The Way to Happiness: Higher Socioeconomic Status?

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Introduction: Motivation and Exploratory Data Analysis

Happiness has long been one of people's most important aspires, and the relationship between socioeconomic status (SES) and happiness has become a focal point of multidisciplinary research on individual well-being and societal cohesion. Prior literature suggests that education, employment, and work-life balance are critical social determinants of subjective health and happiness, with effects varying with gender. [1] [2] There have also been studies investigating with dataset across different countries within the field, aiming at revealing how income and employment correlate with happiness and satisfaction. [3] Socioeconomic status, encompassing elements such as income, education, and occupation stands as a pivotal determinant in shaping the quality of life for individuals. [4] Understanding the complexities of this relationship holds significant implications for policymakers, educators, and social scientists alike. While conventional wisdom suggests that higher SES often translates to greater happiness, we are curious to confirm this assumption with data-backed evidence.

We have come across the dataset labeled "happiness," provided by Wooldridge Data and collected through online surveys, which enables us to explore the correlation between various aspects of socioeconomic status and an individual's self-assessed happiness. [5] This dataset, comprising 33 variables, contains demographic details of 17,137 individuals. Key variables include "happy" (indicating an individual's overall happiness), "workstat" (employment status), "income" (total family income), "educ" (highest level of education attained), "female" (1 if female), "babies" (household members under 6 years old), "preteens" (household members aged 6 to 12), and "teens" (household members aged 13 to 17).

[1] Maharlouei, Najmeh et al. "Subjective Health and Happiness in the United States: Gender Differences in the Effects of Socioeconomic Status Indicators." Journal of mental health & clinical psychology vol. 4,2 (2020): 8-17. doi:10.29245/2578-2959/2020/2.1196

[2] Mizobuchi, H. Measuring Socio-economic Factors and Sensitivity of Happiness. J Happiness Stud 18, 463–504 (2017). https://doi.org/10.1007/s10902-016-9733-1

[3] Peiró, Amado. "Happiness, satisfaction and socio-economic conditions: Some international evidence." The Journal of Socio-Economics 35.2 (2006): 348-365.

[4] Etzioni, Amitai, and Paul R. Lawrence. Socio-economics: Toward a new synthesis. Routledge, 2016.

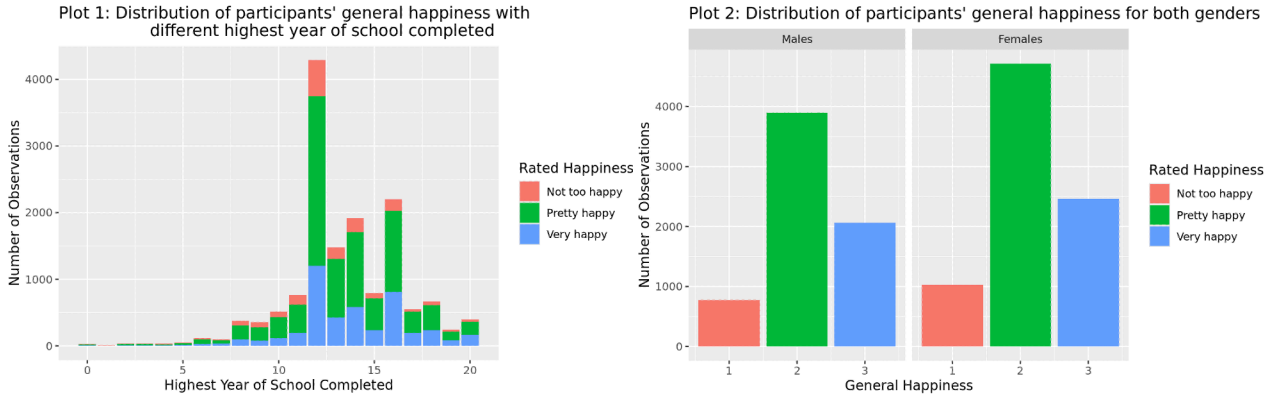
[5] Wooldridge Data. https://vincentarelbundock.github.io/Rdatasets/doc/wooldridge/happiness.html

