A Study on How Education and Gender Influence Pay Gaps in the Workplace

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Abstract

Over the last 49 years, the issue of pay differences between men and women has climbed higher. In the past, the biggest pay differences were found in jobs that did not pay much or require much schooling. These days, the largest pay gaps are seen amongst top earners who are well-educated. In this study, we will use the wages by education dataset along with linear regression models to assess the extent to which two mechanisms rooted in education— the attainment of a high school diploma and advanced degree-level fields of study —can account for the gender wage gap across the wage distribution. In this study, we use our research to navigate through and prove that there is a relationship between the wage gap between male and female workers with an advanced degree as compared to those with only a high school diploma.

Keywords: wage gap, education, higher education, occupational segregation, discrimination, gender bias, pay differences, wages by education, gender wage disparity, advanced degree, high school diploma

Introduction

Gender wage inequality has been a significant and ongoing issue within the workforce, drawing attention to the visible gaps between the salaries of male and female employees. This challenge is multifaceted and influenced by various factors such as occupational segregation and discriminatory practices. While exploring this issue, it is crucial to look into the role of the aim for higher education in shaping the wage differences between genders. While pursuing advanced degrees is often perceived as a pathway to narrowing such gaps, evidence suggests a substantial wage gap even among highly educated professionals. With this project, we aim to unravel the complexities around the gender wage gap by comparing the earnings of male and female workers holding advanced degrees with those having only a high school diploma. Through this research, we aim to shed light on the dynamics that contribute to wage inequalities across various educational levels and provide insights into how to address and repair these disparities.

Literature Review

This literature review examines the relationship between education, gender, and workplace pay gaps. Our primary focus is on understanding the wage disparities between men and women at different education levels.

Education's Impact on Pay Gaps

Education has an important role in evaluating pay gaps, especially concerning immigration. Studies show that education affects more than just skill development, as Llull's research highlights (Llull 2018). Llull's model challenges traditional views on immigration, showing that individuals adjust their education, occupation, and participation in response. This

interaction between education and external factors like immigration emphasizes the importance of education in contributing to pay gaps.

The Role of Gender in Pay Gaps

Garcia-Prieto and Gómez-Costilla conducted a study on the differences in wages between men and women (Garcia-Prieto & Gómez-Costilla, 2017). The study found that societal norms and economic structures contribute to gender pay gaps. To study this issue further, they used the Stochastic Frontier Methodology. The results showed that education is important in reducing gender wage discrimination, especially for women with higher education. The study also revealed that women still face challenges, such as the glass ceiling and the negative impact of overeducation on wages. The study provides a detailed perspective on gender pay disparities and highlights the importance of education in addressing these issues.

The Role of Education and Gender in Contributing to Pay Gaps

According to the study done by Rattsø and Stokke (2020), the private-public wage gap and return to experience is influenced by factors such as geography, gender, and education. The research highlights that while higher education is associated with higher wages, the quality and relevance of the education attained play a big role. Simply having more education does not always lead to higher earnings if the skills and knowledge acquired are not in demand, as shown by the variations in the private-public wage gap across different contexts and demographics (Rattsø & Stokke, 2020). Quadlin's research specifically focuses on the gender pay gap across different fields of study. The research shows that women tend to work in lower-paying fields, contributing significantly to the gender pay gap. This emphasizes the complicated relationship between education choices, gender, and income. It is not enough to just encourage women to pursue higher education; we need to ensure that the education they receive is relevant to the labor

market and leads to well-paying jobs. Addressing the gender pay gap requires us to take into account the various factors contributing to the issue.

This review lays the foundation for our study by providing a theoretical framework and context for our analysis.

Context & Implications

Project Stakeholders

In a comprehensive study exploring how education and gender influence pay gaps in the workplace, various stakeholders would be significantly impacted, shaping the contours of a large-scale project. Policy Formulation and Government Initiatives are impacted as government entities and policymakers could be swayed in formulating labor and education policies as a result of the study. The research outcomes might serve as a compass for crafting legislative actions designed to diminish gender-based pay disparities. This could entail the establishment or modification of laws promoting salary fairness, encouraging educational programs, or improving transparency in the workplace.

The Educational Institutions and Curriculum Development are impacted because the findings could prompt revisions in educational strategies to address potential disparities identified in the study. Institutions might focus on providing skills and knowledge that contribute to reducing gender-based pay gaps in the workforce. Enterprises and the human resources divisions within them may find it necessary to review their methodologies. The study could instigate adjustments in how compensation is structured, methods for evaluating performance, and approaches to hiring, all with the goal of cultivating a work environment that is more just

and impartial. Additionally, companies might allocate resources toward initiatives for employee development to tackle any identified educational discrepancies.

