Project Report

Research Topic:

Impact of socio-economic factors and parental education on an individual's educational attainment in US

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1. Executive Summary

Educational attainment, representing the highest level of education an individual has completed, is a crucial determinant of socio-economic status and quality of life. In the U.S., just 40% of adults have completed at least an associate degree and a sizable portion of the population still does not pursue higher education beyond high school (Forbes 2015). The disparities in educational achievement are linked not only to economic outcomes but also to health, civic participation, and overall societal well-being.

This project investigates the impact of socio-economic factors and parental education on the educational attainment of individuals in the U.S. Given the pivotal role education plays in fostering economic and social mobility, understanding these relationships is essential for designing effective policies and interventions.

Leveraging data from the High School and Beyond (HS&B) survey, which tracked high school sophomores and seniors starting in 1980 through follow-ups into the mid-1980s, this study analyzed 4,739 individuals to identify trends and predictors of educational achievement. Variables such as parental education, socioeconomic status, urbanicity, and proximity to educational institutions were considered for their potential impact on educational outcomes. Advanced statistical techniques, including Poisson and Quasi-Poisson models for count data and ordered logistic regression for categorical outcomes, were employed to dissect these influences.

Analysis revealed significant predictors of educational attainment. Parental education emerged as a crucial factor, with children of college-educated parents more likely to achieve higher educational levels. Socioeconomic indicators such as home ownership and family income were also significant, suggesting that economic stability provides a conducive environment for educational achievement. Conversely, higher tuition costs and greater distance from educational institutions were barriers to higher education.

The study's findings emphasize the need to tackle both economic and accessibility hurdles to improving educational achievement. It is suggested that the financial barriers to higher education may be reduced by lowering tuition fees through financial assistance and scholarships. Additionally, fostering parental participation and adult education may foster a helpful learning environment, highlighting the significance of education for all generations. Furthermore, boosting local educational possibilities and building online platforms may assist potential students in rural places overcome distance barriers. Policymakers and educators who follow these techniques may enhance access to higher education, encourage better educational fairness, and increase socioeconomic mobility.

This research provides a comprehensive analysis of the factors influencing educational attainment in the U.S., offering valuable insights for policymakers and educators aiming to enhance educational equity and socio-economic mobility.

2. Problem Definition and Significance

Introduction on Educational Structure in the US

Educational attainment refers to the highest level of education completed, and the various levels of education include:

- Elementary – High School: (1-12)
- Community/Junior Colleges: (12-14)
- Four-Year Colleges and Universities: (12-16)
- Graduate Colleges and Universities: (16-18)
- Professional Schools and Advanced Studies

Data on Educational Attainment in US indicates:

- Americans who complete a college degree, earn more; vote more, are healthier, are more likely to marry, and have higher levels of social trust.
- **A large chunk of the population in the US still does not pursue higher education or a bachelor's degree**.
- Just **40 percent** of Americans have finished an associate degree or above, while an additional **22 percent** attended some college but failed to graduate (Forbes 2015).
- **Only 62% of students who start a degree or certificate program finish their program within six years** (nsc research center 2023).
- **High costs** seem to be the biggest obstacle to college enrollment.
- Many also are satisfied with a high school diploma and **did not aspire** to pursue higher education.
- **Huge gap between earnings by educational attainment**. (See appendix for graphs)

Problem Definition: The objective of this research is to understand the impact of socio-economic factors and parental education on an individual's educational attainment.

Significance: This research is crucial for policymakers, educators, and families as it sheds light on the determinants of educational success which in turn is important for national economic success. Identifying the factors that significantly affect education can help in designing targeted interventions and policies to improve educational outcomes and reduce disparities. Education is a critical determinant of an individual's career prospects, earnings potential, and quality of life. Therefore, understanding the dynamics that influence educational attainment is essential for fostering a more equitable society.

3. Prior Literature

SOURCE	RESEARCH QUESTION	PREDICTORS	FINDINGS
1. Rouse C.E (1995)	*What is the impact of Junior colleges on attaining a BA degree?*	• Tuition fees • Miles to Junior college • Miles to 4-year college • Gender • Effect of starting at Junior college • Effect of starting at 4-year college • Socio economic status (SES) factors	• The net effect of Junior colleges is always positive providing evidence that they may increase overall years of education. • This is because the gains of those who otherwise would not have attended college at all outweigh a decrease in likelihood of attaining a BA degree. • Local community colleges may divert some students from 4-year schools who might have achieved more years of schooling, but this effect is outweighed by the gains of those who otherwise would not have attended college at all. • Community colleges are a viable and effective way to increase overall educational attainment.

2. K.L Wilson & A. Portes (1975)	*What is the relative importance of social-psychological variables (such as influences from significant others and self-assessment of abilities) versus objective variables (like parental status and academic performance) in educational attainment?*	• SES • Academic Performance • Mental Ability • Aspirations (educational and Occupational) • Self-assessment of Abilities	• The educational attainment process in U.S. society may increasingly depend on objective institutional evaluations and the availability of parental resources, rather than on the individual's decisions and future, emphasizing the role of economic and social means over subjective and interpersonal influences. • Variables like significant-other influences and aspirations, which were considered central in previous models, appear to have a reduced role in educational attainment. • Findings underscore the need for policies that directly address socioeconomic disparities and support academic achievement to improve educational outcomes.

4. Data Source and Preparation

- The data is sourced from **the High School and Beyond (HS&B) longitudinal survey series** conducted by the Department of Education in 1980 of students who were high school sophomores and seniors in **1980**. Survey 1980.
- A follow-up in **1982, 1984 and 1986** was conducted, encompassing students from approximately **1,100** high schools. Survey follow up 1986.
- The survey used **self-enumerated questionnaires, personal and telephone interviews, and mail back questionnaires**.
- The final dataset derived for the analysis includes **4,739 observations on 14 variables based on Rouse (1995)** study which modifies the original HS&B data and includes only those who participated in all the 4 surveys.
- **Years of education attained is calculated by assigning 12 years to all members of the senior class**. Each additional year of secondary education counted as one year. Students with vocational degrees were assigned 13 years, AA degrees were assigned 14 years, those with some bachelors were 15 years, BA degrees were assigned 16 years, those with some graduate educations were assigned 17 years, and those with a graduate degree were assigned 18 years.