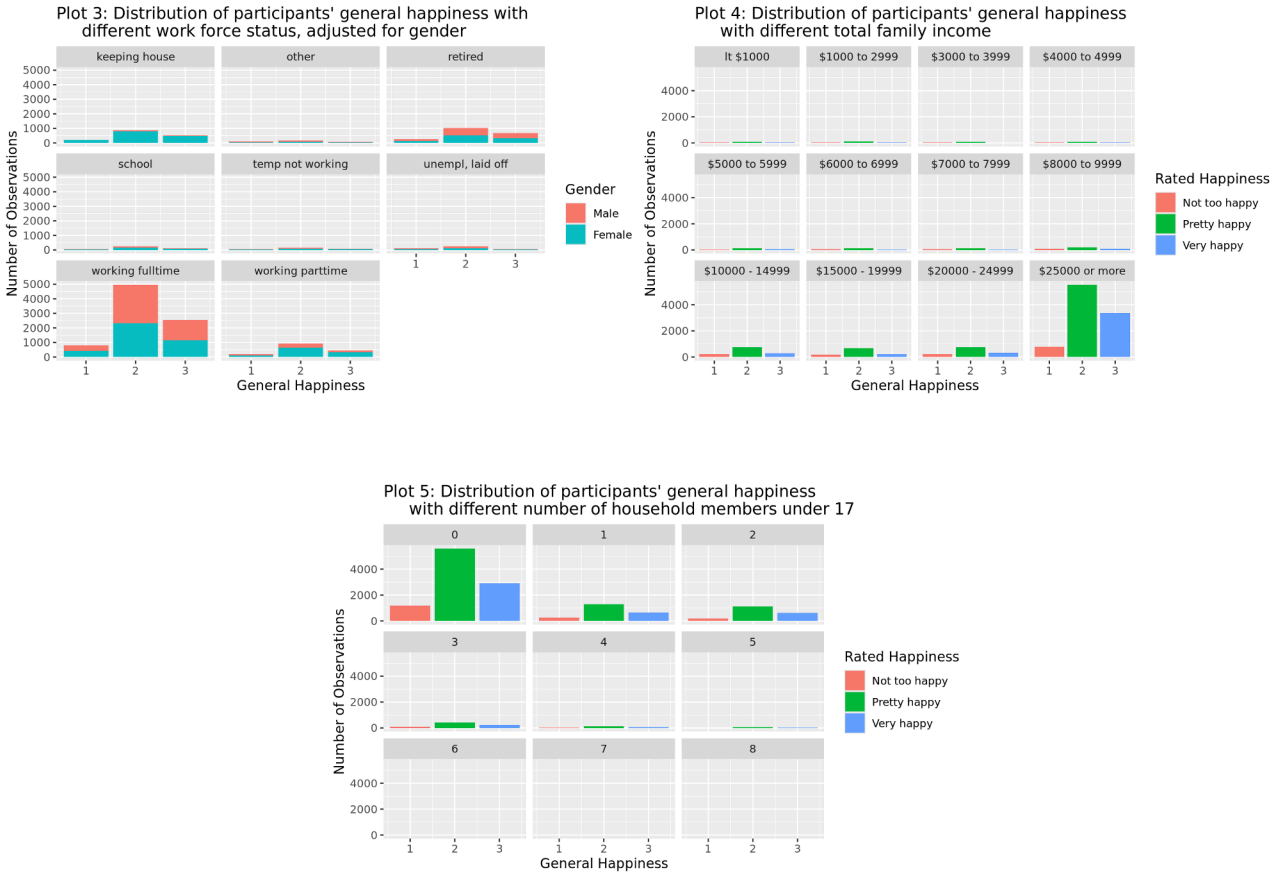
Our research question in this instance is whether individuals with higher socioeconomic standing tend to report greater levels of happiness. Our hypothesis is a positive correlation; more specifically, an employed male with high household income, high educational level and fewer young members at home is anticipated to be happier.

