Analysis of Age, Race, and Income as Factors of Work Time

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Research Interest

- In order to make ends meet and due to the structure of the 40 hour work week, a majority of one's waking hours must be spent doing work and work-related activities.
- Studies show that Americans, on average, work 34.4 hours a week, longer than their counterparts in other economically developed nations. (Isidore & Luhby, 2015)

But WHY are Americans working so much? And are there certain factors that contribute to this trend?

Data Source

Our data was sources from the IPUMS TimeUse database, which is maintained by the University of Minnesota. All IPUMS databases aggregate data from surveys conducted within the United States and TimeUse specifically aggregates individual-level survey data collected from the Annual American Time Use Survey and the Current Population Survey (CPS), conducted by the US Bureau of Labor Statistics and the US Census Bureau, respectively.

To be included in the ATUS, eligible households participating in the CPS must satisfy the following criteria: at least one member aged 15+, resides within the 50 US states, not currently in an inmate institution.

Variables

Explanatory Variables:

- Age in whole years (numeric)
- Annual Household Income Group (categorical)
  - < $10,00, $10,000 - $24,999, $25,000 - $49,000, $50,000 - $74,999, $75,000 - $150,000, > $150,000
- Race (categorical)
  - American Indian or Alaska Native, the baseline group, Asian or Pacific Islander, Black, Mixed Race (two races only), and White

Response Variable:

- Time spent on work and work related activities in hours per day

Models and Hypotheses

Primary Hypothesis: work hours will decrease with age, regardless of income level

- For this hypothesis we fit an additive linear regression model with the formula *WorkHours = Age + FamIncome*

Secondary Hypothesis: as age increases, the extent of the decrease in work hours will depend on the race of the respondent/worker, regardless of income group

- For this hypothesis we fit a linear regression model with an interaction between age and race and the formula *WorkHours = FamIncome + (Age · Race)*

Results: Primary Hypothesis

Age vs. Work Hours for each Income Group
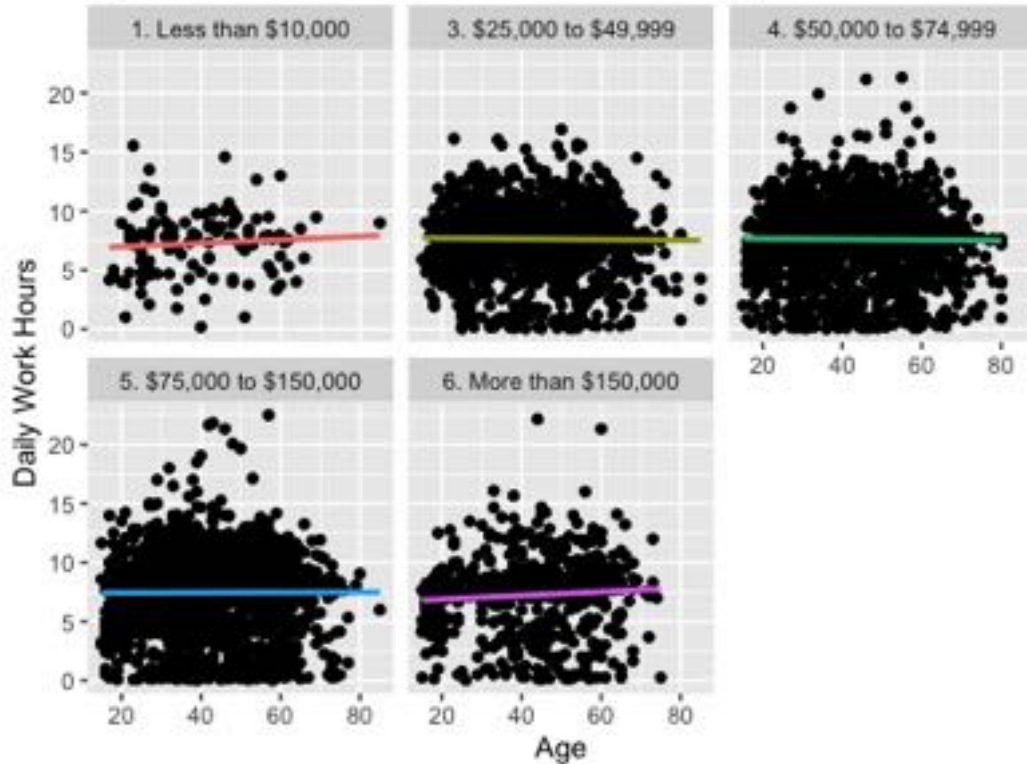
*WorkTime = 7.245 + (0.001•Age) + FamIncome Intercept Offsets*

The p-value of the slope and offset coefficients all fail to meet the 0.05 α significant threshold, which suggest that age does not have a relationship with work hours and that household income bracket has no additionally effect.

