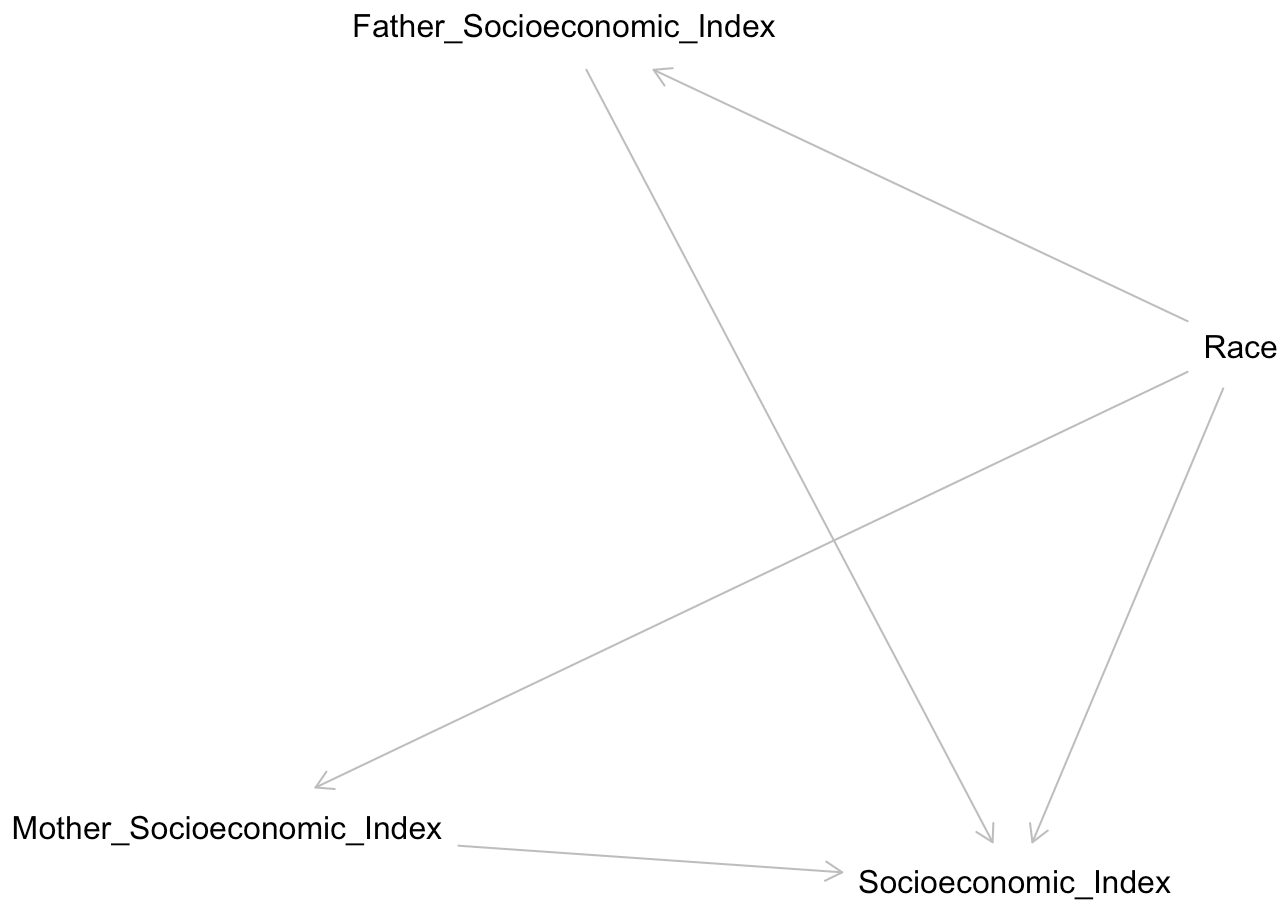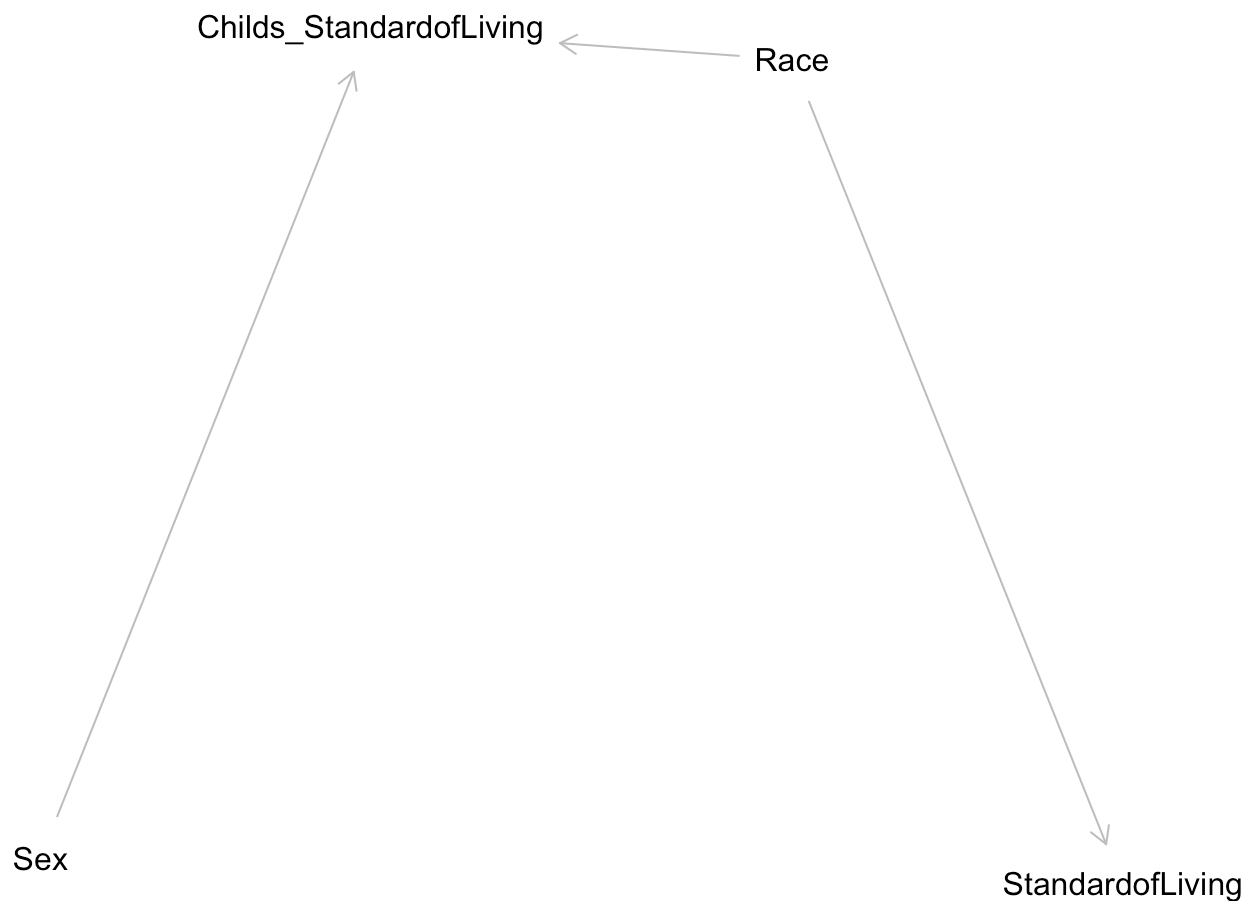
These plots model how I predict the variables to influence each other.