5. Variables

Data Dictionary

Variables	Description
Gender	*Indicating gender of the student*
Ethnicity	*Indicating ethnicity (African American, Hispanic, or other) of the student.*
Score	*Base year (1980) composite test score. These are achievement tests given to high school seniors in the sample.*
Fcollege	*Is the father of the student a college graduate?*
Mcollege	*Is the mother of the student a college graduate?*
Urban	*Is the current high school in an urban area?*
Home	*Does the family own their home?*
Unemp	*High Schools' City unemployment rate in 1980.*

Wage	*State of residence hourly wage in manufacturing in 1980.*
Distance	*Miles from high school to nearest 4-year college. (in 10 miles).*
Tuition	*Average state 4-year college tuition (in 1000 USD) when in high school.*
Education	*Number of years of education attained. (in 1986)*
Income	*Is the family income above USD 25,000 per year (1980)? If yes, then HIGH, else, LOW.*
Region	*Indicating State of region (West or other) of the student.*

Predictor Table:

Predictor	Effect	Rationale
Fcollege	Positive	Children of college graduates are more likely to pursue higher education due to enhanced academic support and expectations at home.
Mcollege	Positive	Similar to paternal education, maternal education often correlates with higher academic aspirations and support for children.
Home	Positive	Owning a home may indicate financial stability, which can afford more educational opportunities and a stable learning environment.
Income	Positive	Higher family income can provide access to better educational resources, extracurricular activities, and reduce financial stress related to continuing education.
Urban	Positive	Urban schools may offer more resources or better access to colleges.
Unemp	Negative	Higher local unemployment rates may reduce family stability and increase economic pressures, potentially diverting attention from educational attainment.
Wage	Mixed	Higher wages might correlate with better educational opportunities, though in areas with high wages, the cost of living might also detract from disposable income available for education.
Distance	Negative	Greater distances to colleges can be a significant barrier to higher education, particularly in areas without adequate transportation or financial resources to support commuting or relocation.
Tuition	Negative	Higher tuition costs can be a deterrent to pursuing higher education due to increased financial burden.
Gender	Mixed	Gender impacts could vary culturally and regionally; traditionally, different expectations and societal roles might influence educational pursuits differently for males and females.
Ethnicity	Mixed	Ethnic background may influence educational attainment due to systemic inequalities, cultural expectations, or community support structures.
Score	Positive	Higher achievement test scores typically indicate better preparation and academic ability, leading to higher educational attainment.

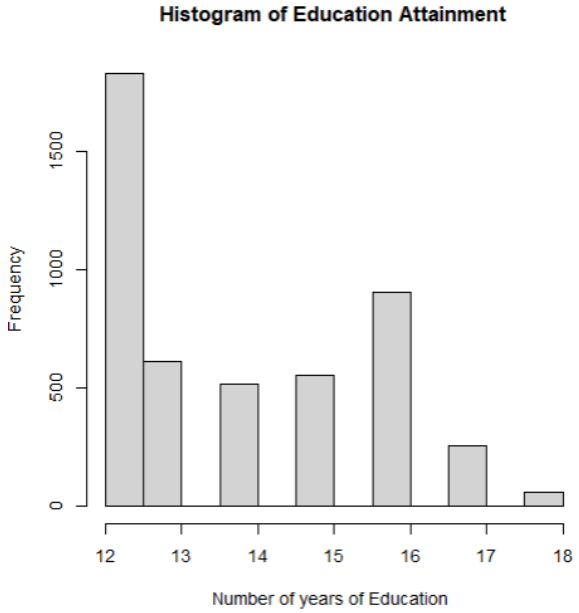
Region	Mixed	Regional differences, such as those between the Western states and others, can include disparities in educational policies, funding, and cultural attitudes towards education.

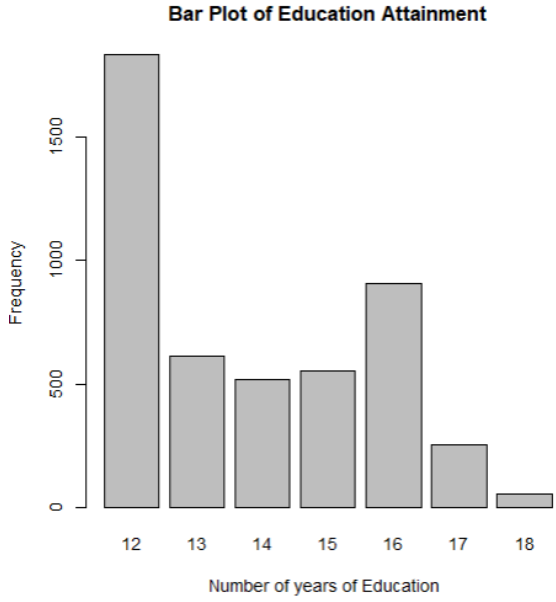
Data Structure:

- **The final dataset contains 4,739 observations on 14 variables.**
- All IVs indicate important socio-economic factors which could influence Educational Attainment.
- Distance indirectly is controlling for attendance which can impact Educational Attainment.
- Wage and Unemployment rates are controlling for economic status.
- There are 2600 Males and 2139 Females.
- There are 786 African Americans, 903 Hispanic and 3050 individuals of other ethnicities.
- 3753 individuals in the data have fathers who did not graduate college and 4088 are those mothers did not graduate college while 986 had fathers who graduated college and 651 had mothers who graduated college.
- 3887 individuals had families who owned a home while 1104 attended high school in an urban area.
- 1365 individuals were from high income families.

6. Data Exploration and Visualization

The variable of interest – **Educational attainment**, is the number of years of education and thus can be **treated as a count of years**. However, years of education attained are calculated by assigning 12 years to all members of the senior class. The years range from 12 till 18 with each additional year of secondary education counted as one year. This follows an **ordered form, and a discreet distribution** as educational attainment is counted in whole years and individuals fall into **distinct categories** or bins as shown in the histogram.





Bar plot is more typical for categorical data, and in this case, it reinforces the idea that each year of education is a distinct category, highlighting the discrete nature of educational attainment levels.