Additionally, our hypothesis that work hours would decrease with age is not supported by the model, as the slope is positive.

Results: Primary Hypothesis cont.

```
# A tibble: 10 × 7
   term                              estim.¹ std_e..² stati..³ p_value lower..⁴ upper..⁵
   <chr>                              <dbl>   <dbl>    <dbl>   <dbl>    <dbl>    <dbl>
 1 intercept                          6.70    0.845    7.92    0        5.04     8.35
 2 AGE                                0.014   0.02     0.724   0.469   -0.025    0.054
 3 FAMINCOME: 3. $25,000 to $4..      1.07    0.883    1.21    0.225   -0.659    2.80
 4 FAMINCOME: 4. $50,000 to $7..      1.02    0.874    1.17    0.242   -0.69     2.74
 5 FAMINCOME: 5. $75,000 to $1..      0.726   0.871    0.834   0.404   -0.981    2.43
 6 FAMINCOME: 6. More than $15..     -0.118   0.928   -0.127   0.899   -1.94     1.70
 7 AGE:FAMINCOME3. $25,000 to ..     -0.018   0.021   -0.841   0.4     -0.058    0.023
 8 AGE:FAMINCOME4. $50,000 to ..     -0.017   0.021   -0.838   0.402   -0.058    0.023
 9 AGE:FAMINCOME5. $75,000 to ..     -0.014   0.021   -0.662   0.508   -0.054    0.027
10 AGE:FAMINCOME6. More than $..      0.001   0.022    0.06    0.952   -0.041    0.044
# .. with abbreviated variable names ¹estimate, ²std_error, ³statistic,
#   ⁴lower_ci, ⁵upper_ci
> get_regression_summaries(model1)
# A tibble: 1 × 9
  r_squared adj_r_squared    mse  rmse sigma statistic p_value    df   nobs
     <dbl>         <dbl>   <dbl> <dbl> <dbl>     <dbl>   <dbl> <dbl>  <dbl>
1    0.002         0.001    9.18  3.03  3.03      1.62   0.102     9   6347
>
```

Results: Secondary Hypothesis

Age vs. Work Hours for each Income and Race Group
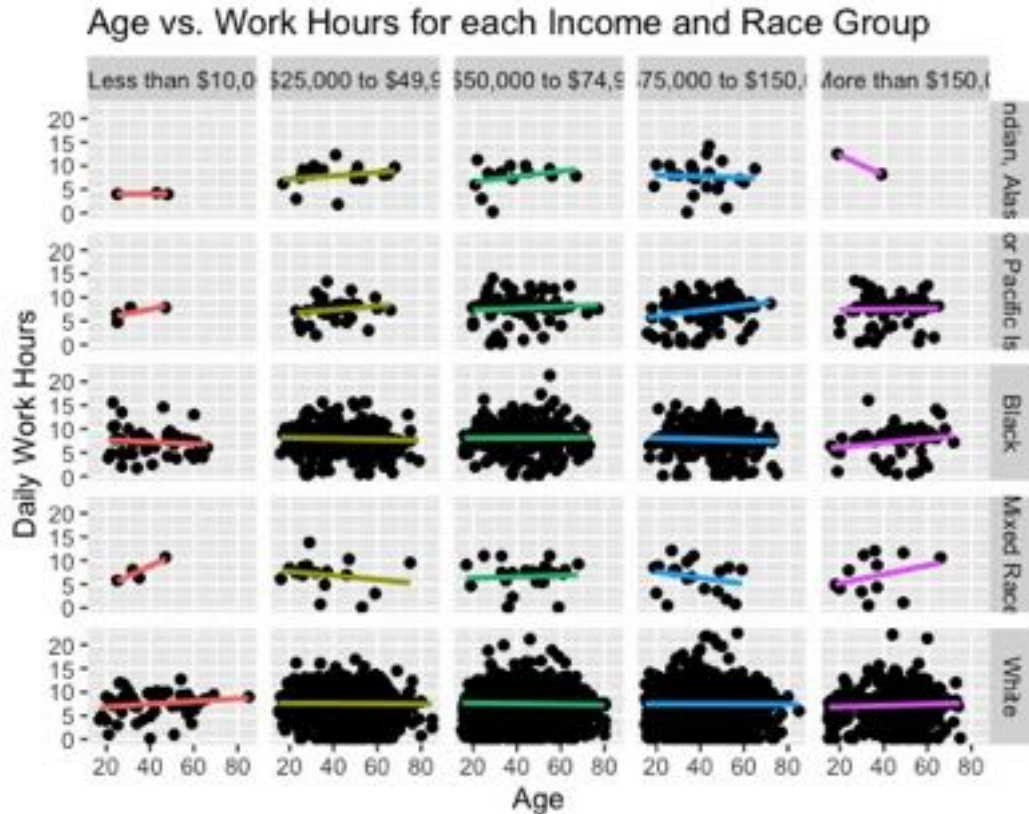
WorkHours = 6.77 + (0.014•Age) + FamIncome Intercept Offsets + Age•Race Slope Offsets