Regression Models

I've created regression models for each variable that I've analyzed. I've included one model that shows main effects, and another that shows interaction effects for each variable. The main effect models assume independent, additive effects on the outcome variable, while the interaction models test combined effects of variables, and display how the outcome variable differs between males and females, and black/white/other races.

Education

Education Regression Models

	Race Interaction	Race Main Effects	Sex Interaction	Sex Main Effects
Intercept	8.317***	8.977***	8.847***	9.057***
	(1.235)	(0.464)	(0.758)	(0.365)
Race	−0.190	0.034		

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

	Race Interaction	Race Main Effects	Sex Interaction	Sex Main Effects
	(0.563)	(0.154)		
Sex (Female)			−1.586	−0.021
			(1.099)	(0.211)
Mother's Education	0.245+	0.193***	0.270***	0.191***
	(0.129)	(0.036)	(0.079)	(0.036)
Father's Education	0.154	0.216***	0.266**	0.216***
	(0.131)	(0.034)	(0.088)	(0.034)
Race x Mother's Edu	0.044			
	(0.071)			
Race x Father's Edu	0.107+			
	(0.065)			
Mother x Father Edu	0.005		−0.009	
	(0.010)		(0.007)	
Race x Ma x Pa Edu	−0.011*			
	(0.005)			
Sex x Mother's Edu			0.050	
			(0.113)	
Sex x Father's Edu			0.130	
			(0.121)	
Sex x Ma x Pa Edu			−0.004	
			(0.009)	
Num.Obs.	675	675	675	675
R2	0.257	0.243	0.253	0.243
R2 Adj.	0.249	0.240	0.245	0.240
AIC	3276.0	3280.4	3279.5	3280.5
BIC	3316.6	3303.0	3320.1	3303.0
Log.Lik.	−1629.005	−1635.214	−1630.732	−1635.234
RMSE	2.70	2.73	2.71	2.73

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

The results of the regression show that the mother and fathers education is a significant indicator of the the child's education, in both the main effects and interaction models for sex and the main effect model for race. The sex interaction model indicates that for every one year increase in the mother and fathers education, the child's education increases by 0.270 years and 0.266 years, respectively. In the race main

effect model, for every one year increase in the fathers education, the education of the child increases by 0.216 years. For every one year increase in the mother's education, the child's education increases by 0.193 years, indicating a slightly weaker effect than the father. The 3-way interaction between race, mothers education, and fathers education is significant at the 0.05 alpha level. The coefficient is negative, meaning the effect of parental education is weaker for non-white people.

The adjusted R^2 and R^2 values for all models are similar, with values around 0.24-0.25. This indicates that ~24% of the variance in the outcome is explained by the predictors.

Socioeconomic Index

	SEI Regression Models			
	Race Interaction	Race Main Effects	Sex Interaction	Sex Main Effects
Intercept	47.631***	33.010***	35.267***	27.767***
	(10.966)	(3.599)	(6.876)	(2.716)
Race	−6.829	−1.485		
	(6.767)	(1.456)		
Sex (Female)			1.167	4.644*
			(9.526)	(1.905)
Mother's SEI	−0.220	0.164***	0.010	0.171***
	(0.261)	(0.046)	(0.159)	(0.045)
Father's SEI	−0.097	0.207***	−0.007	0.215***
	(0.248)	(0.050)	(0.149)	(0.049)
Race x Mother's SEI	0.152			
	(0.171)			
Race x Father's SEI	0.103			
	(0.169)			
Mother x Father SEI	0.007		0.005	
	(0.005)		(0.003)	
Race x Ma x Pa SEI	−0.003			
	(0.004)			
Sex x Mother's SEI			0.024	
			(0.221)	
Sex x Father's SEI			0.179	
			(0.212)	
Sex x Ma x Pa SEI			−0.003	

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

	Race Interaction	Race Main Effects	Sex Interaction	Sex Main Effects
			(0.004)	
Num.Obs.	526	526	526	526
R2	0.099	0.092	0.108	0.101
R2 Adj.	0.087	0.087	0.096	0.096
AIC	4748.6	4744.4	4743.4	4739.5
BIC	4787.0	4765.7	4781.8	4760.8
Log.Lik.	−2365.321	−2367.203	−2362.704	−2364.749
RMSE	21.71	21.79	21.60	21.69

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

At the 0.001 significance level, the mother and father's SEI scores show significant positive effects in both main effect models, meaning higher parental SEI is strongly associated with higher respondent SEI. Sex is significant at the 0.05 alpha level, suggesting females score better holding all other variables constant.

The adjusted R^2 and R2 are around 0.09 for the race models, and 0.1 for the sex models. This suggests that 9%-10% of the variance in the outcome is explained by the predictors. Additionally, adjusted R2 is the same for the interaction and main effect models, which shows they are performing equally well.