The above plots indicate that:

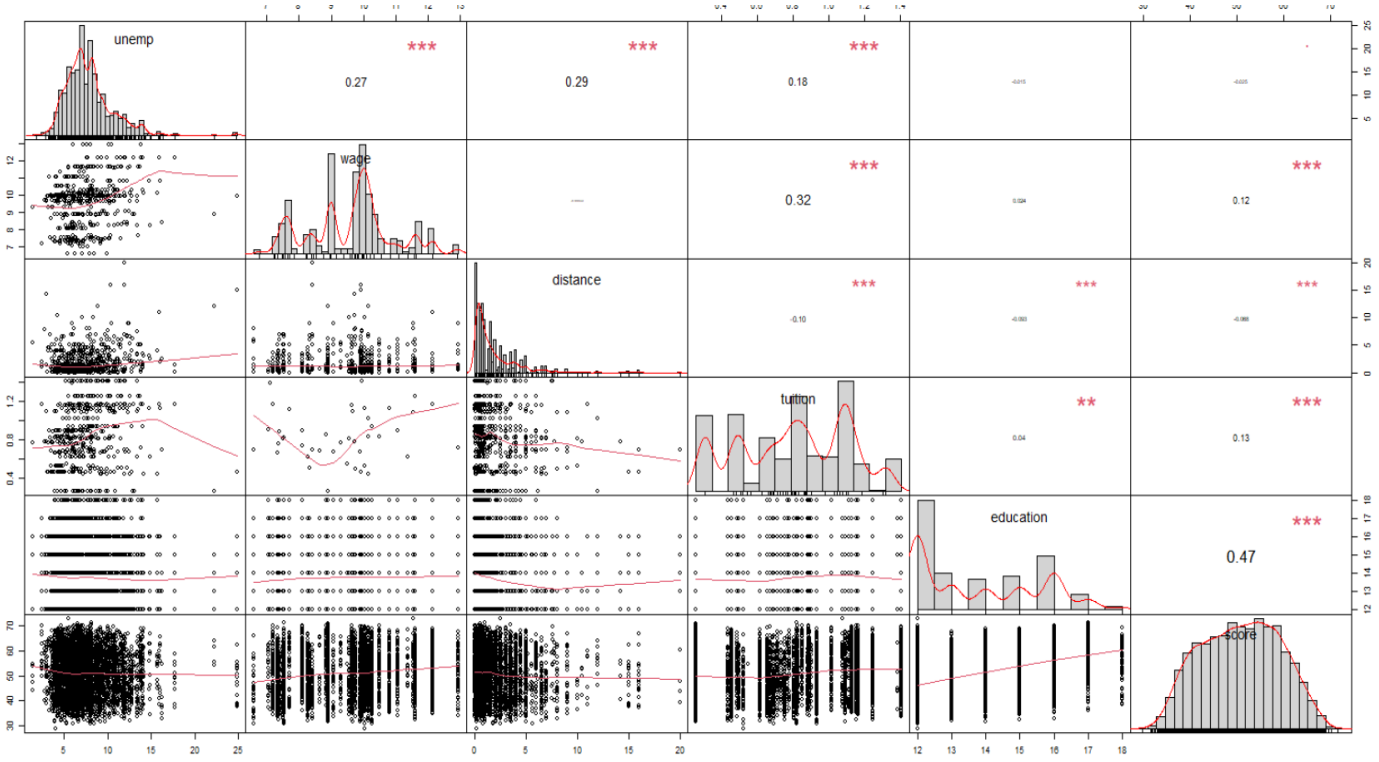
- Most individuals in this sample have completed high school only.
- The frequency of individuals decreases as the level of education increases. This pattern is common as typically, there are fewer individuals obtaining higher degrees due to various factors.

Based on this finding, we can use can test different models, treating Education Attainment as

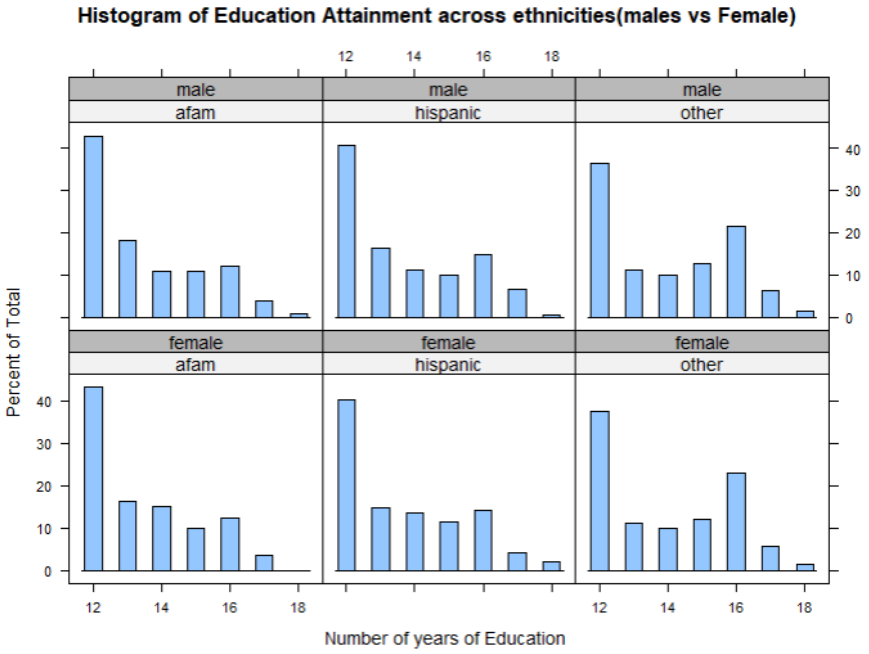
i. Count data.
ii. Ordered Categorical data.

Further Observations for IVs indicate:

