How do Gender and Age Influence Whether a Person Held Leadership Roles during Childhood?

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Introduction

Leadership experiences in childhood can have long-lasting effects on an individual's confidence and future career. However, despite this significance, some individuals would not be able to access the early leadership opportunities compared to other individuals. In order to assess whether early leadership opportunities are equally distributed across individuals, we would like to explore how gender and age influence whether a person held leadership roles during childhood. By using nationally representative survey data from the Pew Research Center's American Trends Panel (ATP), we aim to uncover disparities in childhood leadership experiences and assess the influence of demographic factors.

In this study, we will focus on a specific question in Wave 131 of the ATP survey, which asked U.S. adults whether they took on leadership roles while growing up. The dataset includes demographic information, including age and gender, and uses survey weights calibrated to the U.S. population benchmarks. We will use a stratified sampling approach and apply survey-weighted logistic regression models. Additionally, we will conduct Monte Carlo simulations to evaluate the precision and potential bias of our sampling methods.

Through this analysis, we would like to provide insight into generational and gender-based disparities in early leadership and emphasize how important it is to ensure equitable access to leadership-building experiences at early life stages.

Data

The primary dataset for this study is from the Pew Research Center's American Trends Panel (ATP), collected during Wave 131 from July 17th to July 23rd 2023, providing a detailed account of insights into the leadership experiences of U.S. adults (18 and above) during their childhood. The dataset includes a population of 5057 U.S. adults, who were recruited by an address-based sampling (ABS) to reflect the broader U.S. adult population through survey weights that have been adjusted for SRS design, simulation, and alignment with U.S. adult population benchmarks to counter selection bias, nonresponse, and attrition. The dataset measures the leadership experiences during childhood, gender, age categories, and various demographic metrics. The sampling frame consists of the full dataset of ATP respondents in Wave 131.

The following variables are selected for the analysis based on their expected importance to

understanding the influence gender and age have on person held leadership roles during childhood using a survey-weighted generalized linear model. Below is the detailed explanation of the key variables.

- F_AGECAT: The age category of respondents (18-29, 30-49, 50-64, 65+)
- F_GENDER: The gender of respondents (men, women)
- EVERLEAD1_W131: The question "Still thinking about when you were growing up, would you say you took on leadership roles in your school or community?
- WEIGHT_W131: Weight adjusted to account for the groups of people that may have been over-sample or under-sampled. It helps provide a more precise reflection of the actual distribution of the U.S. adult population in terms of demographic characteristics.

Before beginning the analysis, we take several steps to clean the data. First, we constructed the binary variables EVERLEAD1_W131, indicating whether or not the respondent held leadership roles during childhood. Responses such as "Extremely often," "often," and "sometimes" were coded as 1 (yes), while "rarely" and "never" were coded as 0 (no). We filtered the variable gender by coding male as 1 and female as 2. For the variable age, we coded 18-29 as 1, 30-49 as 2, 50-64 as 3, and 65+ as 4. This allows for a cleaner interpretation and analysis of the data.

Method

Binary Logistic Regression Model

We employed the Survey-weighted generalised linear models to create a logistic regression model to assess the influence of gender and age on leadership roles during childhood while considering weights from the original database to represent the original U.S. adult population. The dependent variable here is a binary outcome, where respondents either held leadership roles or not while growing up. We followed this model to determine whether or not gender and age affected whether or not individuals took on leadership roles during their childhood:

$$log(Leadership) = B_0 + B_1(F_{GENDER}) + B_2(F_{AGE})$$

- log(Leadership): Expected total number of U.S. adults (18 and above) who took on leadership roles during their childhood
- B_0: The intercept of the regression (expected value of log(leadership) when all the independent variables are equal to zero
- $B_1 - B_2$: coefficients of the independent variables that affect the number of U.S. adults who took on leadership roles during their childhood
    - Gender: female vs. male
    - Age Category: 18-29, 30-49, 50-64, and 65+

Sampling Design

We used a stratified survey design to better understand leadership experiences across age and gender groups. The target population consists of U.S. adults (18 years or older) who participated in Wave 131 of the ATP survey. Each individual respondent serves as both the sampling unit and element. We stratified the population using two categorical variables: gender (men, women) and age group (18–29, 30–49, 50–64, 65+). Within each stratum, we performed proportional allocation to reflect the distribution in the overall survey population and to improve estimation precision across groups. The total sample size was n = 400 individuals who responded to the variable EVERLEAD1_W131. We determined this sample size based on the 95% confidence interval with a desired margin of error of ± 0.05. Using the standard sample size formula of proportion estimation, we got:

$$n = \frac{z^2 * p(1-p)}{B^2} = \frac{(1.96)^2 * 0.5 * (1-0.5)}{(0.05)^2} = 384.16 \approx 385$$

We rounded up this value to 400 to simplify the allocation across the strata and for conservative estimation. This sampling design enabled us to ensure a well-balanced representation of the population, supporting the validity of ATP findings.