Occupational Prestige

Occupational Prestige Regression Models

	Race Interaction	Race Main Effects	Sex Interaction	Sex Main Effects
Intercept	59.527***	33.854***	45.442***	30.767***
	(15.432)	(2.880)	(9.545)	(2.481)
Race	−7.119	−0.841		
	(9.692)	(0.842)		
Sex (Female)			1.899	2.930**
			(13.945)	(1.117)
Mother's Pres	−0.540	0.154***	−0.129	0.158***
	(0.351)	(0.044)	(0.225)	(0.044)
Father's Pres	−0.431	0.115**	−0.240	0.119**
	(0.343)	(0.044)	(0.212)	(0.043)
Race x Mother's Pres	0.219			

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

	Race Interaction	Race Main Effects	Sex Interaction	Sex Main Effects
	(0.221)			
Race x Father's Pres	0.115			
	(0.222)			
Mother x Father Pres	0.015*		0.007	
	(0.007)		(0.005)	
Race x Ma x Pa Pres	−0.004			
	(0.005)			
Sex x Mother's Pres			−0.085	
			(0.317)	
Sex x Father's Pres			0.078	
			(0.313)	
Sex x Ma x Pa Pres			0.001	
			(0.007)	
Num.Obs.	526	526	526	526
R2	0.066	0.050	0.073	0.061
R2 Adj.	0.053	0.045	0.061	0.055
AIC	4183.5	4184.2	4179.2	4178.3
BIC	4221.9	4205.5	4217.6	4199.6
Log.Lik.	−2082.739	−2087.097	−2080.593	−2084.157
RMSE	12.69	12.79	12.64	12.72

+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The output of the Occupational Prestige model shows that the prestige scores of the mother and father are significant at the 0.01 alpha level in the main effect models for both race and sex. Sex is significant at the 0.01 alpha level for the main effects model. The coefficients are positive, indicating that being female offers an advantage in this case, but less so when interaction terms are included.

Adjusted R^2 values are around 0.05 for the race models, and around 0.06 for the sex models, indicating 5%-6% of variance in the outcome is explained by the predictors. The adjusted R^2 is higher for the interaction models, indicating they may be performing better than the main effect models.

Standard of Living

Standard of Living Regression Models

	Race Interaction	Race Main Effects	Sex Interaction	Sex Main Effects

	Race Interaction	Race Main Effects	Sex Interaction	Sex Main Effects
Intercept	2.330***	2.195***	1.806***	1.812***
	(0.193)	(0.120)	(0.127)	(0.095)
Race	−0.355**	−0.266***		
	(0.113)	(0.053)		
Sex (Female)			−0.073	−0.085
			(0.171)	(0.077)
Respondent's SOL	0.196**	0.255***	0.274***	0.271***
	(0.073)	(0.032)	(0.048)	(0.032)
Race x Parent SOL	0.040			
	(0.044)			
Sex x Parent SOL			−0.005	
			(0.065)	
Num.Obs.	985	985	985	985
R2	0.092	0.091	0.069	0.068
R2 Adj.	0.089	0.089	0.066	0.067
AIC	3147.0	3145.8	3171.6	3169.6
BIC	3171.4	3165.3	3196.1	3189.2
Log.Lik.	−1568.479	−1568.881	−1580.801	−1580.803
F	32.940	49.019	24.047	36.104
RMSE	1.19	1.19	1.20	1.20

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

In this model, we see that race is a strong indicator of a child's standard of living for both the main effects model and interaction model. It shows a significant negative effect at the 0.01 alpha level, indicating scores will be lower for non-white people. Note that in this case a "lower" score is actually better. The standard of living score of the respondent is also significant at the 0.01 alpha level for all models. This means that as the SOL score of the respondent increases, the child's SOL will also increase.

R^2 and adjusted R^2 values are around 0.90 for the race models, and 0.67 for the sex models. This indicates that race predictors explain more of the variance in the outcome, at 9% versus 6%.

Plots

I've created 4 plots to help visualize the models. The first two plots show education, occupational prestige, and SEI based on gender, and the final two show outcomes based on race. The plots include confidence intervals.