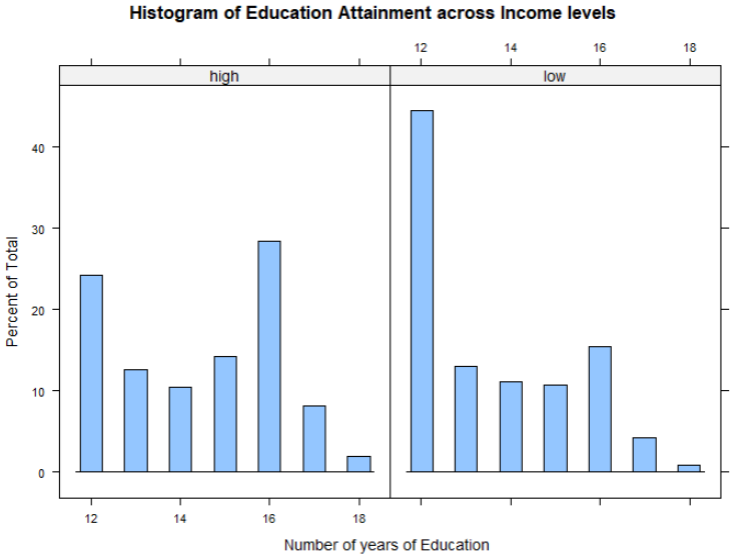
- The number of parents (Father and Mother) that are college graduates is way lower than those that didn't graduate.
- The histogram for unemployment seems rightly skewed, suggesting that most observed cities have lower unemployment rates, with fewer cities experiencing higher unemployment.
- Hourly Wages distribution suggests that while wage rates in this sample are centered around a particular value, there is variability, and some workers earn significantly more than others.
- We also observe that a large number of individuals live relatively close to a 4-year college.
- Distribution of scores looks normally distributed, which is typical for standardized test scores.
- Tuition variable shows a multi-modal distribution with multiple peaks, suggesting that there are several common values or ranges of tuition costs.

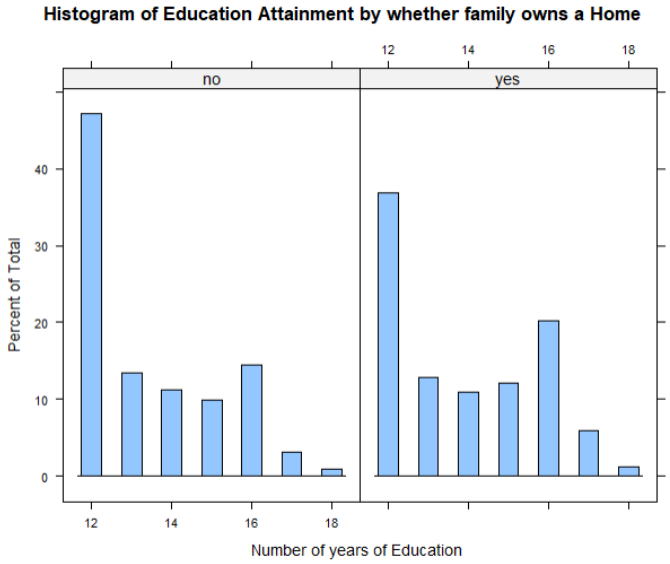


- From the picture above, we also see that there is no high correlation between the numerical predictors of interest indicating an absence of multicollinearity.

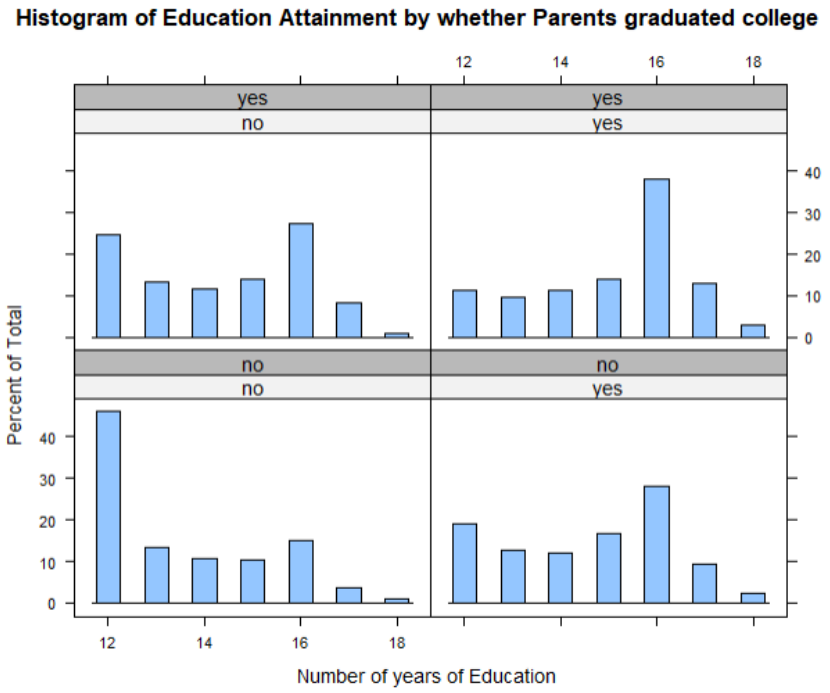


- For **African Americans (afam) and Hispanic groups**, there's a **significant drop-off** after High school. This is **more significant in Males**.
- There are greater percentage of bachelor's degrees (16 years) for "Other" ethnicities.
- Females of the Hispanic group have increased percentage of children either pursuing or attained graduation.





- There is a clear difference between the two income groups for educational attainment levels suggesting that income may have a substantial influence on the ability to pursue higher education, particularly bachelor's and graduate degrees.
- There is a slightly more completion of bachelor's degrees among individuals with families that own a home and a decrease in drop off after 12 years.



- Parental graduation seems to have a significant effect on the educational attainment of their children.
- Individuals with both parents graduated from college show a higher percentage of children achieving 16 and 18 years of education.
- There still appears to be an increased likelihood of higher education attainment in scenarios where only one parent has graduated compared to when neither parent has graduated.
- If no parent has graduated, the educational attainment seems to drop significantly and drop off rates after 12 years increase significantly.
- The graph underscores the potential impact of parental education on children's educational outcomes. This insight can be crucial for policymakers and educators aiming to understand and address educational inequality.

7. Data Modeling

a) Treating Educational attainment as Count data.

Model 1: Poisson Model
poisson = glm (as. numeric(education) ~., family = poisson (link = log), data = d)

However, there seems to be presence of under dispersion with variance < mean.

Model 2: Quasi-Poisson Model
qpoisson <- glm (education ~., family=quasipoisson (link=log), data=d)

b) Treating Education attainment as Ordered Categorical data.

We split the data into a training-test set and use train data to model.

Model 3: Multi- Class Ordered Logit Model
ol <- polr (education ~., data=train, Hess=TRUE)

Model 4: Multi- Class Ordered Logit Model with Interactions
ol2 = polr (education ~. + fcollege*mcollege, data= train)

Parents' graduation may have a significant effect on educational attainment as we saw in section 5. Hence, this interaction term was included.

