



# **Happiness**

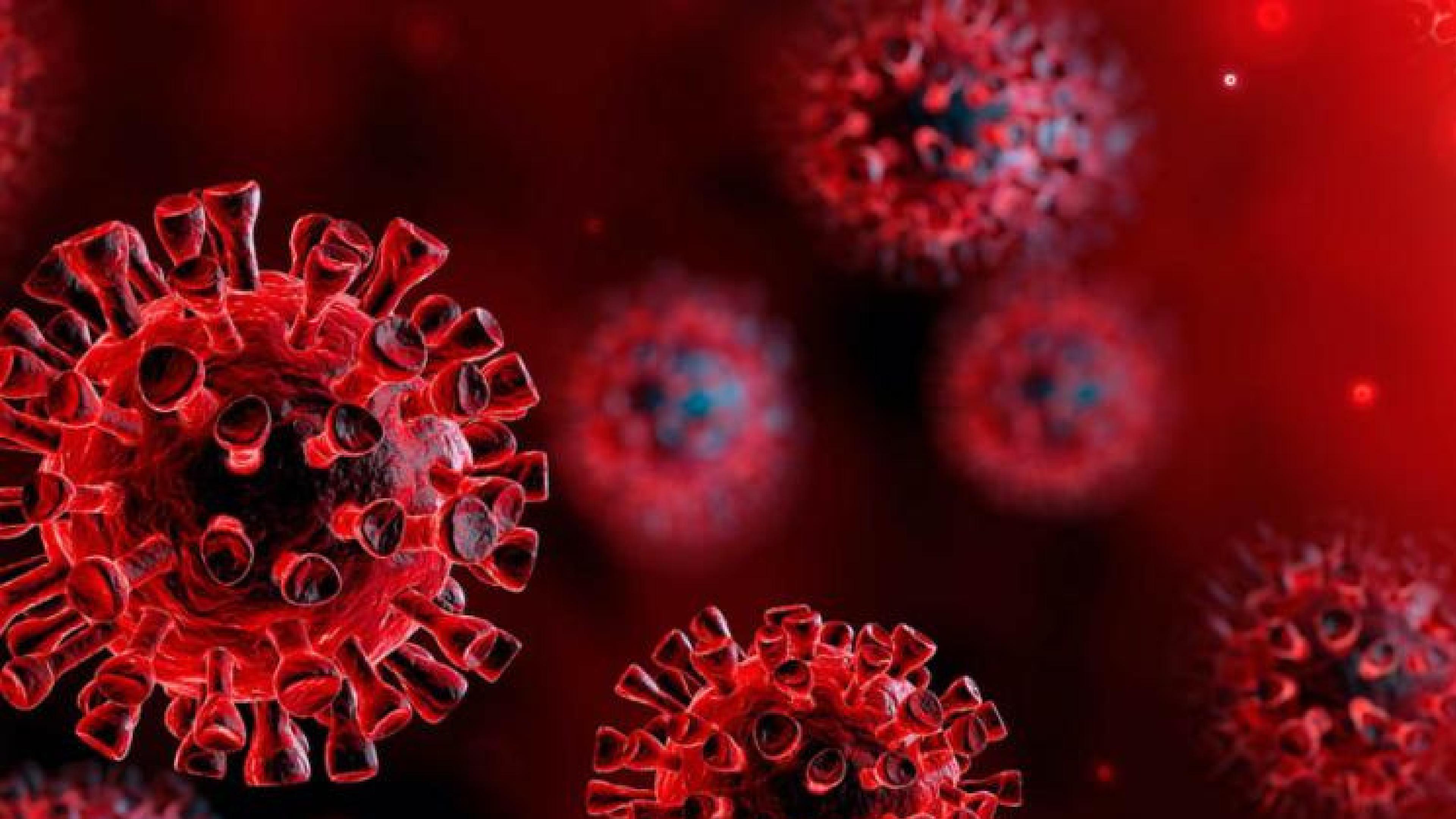
## **AND ITS EFFECTS OVER TIME**

Alex Arnold, Sophie Knight, Samantha Lane, Rachel Podemski

# Inspiration

"There is no path to happiness.  
Happiness is the path."