## Parental Characteristics' Effects on Prestige, by Gender
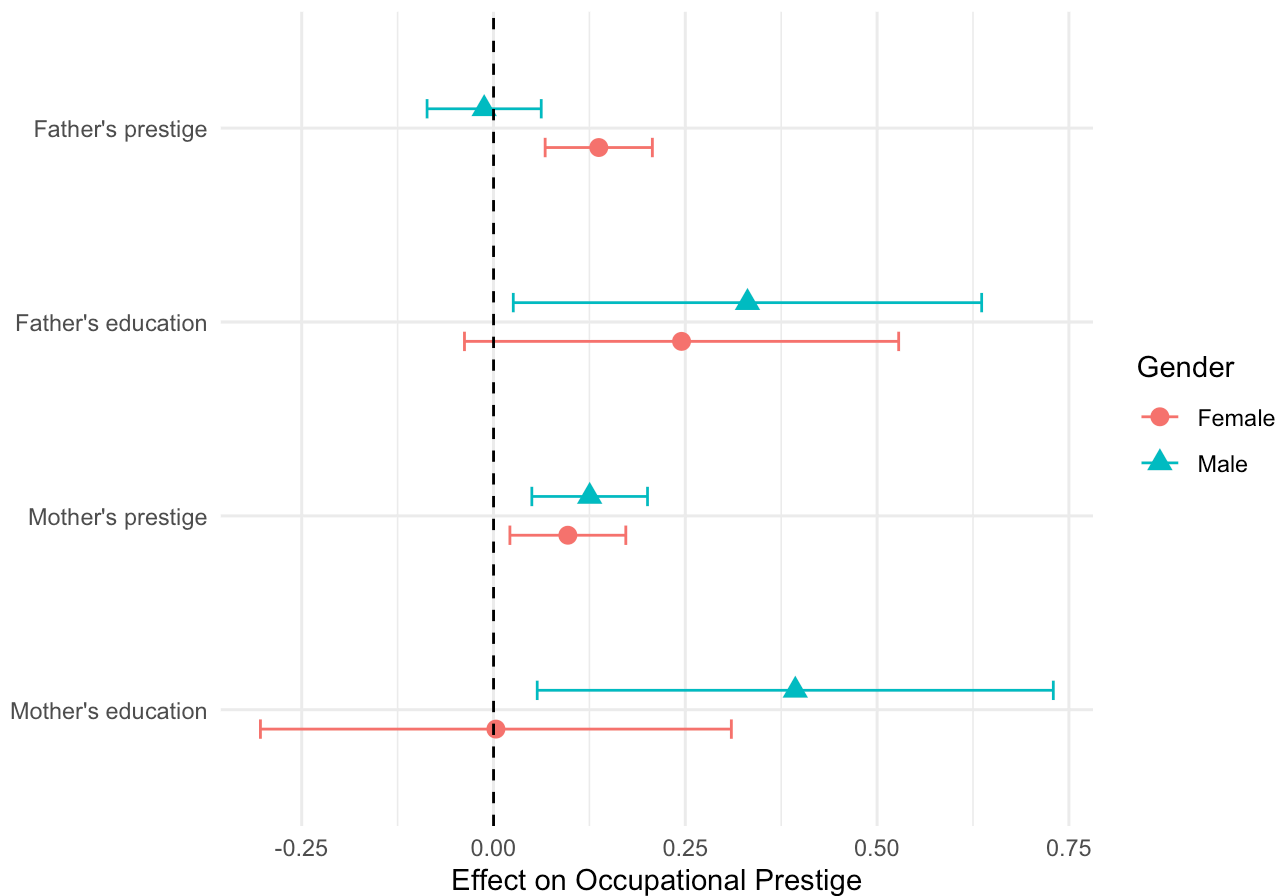
Here we can see that the parents education has a strong effect on occupational prestige, particularly for female respondents. Because the confidence interval contains zero for mothers prestige in males, it has no effect. In general, education and and parent's prestige scores have a stronger positive effect for females.