Apart from the first model, the rest seem to have very similar statistically significant predictors as well as the direction of the effect. It is important to note that Models 3 and 4 were tested on 75% of the original data (training set). (See appendix for full output)

	Estimate	Std. Error
gendermale	8.4947e-01	1.0655e+00
ethnicityhispanic	1.0367e+00	1.1173e+00
ethnicityother	6.4914e-01	1.1006e+00
score	1.1173e+00	1.0044e+00
fcollegeyes	1.8885e+00	1.1032e+00
mcollegeyes	1.8655e+00	1.1604e+00
homeyes	1.2569e+00	1.0904e+00
urbanyes	1.0512e+00	1.0817e+00
unemp	1.0419e+00	1.0127e+00
wage	9.5063e-01	1.0261e+00
distance	9.5054e-01	1.0160e+00
tuition	8.0170e-01	1.1366e+00
incomelow	6.3950e-01	1.0775e+00
regionwest	8.6182e-01	1.1047e+00
fcollegeyes:mcollegeyes	6.8966e-01	1.2180e+00
12|13	7.2143e+01	1.3742e+00
13|14	1.3953e+02	1.3779e+00
14|15	2.4549e+02	1.3815e+00
15|16	5.0027e+02	1.3862e+00

Odds Ratios for Model 4 predictors

Best Model: Model 4

We will select Model 4 as the best model as the Ordered Logit model gives the best representation of the real world with ordered categories of Education rather than Count type data and further with the interaction terms it is a better fitted model with a slightly lower AIC and classification error than Model 3.

8. Quality Checks

Simple Poisson model did not hold the assumption of Equi-dispersion. There was presence of under dispersion. Thus, a quasi-poisson model was used. While this model is used for overdispersion, it might be adaptable for under dispersion because it uses a dispersion parameter that can, in theory, adjust for different levels of dispersion.

There was no multi collinearity present based on the VIF test and observations were independent based on the Durbin Watson test.
For Ordered Logit models, there was no specific independent test defined. Independence is assumed based on the previous test for poisson models.
Further no multicollinearity was detected.

Based on the quality check, the models are reliable for interpretation.

9. Interpretations based on Model 4

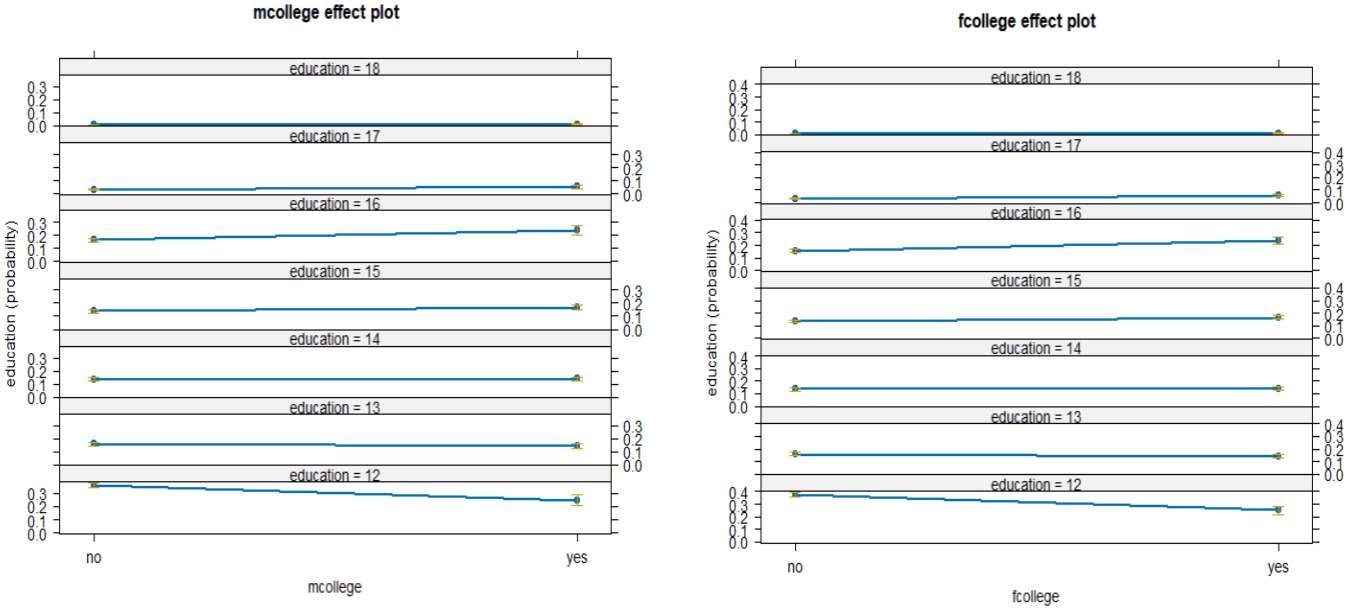
Green indicates positive effect and red indicates negative effect.

- **fcollegeyes (1.888)**: Individuals with a father who graduated college have 1.88 times the odds of achieving a higher educational level compared to those whose father did not graduate college.

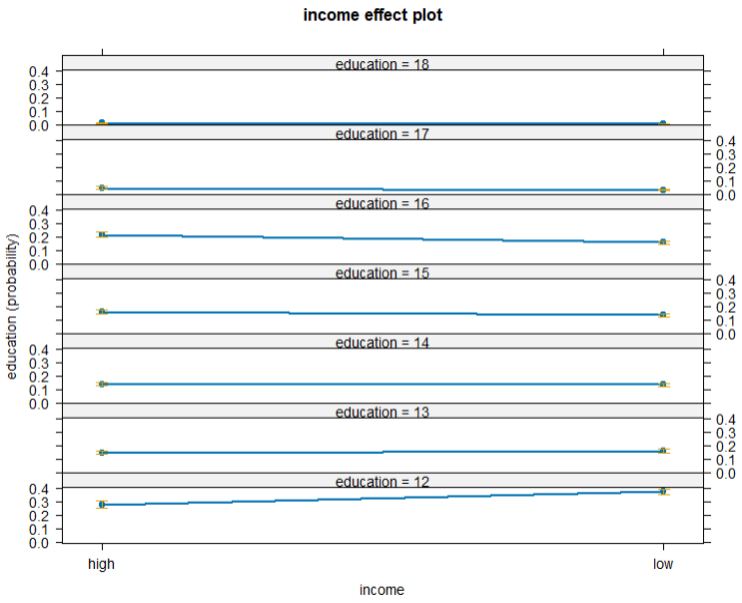
- **mcollegeyes (1.165)**: Individuals with a mother who graduated college have 1.17 times the odds of achieving a higher educational level compared to those whose mother did not graduate college.
- **unemp (1.042)**: A one-unit increase in unemployment rate is associated with a 4.2% increase in the odds of achieving a higher educational level.
- **homeyes (1.256)**: Individuals whose family owns a home have 1.26 times the odds of achieving a higher educational level compared to those who do not own a home.
- **score (1.117)**: A one-unit increase in 'score' is associated with a 11.7% increase in the odds of achieving a higher educational level.