Concerning our response variable "happy," we assigned numerical rankings of "1," "2," and "3" to its three categories—"not too happy," "pretty happy," and "very happy," respectively—to facilitate analysis and model fitting. To create the predictor variable that records the number of household members under 17, which was not originally included in our dataset, we aggregated data from three existing variables: the number of babies, preteens, and teenagers in the household. We believe it's more logical to consider these age groups collectively since each requires financial support and additional care from older members of the household, given that they are not yet fully independent.

Given the N/As across "educ", "workstat", "income" and the "young_members" variable in total is approximately of all observations, using imputation to generate missing data might not be the optimal choice in this context. We thus filtered the NAs across each column and generated data visualization and regression on the existing data.

We generated visualizations to explore the relationships between the predictor variables and the response variable. Since most of our variables, including the response variable, are categorical, we opted for bar plots for all our exploratory data analyses.





The first bar plot examines the distribution of observations across different levels of highest year of school completed in the sample, accounting for their overall happiness. The majority of participants in the sample have completed 12-16 years of education, roughly equivalent to middle school and a high school diploma. Across almost every education level, more individuals selected "pretty happy" than "very happy" or "not too happy," possibly influenced by a tendency to prioritize these responses in general.

The second plot analyzes the distribution of observations for males and females separately, considering their overall happiness. Overall, participants tend to choose "pretty happy" more frequently than "very happy" or "not too happy," and there are more female participants in the dataset than male.

The third plot examines the distribution of observations across different work force statuses, factoring in gender and overall happiness. Most participants in the dataset are employed full-time, with only a small proportion in school, temporarily unemployed, or not working. More female participants are homemakers or work part-time compared to male participants, while

gender distribution is relatively even across other work force statuses. The overall pattern of happiness preference remains consistent across genders.

The fourth plot illustrates the distribution of observations across different household income levels, considering overall happiness. The majority of participants have a household income above $10,000, especially those with incomes exceeding $25,000, who strongly favor "pretty happy" and "very happy" over "not too happy." The general pattern of happiness preference persists across all income levels.

The fifth plot displays the distribution of observations for participants with different numbers of young household members, adjusting for overall happiness. Most participants do not have anyone under 17 in their household, while those who do typically have one or two such members. The overall pattern of happiness preference remains consistent across these groups.

Finally, we decided on predicting whether people with higher socioeconomic status are happier with these predictors: work force status ("workstat"), total family income ("income"), highest year of school completed ("educ"), gender ("female"), and the number of household members under 17 ("young_members").

Methodology: Interaction Assessment and Model Selection

Among our predictors, we examined two possible interactions: the interaction between work force status and gender, and that between household income and the count of household members under 17. Given the societal expectation for women to bear children and the stereotype of women primarily responsible for childcare, we anticipate a stronger correlation between being female and working part-time. Additionally, we anticipate that households with higher incomes will generally be able to support more members under 17, necessitating greater economic assistance from other family members.

Through an anova-f fest, we conducted a comparison between the original model and an interaction model (involving both work force status and gender) to evaluate whether the interaction term, on average, performs better than alternatives, as opposed to the null hypothesis suggesting no interaction between work status and gender. This analysis aims to identify discrepancies resulting from the interaction term between the initial additive model and the interaction model. A significant F-test for the interaction term(s) signifies that the model incorporating interaction effects offers a more suitable representation of the data compared to the model lacking interaction effects.

F test for m1: H0: there is no interaction between working status and whether one is woman. Ha: there is an interaction between working status and whether one is woman.

F test for m2: H0: there is no interaction between household income and the number of young members in the household. Ha: there is an interaction between household income and the number of young members in the household.

The p-value for the interaction term involving full-time work status and gender is 0.0003, indicating statistical significance as it falls below the conventional threshold of 0.05. This provides ample evidence to reject the null hypothesis. Consequently, we conclude that the association between happiness and full-time employment status varies based on the gender of the respondent.