Parental Characteristics Effects on Socioeconomic Index, by Gender
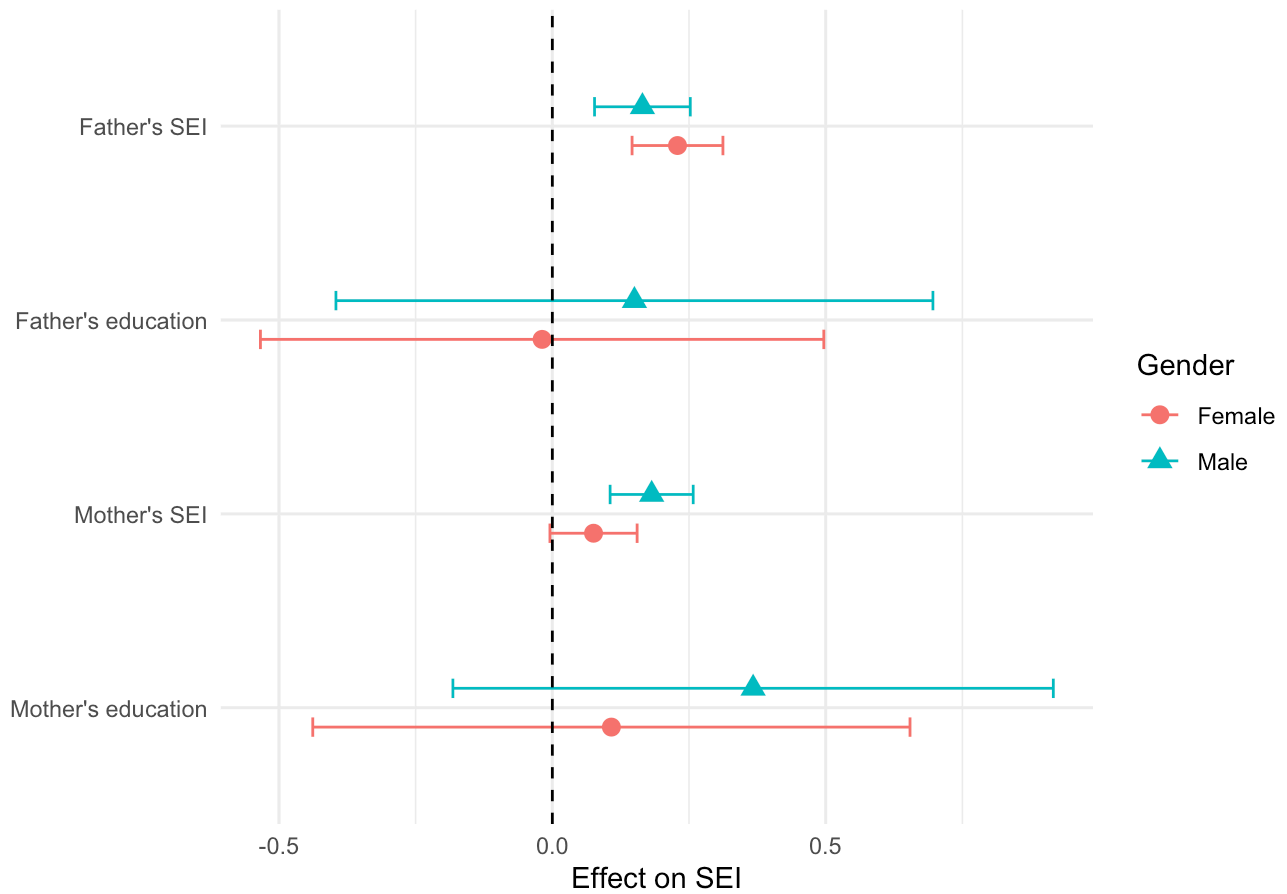
Education of the parent also has a strong impact on SEI scores, but only for female respondents. The confidence intervals for males both contain zero, indicating no effect. The SEI scores of the parents impact that of the respondent, but slightly more for males than females.