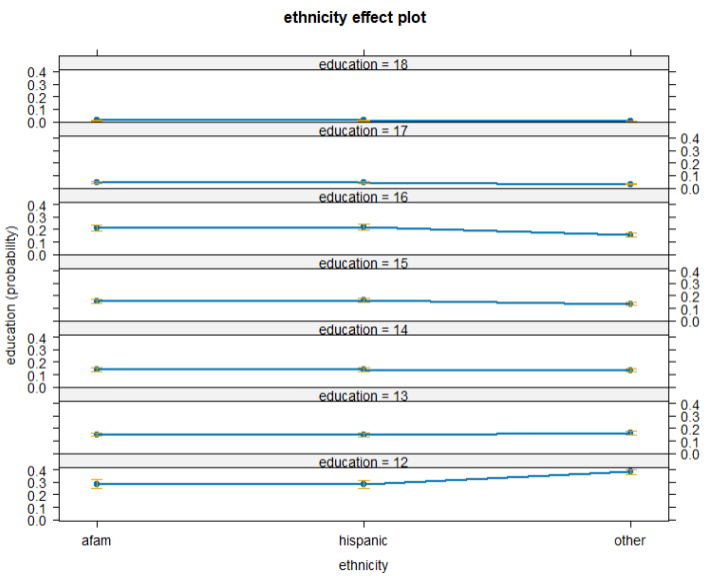
- **gendermale (0.849)**: The odds of achieving a higher category of educational attainment for males are about 85% of the odds for females, holding all other variables constant. This suggests that being male is associated with lower educational attainment compared to being female.
- **ethnicityother (0.649)**: The odds of achieving a higher category of educational attainment for other ethnicities are about 65% of the odds for AFAM group, holding all other variables constant.
- **wage (0.951)**: For each one-unit increase in hourly wage in manufacturing in the state of residence of the individual, the odds of achieving a higher category of educational attainment decrease by about 4.94%.
- **distance (0.951)**: For each one-unit increase in distance a 4-year college from high school of the individual, the odds of achieving a higher category of educational attainment decrease by about 4.94%.
- **tuition (0.817):** For each unit increase in average 4-year college tuition, the odds of achieving a higher education level decrease by approximately 18.3%. This might suggest that higher tuition costs are a barrier to achieving higher levels of education.
- **incomelow (0.639):** Individuals with families classified as having a low income have approx. 36% lower odds of achieving a higher education level compared to high income group.
- **fcollegeyes: mcollegeyes (0.689):** This interaction term indicates that for individuals whose parents both graduated colleges, the odds of achieving a higher education level decrease by approx. 31%.

Some further effects:



- The effect of having a mother or a father that graduated from college increases the probability of attaining a bachelor's degree (16 years) the most. Other levels of higher education (>12 years) also show higher probability, but this is most pronounced for an attaining a bachelor's degree.





- Having a family with higher income also seems to have a higher probability of attaining a bachelor's degree the most out of all levels of education. Income plays a more critical role at this level.
- The Hispanic and AFAM groups shows an increase in probability of higher educational attainment for each additional year after 12 years up to 16 years whereas other ethnicities show a significant drop especially for attaining a bachelor's degree. This group also has the least probability of attaining a graduate degree.

10.Recommendations

1. Promote adult education programs. Parents obtaining college degrees could have a positive influence on their children's education, particularly for attaining a bachelor's degree.
2. Further research into why the combined effect of both parents attending college is not as high as expected could offer insights. It may be valuable to look at quality time spent with children, parental involvement in school activities, or even stress related to academic expectations or perhaps the presence of financial stability leading to the child doing a business rather than further studies.
3. Facilitate home ownership among families, as owning a home is associated with higher educational attainment for children. This could be through financial literacy programs or partnerships with banks for better mortgage rates for families.
4. Examine the factors related to distance from a college that may be discouraging educational advancement. Support initiatives like online education, community colleges closer to home, or transportation subsidies.
5. Support scholarships, financial aid programs, and college savings plans to make 4-year colleges more affordable.
6. Direct resources and programs toward low-income families to help break the cycle of poverty and increase educational attainment. This could include scholarship programs and financial support for educational materials.
7. Create targeted saving plans that enable low-income families to fund their children's education, particularly for bachelor's and master's degrees.

11.References

- Kelly, A. (2015, April 28). *The neglected majority: What Americans without a college degree think about higher education, part 1*. Forbes. https://www.forbes.com/sites/akelly/2015/04/28/the-neglected-majority-what-americans-without-a-college-degree-think-about-higher-education-part-1/?sh=4224702572cf.
- *U.S. population spotlight: Educational attainment*. U.S. Department of Commerce. (n.d.). https://performance.commerce.gov/stories/s/U-S-Population-Spotlight-Educational-Attainment/na47-j74r/
- Schaeffer, K. (2022, April 12). *10 facts about today's college graduates*. Pew Research Center. https://pewresearch.org/short-reads/2022/04/12/10-facts-about-todays-college-graduates/
- *Completing college*. National Student Clearinghouse Research Center. (n.d.). https://nscresearchcenter.org/completing-college/
- Rouse, C.E. (1995). Democratization or Diversion? The Effect of Community Colleges on Educational Attainment, Journal of Business & Economic Statistics, 12, 217–224
- KL Wilson & A Portes (1975). The Educational Attainment Process: Results from a National Sample
- United States Department of Education. Institute of Education Sciences. National Center for Education Statistics. (2006, January 12). *High School and Beyond, 1980: A Longitudinal Survey of students in the United States*. High School and Beyond, 1980: A Longitudinal Survey of Students in the United States. https://www.icpsr.umich.edu/web/ICPSR/studies/7896
- United States Department of Education. National Center for Education Statistics. (2014, January 21). *High School and Beyond, 1980: Sophomore and senior cohort third follow-up (1986)*. High School and Beyond, 1980: Sophomore and Senior Cohort Third Follow-up (1986). https://www.icpsr.umich.edu/web/ICPSR/studies/8896