We constructed a second model to assess additional interaction effects by incorporating another interaction term, this time between household income and the presence of young members, alongside the existing interaction model. Our findings revealed significant results for both F-tests. Specifically, the F-statistic value of 0.033 for the interaction term involving household income (measured in dollars per year) and the number of children (young_members) across all levels falls below the significance level of 0.05. This provides sufficient evidence to reject the null hypothesis. Consequently, we infer that the association between the general happiness score and household income (measured in dollars per year) is contingent upon the number of children within the household.

In our study, we contemplated employing both multinomial regression and ordinal regression models for the categorical response variable. Ultimately, we opted for the latter. The decision was straightforward, as the response variable "happy" exhibits an ordinal nature, with discernible gradations from "not too happy" to "pretty happy" to "very happy." We see that the proportional odds assumption is fulfilled as we perceive the change in predictors to have the same conditional relationship with odds of being across different categories.

After assessing and confirming all the above conditions, we went into fitting the ordinal regression model.

Results: Effects of Education, Gender-Adjusted Work Status, and Household Condition

Working Statuses	Exponentiated coefficients	Gender Interactions	Exponentiated coefficients	Household Income	Exponentiated coefficients	Young Members Interactions	Exponentiated coefficients
Retired	1.7024114	Female	1.418911	$1000 to 2999	1.0217438	Young Members	1.226093
Working Full-time	1.1200057	Female & Unemployed	1.0975054	$3000 to 3999	0.8965579	Young Members & $1000 to 2999	0.7860739
School	1.0344362	Female & Working Part-time	1.0761273	$4000 to 4999	1.1695977	Young Members & $3000 to 3999	0.7663593
Working Part-time	0.8146048	Female & School	0.9620414	$5000 to 5999	1.5157996	Young Members & $4000 to 4999	0.6559197
Temporarily Not Working	0.7772623	Female & Temporarily Not Working	0.9461765	$6000 to 6999	0.8439726	Young Members & $5000 to 5999	0.7104273
Other	0.5932338	Female & Other	0.8244014	$7000 to 7999	0.9211934	Young Members & $6000 to 6999	0.5911864
Unemployed	0.3977148	Female & Working Full-time	0.6489594	$8000 to 9999	0.9260782	Young Members & $7000 to 7999	0.6216896
		Female & Retired	0.6095667	$10000 - 14999	1.3945867	Young Members & $8000 to 9999	0.8870423
				$15000 - 19999	1.4007407	Young Members & $10000 - 14999	0.8236165
				$20000 - 24999	1.7116136	Young Members & $15000 - 19999	0.8344152
Other Factors	Exponentiated coefficients			$25000 or more	2.5982148	Young Members & $20000 - 24999	0.7486186
Education	1.0445367					Young Members & $25000 or more	0.8509345

Education:

A person who has one more year of education is predicted to have 1.04 times the odds of being in the next higher score of happiness category compared to a person who has less years of education, while adjusting for other variables. Generally, having an additional year of education indicates a higher level of happiness.

Gender-Adjusted Work Status:

After adjusting for factors such as years of education, household income, number of children, and gender, individuals who are retired are expected to have 1.702 times higher odds of achieving a higher level of happiness compared to those who are homemakers. Similarly, full-time workers are anticipated to have 1.120 times higher odds of being in a higher happiness category compared to homemakers. Conversely, individuals in other employment statuses are predicted to have lower odds of reaching a higher happiness category than homemakers.

A woman is predicted to have 1.418 times the odds of being in the next higher score of happiness category compared to a man, while adjusting for all other variables. However, when accounting for the interaction between gender and employment status, it is found that the happiness levels of women, although diverging from the overall pattern, are still influenced by their work status.

When adjusting for education, income, and number of children, and compared to homemaking women, unemployed women have $(1.418) \cdot (1.098)=1.557$ times the odds of being in a higher happiness category, while part-time working women have $(1.418) \cdot (1.076)=1.513$ times higher

odds. Conversely, women in other employment statuses, including full-time work, temporary unemployment, being in school, or retirement, are predicted to have lower odds of achieving the next higher happiness level.