Parental Characteristics' Effects on Occupational Prestige, by Race
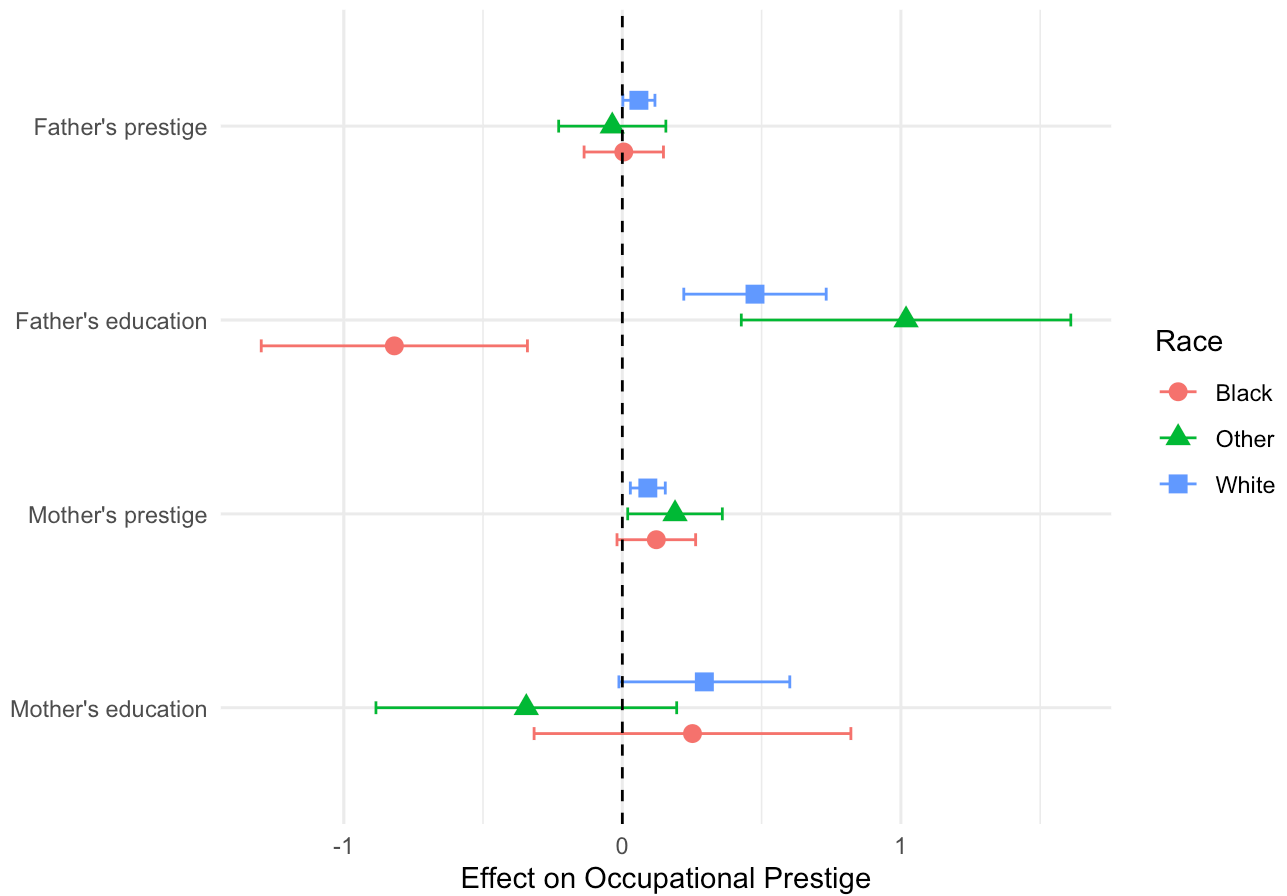
In this plot, we see that the mothers education is the strongest indicator in occupational prestige scores for race "other" and white, but fathers education has more effect for white people. The prestige score of the father has more of a positive effect for black and other race, and little to no effect for white. The mother's prestige score only has an effect for black people.