12.Appendix

R Code

```
library(readxl)

d <- read_excel("C:/Users/mudas/OneDrive/Desktop/BAIS/SDM/Final Project/College Distance Data 1.xlsx")

View(d)

str(d)


d$Column1 = NULL


summary(d)


table(d$gender)

barplot(table(d$ethnicity))

table(d$fcollege)

table(d$mcollege)
```

```
table(d$home)

table(d$urban)

table(d$income)

table(d$region)

barplot(table(d$education),xlab = "Number of years of Education ", ylab = "Frequency",main = "Bar Plot of Education Attainment")


hist(d$score)

hist(d$unemp)

hist(log(d$unemp))

hist(log(d$distance)) #use log in GLM


hist(d$education,xlab = "Number of years of Education ", ylab = "Frequency", main = "Histogram of Education Attainment")


hist(d$tuition)

hist(d$wage)


library(lattice)

histogram(~education|ethnicity*gender, xlab ="Number of years of Education ",main = "Histogram of Education Attainment across ethnicities and gender)", data=d)

histogram(~education|income, xlab ="Number of years of Education ",main = "Histogram of Education Attainment across Income levels",data=d)

histogram(~education|fcollege*mcollege, xlab ="Number of years of Education ", main = "Histogram of Education Attainment by whether Parents graduated college",data=d)

histogram(~education|home, xlab ="Number of years of Education ",main = "Histogram of Education Attainment by whether family owns a Home", data=d)


library("PerformanceAnalytics")

chart.Correlation(d[c(8:12,3)]) #



# Convert character columns to factors

for(col in names(d)) {

  if(is.character(d[[col]])) {

    d[[col]] <- factor(d[[col]])

  }

}
```

```
#Poisson Model

poisson = glm(education ~ . ,family = poisson(link = log) ,data = d)
summary(poisson)

library(AER)
dispersiontest(poisson) #suggests underdispersion variance < mean
mean(d$education)
var(d$education)

library(DescTools)
VIF(poisson) #No multicollinearity

qpoisson <- glm(education ~ ., family=quasipoisson (link=log), data=d) #Quasi-Poisson model may counter under dispersion
summary(qpoisson)

library(stargazer)
stargazer(poisson, qpoisson, type="text", title="Comparison of Models", single.row=TRUE)

exp(cbind(coef(poisson), coef(qpoisson)))

dwtest(qpoisson) #No Auto-Correlation

#Logit Models

d$education <- factor(d$education,ordered=TRUE) #converting to ordered factor type


set.seed(79077374)
samplesize = floor(0.75*nrow(d))   # Create train and test data sets
index <- sample(seq_len(nrow(d)), size=samplesize)
train <- d[index,]
test  <- d[-index,]


library(MASS)
ol <- polr(education ~ . , data=train, Hess=TRUE)# Ordered logit model
```

```
summary(ol)
coeftest(ol)# t-tests of coefficients

predicted <- predict(ol, test)
table(test$education, predicted)    # Confusion matrix
mean(as.character(test$education) != as.character(predicted))  # Classification error



ol2 = polr(education ~ .+ fcollege*mcollege, data= train, Hess=TRUE)
summary(ol2)
coeftest(ol2)
exp(coeftest(ol2$coefficients))

VIF(ol2)

predicted <- predict(ol2, test)
table(test$education, predicted)   # Confusion matrix
mean(as.character(test$education) != as.character(predicted))  # Classification error is less than ol model

stargazer(poisson, qpoisson,ol,ol2, type="text", title="Comparison of Models",  out= "final models.html" , single.row=TRUE)
AIC(poisson, qpoisson,ol,ol2)
library(lmtest)
lrtest(ol, ol2)

library("effects")

plot(Effect(focal.predictors="income", ol2))
plot(Effect(focal.predictors="ethnicity", ol2))
plot(Effect(focal.predictors="fcollege", ol2))
plot(Effect(focal.predictors="mcollege", ol2))
```

Stargazer Output

Comparison of Models

	Dependent variable:			
	education			
	Poisson	glm: quasipoisson link = log	ordered logistic	
	(1)	(2)	(3)	(4)
gendermale	-0.010 (0.008)	-0.010*** (0.003)	-0.166*** (0.063)	-0.163** (0.063)
ethnicityhispanic	0.001 (0.014)	0.001 (0.006)	0.032 (0.111)	0.036 (0.111)
ethnicityother	-0.022* (0.012)	-0.022*** (0.005)	-0.436*** (0.096)	-0.432*** (0.096)
score	0.007*** (0.001)	0.007*** (0.0002)	0.111*** (0.004)	0.111*** (0.004)
fcollegeyes	0.038*** (0.011)	0.038*** (0.005)	0.552*** (0.087)	0.636*** (0.098)
mcollegeyes	0.026** (0.012)	0.026*** (0.005)	0.414*** (0.099)	0.624*** (0.149)
homeyes	0.011 (0.011)	0.011** (0.004)	0.230*** (0.086)	0.229*** (0.087)
urbanyes	0.003 (0.010)	0.003 (0.004)	0.048 (0.079)	0.050 (0.079)
unemp	0.002 (0.002)	0.002*** (0.001)	0.041*** (0.013)	0.041*** (0.013)
wage	-0.003 (0.003)	-0.003** (0.001)	-0.051** (0.026)	-0.051** (0.026)
distance	-0.003 (0.002)	-0.003*** (0.001)	-0.051*** (0.016)	-0.051*** (0.016)
tuition	-0.015 (0.016)	-0.015** (0.006)	-0.225* (0.128)	-0.221* (0.128)
incomelow	-0.027*** (0.009)	-0.027*** (0.004)	-0.455*** (0.075)	-0.447*** (0.075)
regionwest	-0.013 (0.012)	-0.013*** (0.005)	-0.148 (0.100)	-0.149 (0.100)
fcollegeyes:mcollegeyes				-0.372* (0.197)
Constant	2.336*** (0.038)	2.336*** (0.016)		
Observations	4,739	4,739	3,554	3,554
Log Likelihood	-10,977.280		-5338.659	-5336.889
Akaike Inf. Crit.	21,984.560		10717.32	10715.78
Note:				*p<0.1; **p<0.05; ***p<0.01