Ethical Framework of How Project Ethics Are Evaluated

Researchers need to guarantee that participants in the study willingly give informed consent, comprehending the purpose, potential risks, and benefits of their participation. This is especially critical when addressing sensitive subjects like gender-based pay gaps. They should uphold the confidentiality and anonymity of participants to protect their privacy. As it is essential when gathering personal information related to individuals' education, gender, and income.

Conducting ethical research demands a dedication to precision and honesty in gathering, analyzing, and presenting data. Distorting or manipulating data can result in misguided conclusions, jeopardizing the study's credibility. Potential biases related to gender, education, or any other factors that could influence the outcomes should also be removed. The study should seek to optimize advantages and reduce potential harm to both participants and stakeholders. Researchers must weigh the potential positive influences of the study, such as contributing to gender equality initiatives while taking care to prevent any negative consequences for individuals or groups involved.

Materials & Methods

In the Methods and Materials section of this research paper, a rigorous approach was used to ensure accuracy in our analysis.

Materials

The foundation of our research involved utilizing Python programming language, SQL, and Jupyter Notebook, to create graphical representations and data analysis. Specifically, the

Jupyter Notebook facilitated the development of our Linear Regression Model, a powerful tool for examining quantitative data. The main focus of our research was the comparison of the significance of earning an advanced degree versus a high school diploma, particularly in the context of wage and gender inequality. To accomplish this, we used Python libraries such as Pandas and Matplotlib, enabling us to process and visualize the data effectively. The Pandas SQL library also proved valuable for handling SQL queries and database operations by contributing to an accurate evaluation of our research objectives.

Methods

In addressing our research question on how education and gender impact workplace pay gaps, our methodology uses a multifaceted approach. We conceptualize education levels, gender, and the wage gap, categorizing individuals based on education into distinct groups. We used data from our wages by education dataset to make sure our findings were comprehensive and representative. We used statistical analyses, like Ordinary Least Squares regression, to measure the significance of the wage gap while considering other factors. We compared the average earnings of male and female workers across education levels to identify and interpret disparities. Our streamlined approach helped us explore the relationship between education, gender, and workplace pay gaps in a detailed and nuanced way.

Results

We ran Ordinary Least Squares (OLS) Regression analyses to explore the relationship between gender, education levels, and wages. The summary below provides insights into the factors contributing to the gender wage gap.

Table #1

Summary of Regression Analysis

Variable	Women of All Degrees	Men of All Degrees	People with High School Diplomas	People with Advanced Degrees
Intercept	1852.48	1809.63	1927.68	1880.94
Gender	1.2473	1.1955	-	-
Education	-	-	3.3444	2.6552
P-Value	0.000	0.000	0.237	0.000
Effect Size	+1.2473	+1.1955	+3.3444	+2.6552

Note. This table presents key findings from the regression analysis on the gender wage gap and the influence of education on wages.

Gender Wage Gap & Comparative Analysis

The scatter plot illustrates a significant wage disparity between men and women, with women consistently earning substantially less than men. However, the analysis did reveal a positive coefficient for the *women_total* variable (1.2473) which tells us that there has been an increase in average wages for women over the last 49 years as compared to men. Similarly, for men, the *men_total* variable has a positive coefficient (1.1955), suggesting an increase in average wages for males as well. The positive coefficient for the *women_total* variable in the Women of

All Degrees group indicates that, on average, women experience a wage increase over time of $1,247.30, which is about 1.04 times more than men in the Men of All Degrees group, when other factors are held constant. Though this does not mean that women earn more than men, it represents progress made toward bridging the wage gap between men and women.