Nonresponse Adjustment and Weighting

Out of the total sample of 5,875, 5,075 responded with a rate of 86%. There was no need to handle these nonresponses manually in our project, because the ATP dataset has already accounted for nonreponse through its complex weighting scheme. Firstly, equal base weight is given for each panelist, reflecting their initial probability of selection into the panel. Then, the weights are adjusted to account for the changes in ATP recruitment design across years. Then, the final weights(WEIGHT_W131) are calibrated to align with the population benchmarks to correct the unit nonresponse and panel attrition. This ensures our upcoming inferences are representative of U.S adults even when using complex designs.

Analysis

1. Overall Estimate

In order to assess how gender and age are associated with childhood leadership experience, we estimated the proportion of overall leadership experience of individuals who responded to EVERLEAD1_W131. Using the svymean() function with the provided weights (WEIGHT_W131) and our stratified sample design, we found that approximately 58.45% of U.S adults have held leadership roles with a standard error of 3.04%. This yielded a 95% confidence interval of [52.5%, 64.3%], holding the representativeness of the population.

2. Stratum-Level Estimate

We also estimated means and standard errors across the eight strata using svyby() function and WEIGHT_W131. These subgroup-level estimates offer more specific trends for various demographic categories.

Stratum	Leadership Experience Proportion	Standard Error	Lower CI	Upper CI
Male. 18-29	0.754	0.103	0.553	0.955
Female. 18-29	0.751	0.095	0.564	0.937
Male. 30-49	0.6598	0.078	0.445	0.751
Female. 30-49	0.534	0.068	0.400	0.668
Male. 50-64	0.625	0.089	0.451	0.798
Female. 50-64	0.427	0.075	0.281	0.574
Male. 65+	0.604	0.088	0.431	0.777
Female. 65+	0.498	0.082	0.338	0.659