Household Condition:

When considering various factors influencing an individual's happiness score, household income emerges as the primary determinant. Compared to individuals in households with a $1000 total income, those with incomes exceeding $10000 exhibit more than a 1-fold increase in the odds of reaching the next higher happiness category, after adjusting for other variables. Specifically, individuals in households with $25000 or more in total income are predicted to have 2.598 times the odds of attaining the next higher happiness category.

However, individuals with household incomes ranging from $1000 to $2999 and $4000 to $5999 also demonstrate odds greater than 1 for reaching the next higher happiness category. This phenomenon may be attributed to class distinctions, which significantly influence perceptions of happiness within one's own socioeconomic stratum. Individuals on the cusp of upward mobility often face heightened challenges despite having higher household incomes relative to their peers.

While an additional child in the household generally corresponds to increased happiness, happiness scores tend to decline as the number of dependents rises across all income categories. The notable correlation between higher household income and larger family size offers a potential explanation.

Considering the interaction between the number of young dependents and household income, while accounting for education, gender, and employment status, individuals with household incomes above $1000 are anticipated to experience reduced probabilities of being in the next higher happiness category for each additional young dependent, compared to those with a $1000 income (ex. $(1.226) \cdot (0.786)$=0.964 times higher odds for $1000-$2999). However, individuals with household incomes exceeding $8000 demonstrate elevated odds of attaining the next higher happiness category compared to those with incomes ranging from $1000 to $8000 (ex. $(1.226) \cdot (0.887)$=1.087 times higher odds for $8000-$8999). This phenomenon suggests a potential income threshold, wherein higher income levels, coupled with increased socioeconomic responsibilities, correlate with heightened probabilities of achieving greater happiness scores.

Discussion: Summary, Strengths, and Limitations

In summary, the overarching finding indicates that employed females with higher household incomes, advanced education levels, and a larger number of children at home tend to report elevated levels of happiness.

However, two unexpected discoveries have emerged. Firstly, contrary to the assumption that males, typically with higher socioeconomic status, should be happier, females actually exhibit

greater happiness levels. This deviation may stem from societal and economic pressures placed on males, who are traditionally seen as the primary providers for household financial stability. Furthermore, the results section reveals variations in happiness levels among women based on their employment status. Retired and full-time working women do not consistently exhibit higher happiness scores, suggesting that women who work face challenges in both professional and domestic realms, encountering workplace discrimination and microaggressions while juggling additional household responsibilities. These factors likely contribute to lower happiness scores compared to women primarily engaged in homemaking.

Secondly, there is a positive correlation between the presence of young household members, but this correlation diminishes when considering its interaction with total family income levels. This suggests that higher income levels, coupled with increased socioeconomic responsibilities, correlate with higher probabilities of achieving greater happiness scores. Given that households with more children typically have higher total incomes, the observed positive correlation between happiness and increased young dependents may primarily result from the influence of higher income rather than solely from the presence of additional children.

The key strength of our analysis lies in our incorporation of socioeconomic variables into our interpretations through the creation of two interaction terms: the female-workstat interaction underscores how additional responsibilities associated with women's societal roles in various contexts impact their happiness perception, while the young members-income interaction highlights how economic status and household conditions collectively shape one's happiness perception, reflecting broader social structures and class divisions beyond the household. Our data analysis offers valuable insights into the complexities of identities and the nuanced dynamics within both social and domestic relationships, particularly in the context of examining the relationship between an individual's socioeconomic status and their level of happiness.

Some limitations in this research include the sampling bias caused by self-reported happiness and potential missing interactions. In addition to addressing the limitations in our research, future studies in this field can concentrate on investigating the underlying reasons behind the two unexpected findings, evaluating the validity of the explanations we have proposed, and exploring additional factors that may influence the relationship between socioeconomic status and happiness.

Works Cited

1. Etzioni, Amitai, and Paul R. Lawrence. Socio-economics: Toward a new synthesis. Routledge, 2016.
2. Maharlouei, Najmeh et al. "Subjective Health and Happiness in the United States: Gender Differences in the Effects of Socioeconomic Status Indicators." Journal of mental health & clinical psychology vol. 4,2 (2020): 8-17. doi:10.29245/2578-2959/2020/2.1196

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