The p-values of the Age•Race slope offsets do not meet the 0.05 α significance threshold, suggesting that Race does not provide an additional change in work hours to Age and Household Income

However, some of the Age•Race coefficients showed a negative offset for the slope, which suggests that some racial identities impact work hours

Discussion

Both of our hypotheses were determined to be incorrect based on the results of our modeling. This is potentially due to the scheduling inflexibility of many workplaces and the nationwide work time thresholds to be considered a full or part time employee.

Some of the limitations of our models include minor violations of regression assumptions, particularly for Linearity and Normality assumptions. This indicates that a non-linear model may be needed to accurately map the relationship between Age, Race, Income, and Work Hours.

Overall, we were unable to find any significant relationship between Age, Race, Income, and Work Hours and more investigation is needed.

Results: Secondary Hypothesis cont.

```
# A tibble: 14 × 7
  term                              estim_¹ std_e_² stati_³ p_value lower_⁴ upper_⁵
  <chr>                               <dbl>   <dbl>   <dbl>   <dbl>   <dbl>   <dbl>
 1 intercept                          6.77    1.24    5.46   0        4.34    9.20
 2 FAMINCOME: 3. $25,000 to $4…       0.417   0.294   1.42   0.155   -0.158   0.993
 3 FAMINCOME: 4. $50,000 to $7…       0.402   0.291   1.38   0.167   -0.169   0.974
 4 FAMINCOME: 5. $75,000 to $1…       0.273   0.291   0.941  0.347   -0.296   0.843
 5 FAMINCOME: 6. More than $15…       0.086   0.308   0.279  0.78    -0.518   0.69
 6 AGE                                0.014   0.029   0.486  0.627   -0.043   0.071
 7 RACE: Asian or Pacific Isla…      -1.01    1.37   -0.734  0.463   -3.70    1.68
 8 RACE: Black                        0.915   1.26    0.726  0.468   -1.56    3.38
 9 RACE: Mixed Race                  -0.153   1.58   -0.097  0.923   -3.25    2.94
10 RACE: White                        0.428   1.22    0.352  0.725   -1.96    2.82
11 AGE:RACEAsian or Pacific Is…       0.02    0.033   0.602  0.547   -0.045   0.084
12 AGE:RACEBlack                     -0.017   0.03   -0.578  0.563   -0.076   0.042
13 AGE:RACEMixed Race                -0.019   0.038  -0.501  0.616   -0.094   0.056
14 AGE:RACEWhite                     -0.015   0.029  -0.523  0.601   -0.073   0.042
# … with abbreviated variable names ¹estimate, ²std_error, ³statistic,
#   ⁴lower_ci, ⁵upper_ci
> get_regression_summaries(model2)
# A tibble: 1 × 9
  r_squared adj_r_squared   mse  rmse sigma statistic p_value    df  nobs
      <dbl>         <dbl> <dbl> <dbl> <dbl>     <dbl>   <dbl> <dbl> <dbl>
1     0.005         0.003  9.15  3.03  3.03      2.56   0.002    13  6347
>
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Sources

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