Table 1. Estimated proportion of Childhood Leadership Experience by Stratum

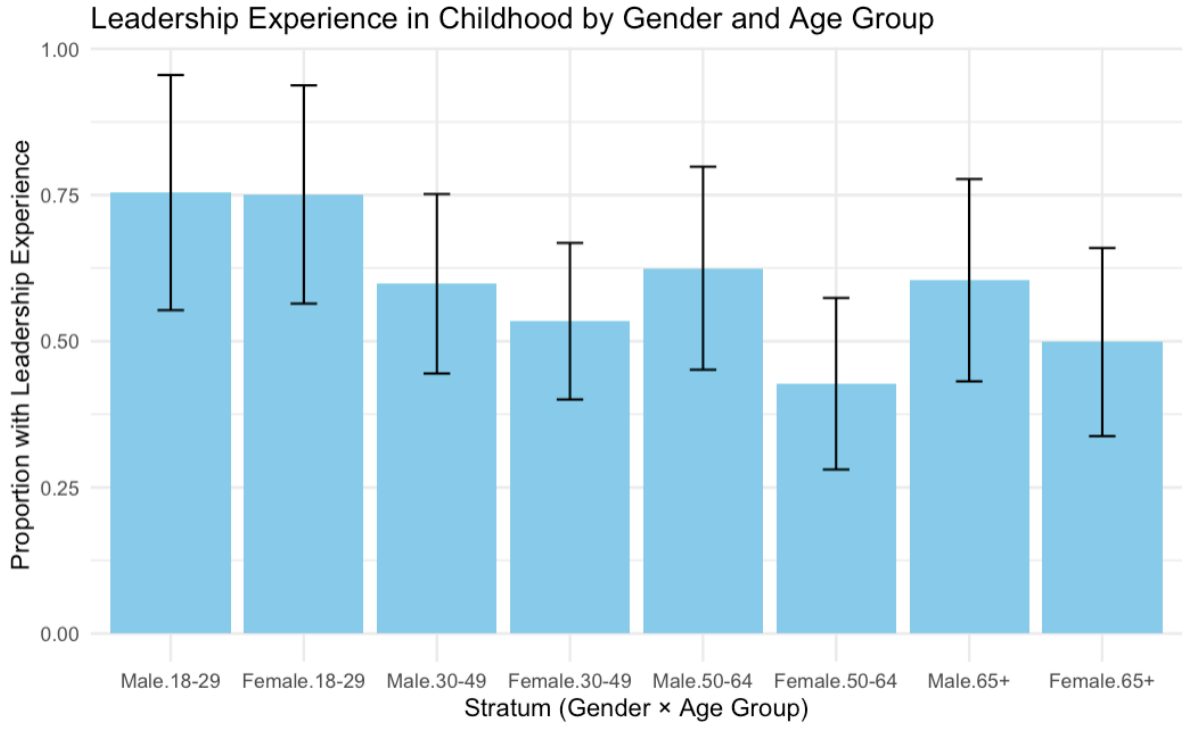

Figure 1. Estimated proportion of Childhood Leadership Experience by Stratum

Figure 1 is a visual presentation of Table 1, showing how childhood leadership estimates vary across strata. It suggests that younger age groups tend to have more leadership experience, and that males report more leadership roles in their childhood compared to females across most age categories. These results underscore the importance of evaluating both gender and age as potential contributors to childhood leadership experience.

3. Results of the Logistic Regression Model:

We used a logistic regression model with a quasibinomial family to account for survey weights to analyze the likelihood of respondents of having held a leadership position (EVERLEAD1_W131) based on the stratum age category and gender. We held males and age group 18-29 as a reference category.

After running the logistic regression model, we see that females had a coefficient value of -0.24379 with a p-value of 0.000681, which indicates the variable gender was statistically significant. Females were less likely to hold leadership roles compared to males.

We also see that the coefficient for the variable “age category 30-49” had a coefficient of -0.10055 and a p-value of 0.398831, showing no statistically significant difference compared to the reference group, but age categories 50-64 and 65+ show statistically significant differences: a coefficient value of -0.36723 and a p-value = 0.002531 for 50-64 years and a coefficient value of -0.39015 and a p-value = 0.001553 for 65+ years. These two categories are also less likely to have held leadership roles compared to the reference age group 18-29.

4. Monte Carlo Simulation

To ensure the accuracy of our computation and evaluate the unbiasedness of our sampling methods, we conducted a Monte Carlo simulation comparing stratified sampling and simple random sampling (SRS). Each method was repeated 1,000 times with a fixed sample size of 400. For each simulated sample, we estimated the proportion of respondents who reported holding leadership roles during childhood and calculated the standard error.

Metric	Stratified Sampling	SRS
Mean Estimate	0.5839	0.5819
Mean Standard Error	0.0245	0.0246
Mean 95% Error Bound	±0.0480	±0.0483

Table 2. Average Results Across 1,000 Iterations

Since our analysis uses pre-calibrated survey weights from the ATP dataset, convergence to the population mean is expected when computations are implemented correctly. The Monte Carlo simulation served as a verification to ensure accuracy of the sampling and estimation processes. The results confirmed that both sampling methods produced nearly identical average estimates, as expected.

Notably, stratified sampling demonstrated slightly lower standard error and narrower confidence bounds, offering marginal gains in precision. This is particularly valuable in studies that emphasize subgroup comparisons.

Therefore, the Monte Carlo simulation verified the correctness of our computational procedures and highlighted the relative advantage of stratified sampling in improving estimate precision.

Discussion

Our analysis reveals meaningful differences in reported childhood leadership experiences by both gender and age group. Younger adults (ages 18–29) reported the highest levels of leadership roles, with both men and women in this category having rates over 75%. In contrast, the lowest rates were observed among women aged 50–64, at just 42.7%. These findings suggest generational changes in access to leadership opportunities and hint at historical inequalities that may have shaped those experiences.

The regression results confirm these patterns: older adults, especially those aged 50–64 and 65+, were significantly less likely to report having held leadership roles compared to the youngest age group. Additionally, women overall were less likely than men to report such experiences.

Importantly, our sample supports the validity of these inferences. The American Trends Panel includes a pre-calibrated weight variable (WEIGHT_W131) that adjusts for nonresponse, selection bias, and population representativeness. By applying this weight in our survey design and analyses, we ensured that our estimates can represent the full U.S. adult population.

While our study provides important insights, there are several ways in which we could have expanded our approach. First, we could have included additional gender identities and intersectional variables such as race, socioeconomic status, and geographic location for more inclusive analysis. Also, although we utilized stratified sampling for simulation and used appropriate weights for estimation, we could have explored alternative survey designs, such as post-stratification or multistage cluster sampling, to test robustness under different assumptions.

Together, these findings highlight that leadership development and opportunity are not evenly distributed across individuals. Older women with lower rates of leadership may reflect not only the historical lack of access, but also the persisting cultural expectations that undervalue

female leadership. Therefore, there is a need for well-structured programs that could foster inclusive leadership for underrepresented groups.

References

- Pew Research Center. (2023). American Trends Panel Wave 131. Retrieved from https://www.pewresearch.org/methods/dataset/american-trends-panel-wave-131/