Log-Odds for all 4 models

`

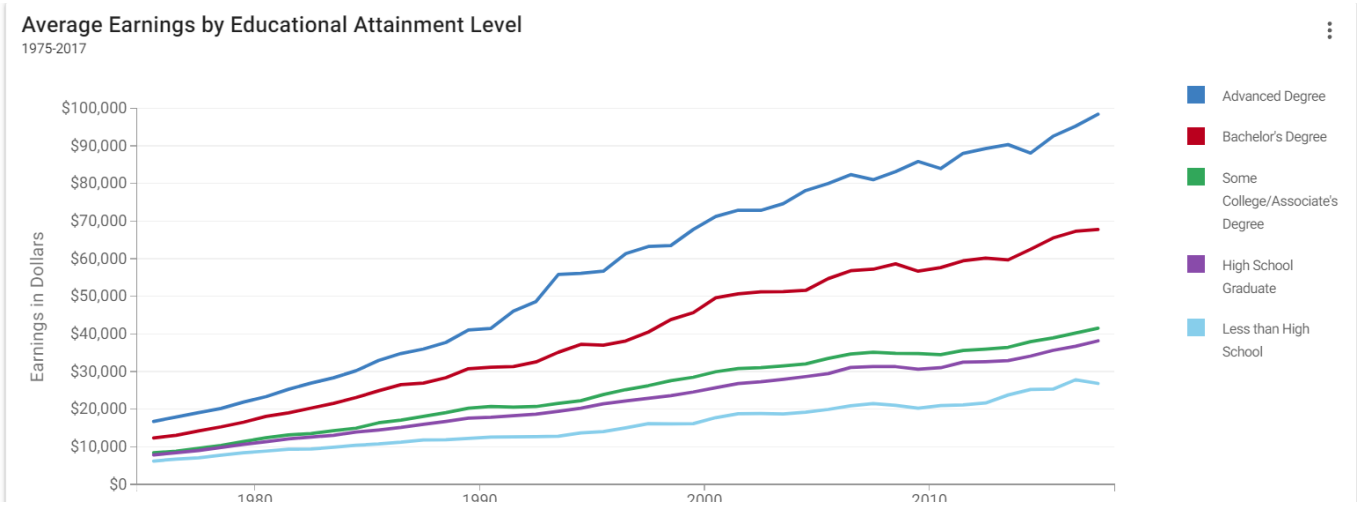
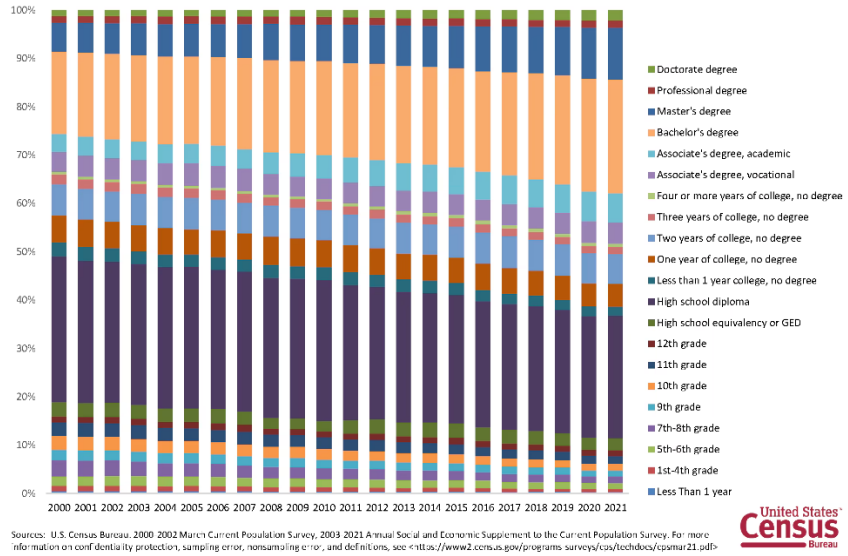


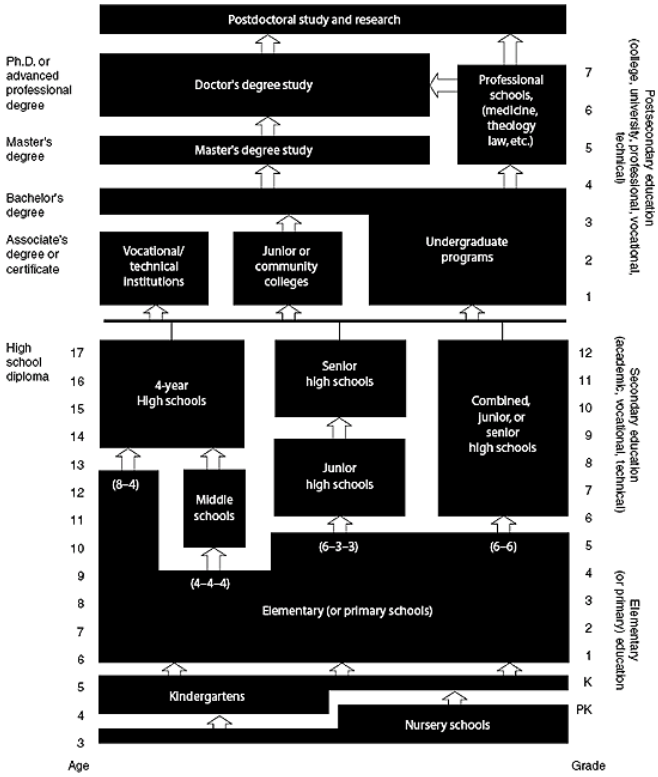
Figure 11: Percent of Population 25 Years and Over by Detailed Attainment Level: 2000-2021



Sources: U.S. Census Bureau, 2000-2002 March Current Population Survey, 2003-2021 Annual Social and Economic Supplement to the Current Population Survey. For more information on confidentiality protection, sampling error, nonsampling error, and definitions, see <https://www2.census.gov/programs-surveys/cps/techdocs/cpsmar21.pdf>

United States Census Bureau

Figure 1. The structure of education in the United States



NOTE: Adult education programs, while not separately delineated above, may provide instruction at the elementary, secondary, or postsecondary education level. Chart reflects typical patterns of progression rather than all possible variations.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Annual Reports Program.