Parental Characteristics' Effects on Socioeconomic Index, by Race
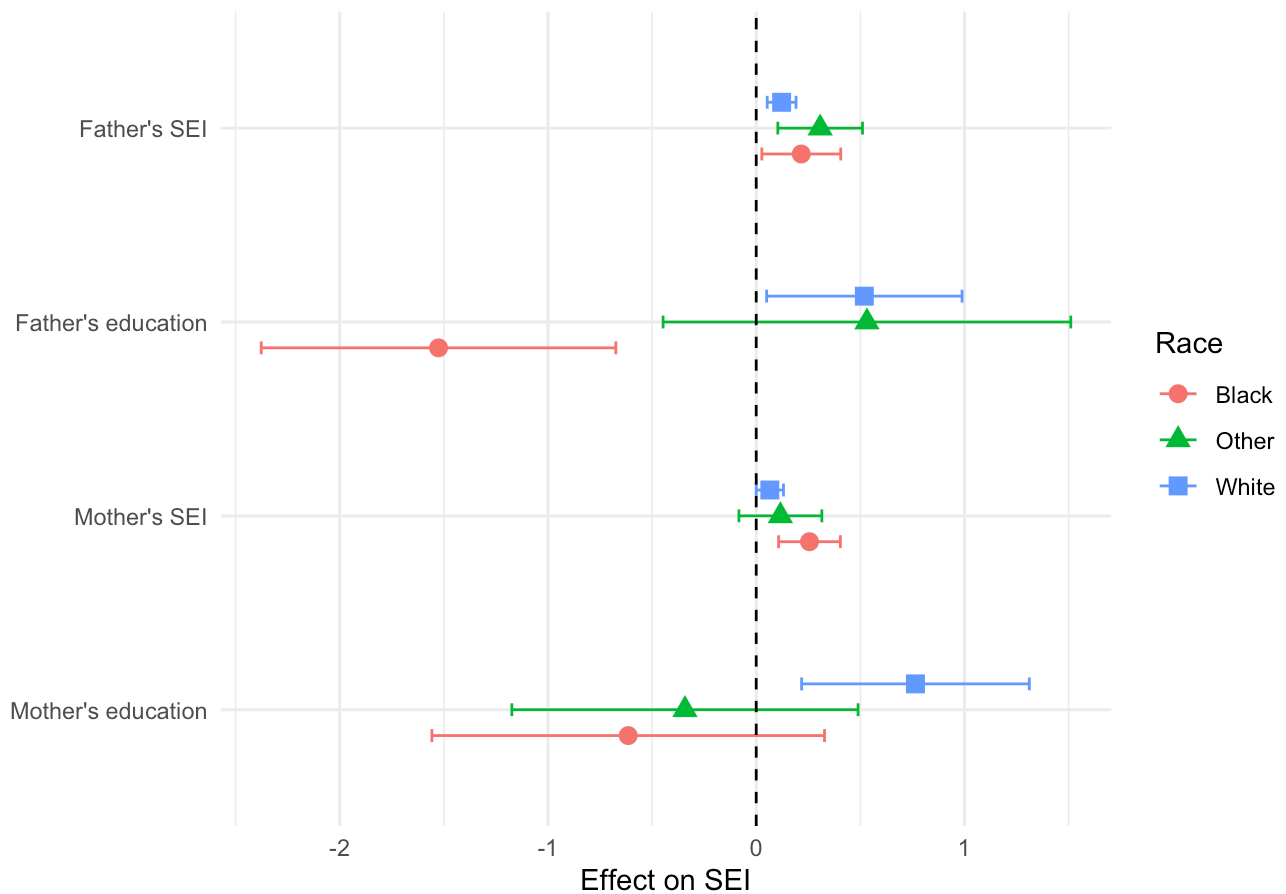
In this case, the plot shows that the father's education only positively effects SEI scores in white people. The mothers education has the strongest effect for race "other" and white, and no effect for black. The fathers SEI score has a positive effect on all races, but least so for white people. The mothers SEI score is only positive for black people.

Discussion

This deep dive into the effects of gender and race on socioeconomic outcomes produced some interesting results. It seems that race has more of a dramatic impact on outcomes than gender. In general, better parental scores in the metrics I analyzed have a more positive impact for white people than people of other races. This suggests that if white and black parents both achieved the same levels of education and career success, white people's children would have better chances of realizing the same success. Mothers of respondents for all races consistently scored lowest on all measures. This suggests that opportunities for women are actually improving compared to the previous generation. One surprising result came from the standard of living scores. This was the only metric where non-white people actually performed better, even after scoring worse on all other measures. This could be reflective of cultural differences. Limitations of this project include the shortened list of races. Expansion on this project could involve finding data with a more diverse race variable, as well as exploring the interaction between race and gender for respondents themselves. Using data to analyze specific factors that contribute to upward social and economic mobility can provide valuable insights. It's important to understand what exactly plays a part in inequality so that we may work to combat it. The analysis and models I showed here give a small glimpse into a much larger

issue. Projects such as this are particularly vital in today's political climate, as awareness is the first step to change.

Sources

Chetty, Raj, et al. "The fading American dream: Trends in absolute income mobility since 1940." Science 356.6336 (2017): 398-406. https://doi.org/10.1126/science.aal4617

Data: https://gss.norc.org/us/en/gss/get-the-data/stata.html