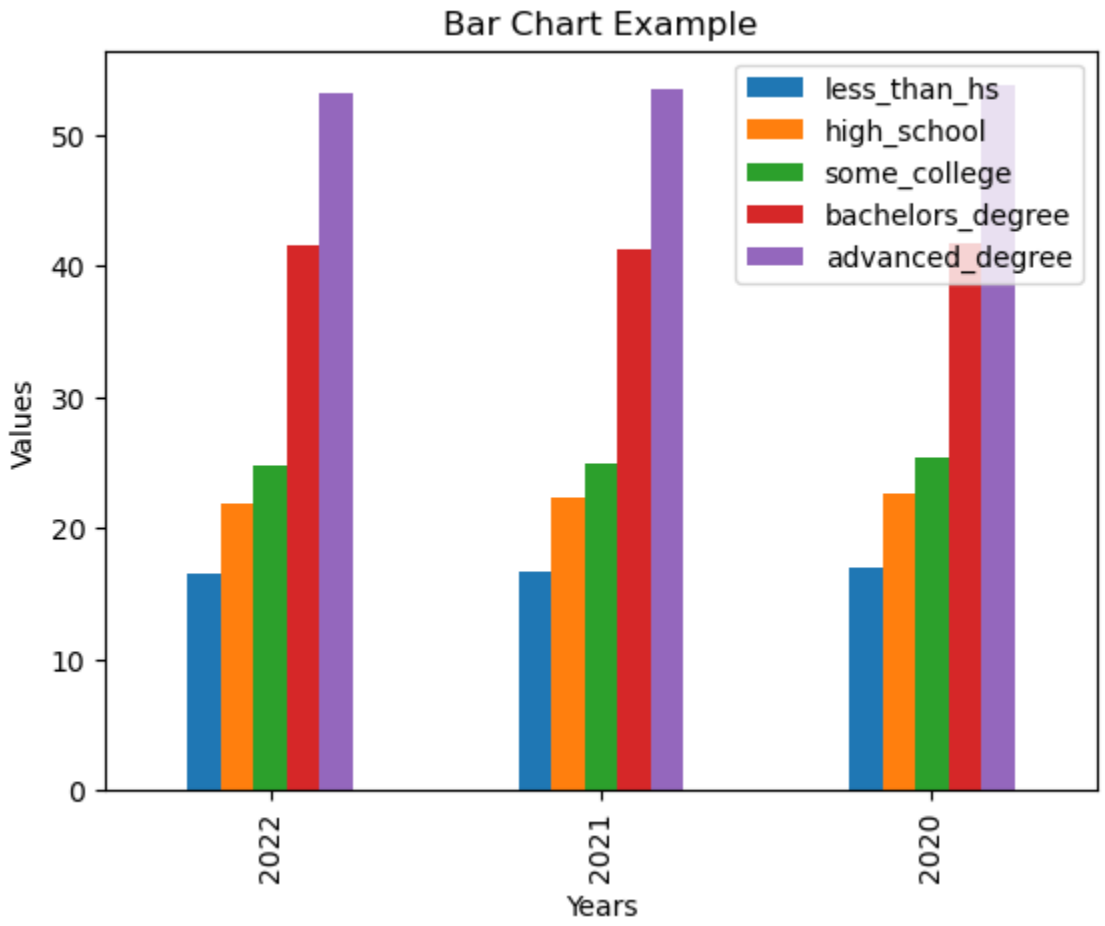
Education Impact & Comparative Analysis

The coefficient for the *high_school* variable is 3.3444, though it is not statistically significant at 0.05. The *advanced_degree* variable has a positive and significant coefficient (2.6552), this indicates a higher average wage for individuals with advanced degrees compared to those with only a high school diploma. It also indicates that, on average, individuals with advanced degrees experience a wage increase of approximately $2,655.20, which is about 0.79 times more than those with only a high school diploma, with other factors held constant. This emphasizes the importance of higher education in contributing to wage differentials in the workforce.

Analysis

By integrating programming languages and visualization tools, we ensured the reliability and interpretability of our analysis. This helps us answer our research question on the interplay between education, gender, and workplace pay gaps.

