Research Question:
How do changes in working hours and unemployment rates relate to life satisfaction across different countries over time?

Hypothesis and data sources

Hypothesis:
Higher annual working hours negatively affect life satisfaction.
Higher unemployment rates negatively affect life satisfaction.
Reductions in average working hours over time will correlate with increases in life satisfaction, but this effect will be weaker in countries experiencing rising unemployment rates.

Datasets used:
1. annual-working-hours-per-worker.csv -> renamed as annual_working_hours
   - Most important columns:
     o Entity -> Renamed to Country
     o Year
     o Average annual working hours per worker -> Renamed to Working_Hours

2. Happiness-cantril-ladder.csv -> renamed as life_satisfaction
   - Most important columns:
     o Entity -> Renamed to Country
     o Year
     o Cantril ladder score -> Renamed to Life_Satisfaction

3. Unemployment_Rate.csv
   - Most important columns:
     o Entity -> Renamed to Country
     o Year
     o Unemployment, total (% of total labor force) (modeled ILO estimate) -> Renamed to Unemployment_Rate

Analysis

Libraries used:
   o Data Manipulation and Analysis: pandas, numpy
   o Visualization: matplotlib, seaborn
   o Statistical Modeling: statsmodels

Data lifecycle steps:

   o Import both datasets using pandas (e.g., pd.read_csv())
   o Clean the data by handling missing value
   o Dropped irrelevant columns (Code_x, Code_y, Code)
   o Merge the datasets on country and year using inner join
   o Create new variables (e.g., change in working hours, change in life satisfaction)

    o   Calculated year-over-year changes in Working_Hours and Life_Satisfaction for each country.

Result

Analysis of datasets on annual_working_hours, life_satisfaction and unemployment _rate in different countries highlights several important points related to my hypotheses:

H1 Changes in working hours significantly impact life satisfaction.
H2 Unemployment rates significantly impact life satisfaction.
H3 the interaction between changes in working hours and unemployment rates moderates the effect of working hours on life satisfaction.

What I found is in the regression analysis we can observe:
  - The R-squared value (0.083) suggests that the model explains 8.3% of the variance in changes in life satisfaction, indicating modest predictive power.
  - The F-statistic (7.683, p < 0.001) confirms the model is statistically significant overall.
  - Significant predictors:
    - Change in Working Hours: Negative coefficient (-0.0024, p = 0.002).
    - Interaction Effect : Positive coefficient (0.0004, p = 0.001).
    - Unemployment Rate: Negative coefficient (-0.0056, p = 0.071, borderline significant).

Correlation Insights:
  - Change in Working Hours is negatively correlated with life satisfaction, supporting its role as a key driver of dissatisfaction.
  - The interaction between unemployment rates and working hours introduces a compensatory effect, with higher unemployment softening the negative influence of working hours on satisfaction.

Regarding to the relevance of the hypotheses:
H1 is strongly supported by the significant negative regression coefficient.
Increases in working hours reduce life satisfaction, likely due to stress, reduced personal time, or overwork.

H2 is partially supported. While unemployment has a borderline significant negative effect, its impact may vary depending on societal context.

H3 is supported by the significant interaction term, suggesting the moderating role of unemployment.
In high unemployment contexts, additional working hours might boost satisfaction (e.g., through perceived job security or financial stability).

To conclude the regression results, highlight that work-related stressors and societal factors play critical roles in shaping life satisfaction. Correlation insights confirm that the interaction between working hours and unemployment factors creates nuanced outcomes.

To enhance life satisfaction, prioritize balancing work-life equilibrium, reducing overwork, and stabilizing employment during economic downturns (meaning targeting lower unemployment rates).