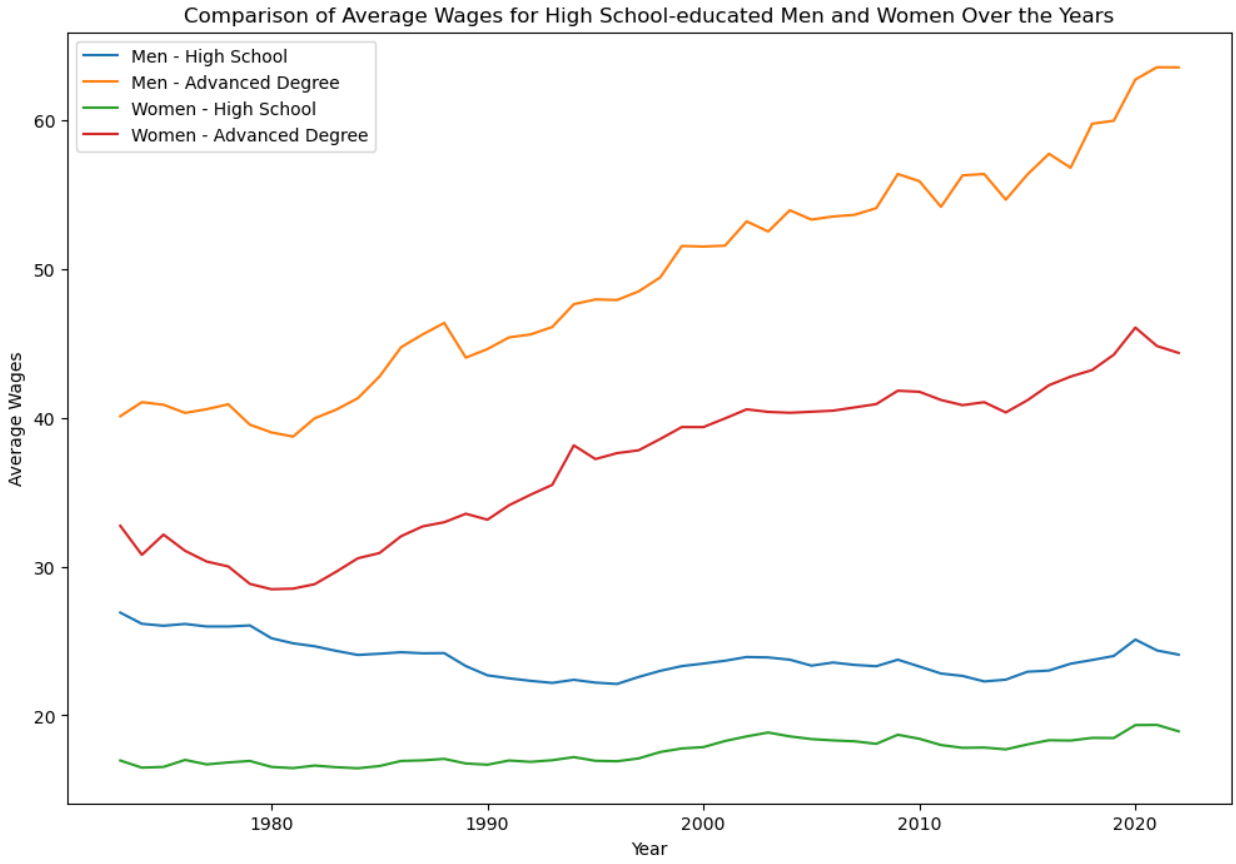
Figure #1



Note. This figure analyzes the proportion of people with different levels of education in the year 2020-2022.

Here we used the Python libraries, Matplotlib and Numpy, in Jupyter Notebook to sort and display the bars and group them based on the different parts of the year. This bar graph provides insights into how much individuals earn based on their educational background from 2020 to 2022. It illustrates the varying pay scales across different education levels, with each bar representing a specific level of education. With a simple glance at the graph, we can observe the discrepancies in pay between individuals with varying education levels. This makes the graph an important tool for data analysis and contributes to our understanding of pay disparities.

Figure #2



Note. This figure compares the wage gaps between men and women with high school diplomas and advanced degrees

Here we used SQL in Jupyter Notebook to group and display the data by years in a line graph. This allowed us to calculate average wages for high school-educated individuals and those with advanced degrees, both for men and women over the last 49 years. The visual highlights a 5-10 dollar per hour wage gap between women and men of both education levels. The gap is more pronounced for individuals with advanced degrees and there is a reason for this. According to a study by Quadlin et al., the gender wage gap tends to widen with higher education levels. Factors such as occupational segregation and gender bias in higher-paying professions contribute to a larger gap between individuals with advanced degrees ("Higher Education and High-Wage

Gender Inequality," Social Science Research, 2023). This visual helps us understand how hourly wages and wage gap levels have changed over time.

Discussion & Conclusion

Looking back over the last 49 years, our findings highlight the enduring challenge within our research question—how education and gender intertwine to mold wage disparities. What the research shows is that men generally earn more than women, and having a higher degree doesn't close the gap completely. Even with advanced degrees, women still earn less than men. The numbers show things are getting a bit better, but there's still work to do. Our research highlights that education alone isn't enough; there are other factors at play, like the jobs people choose and societal views. But, our study has some limits. We only looked at hourly wages and didn't explore everything. Our 50-year snapshot is just part of a bigger story. To understand why these differences happen, we need more research. Looking ahead, future studies could dig into jobs, biases, and how things are changing over time. Our study is like a piece of a puzzle, and there's more to discover in the bigger picture of pay differences between men and women.

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