-Buddha-



# Agenda

- Hypotheses
- Data
- Analysis
- Projection
- Limitations & Future Analysis
- Q&A

# Hypotheses:



**Happiness has increased over time.**

**Weather positively affects happiness.**

**We predict happiness will decrease next year.**

# Data

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# kaggle

*World Happiness  
Reports  
2015-2020*

Happiness Score:

- Economy (GDP)
- Social Support
- Health
- Freedom
- Trust
- Generosity
- Residual

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GOOGLE  
MAPS API

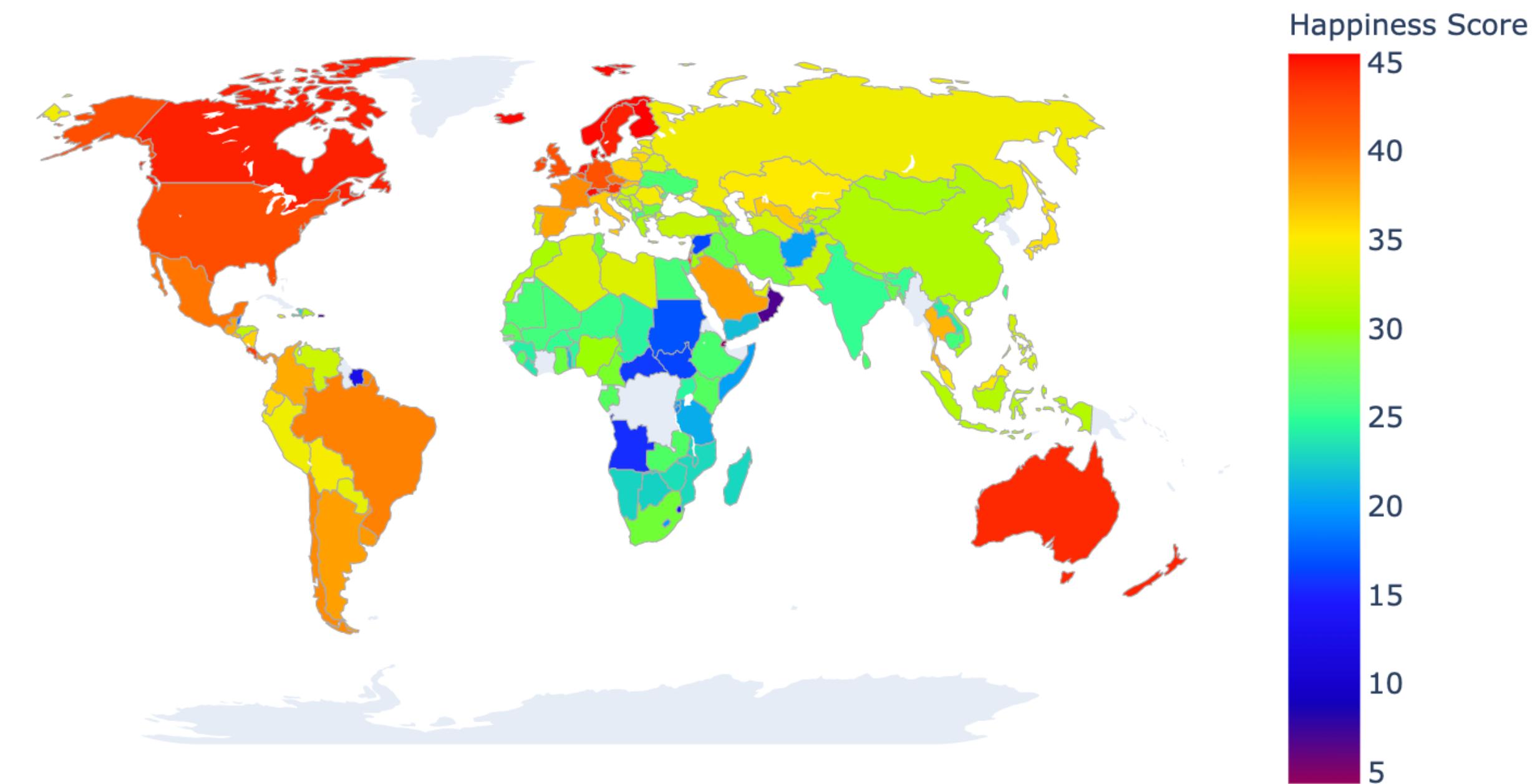
Latitude  
Longitude

COUNTRY  
CODE CSV



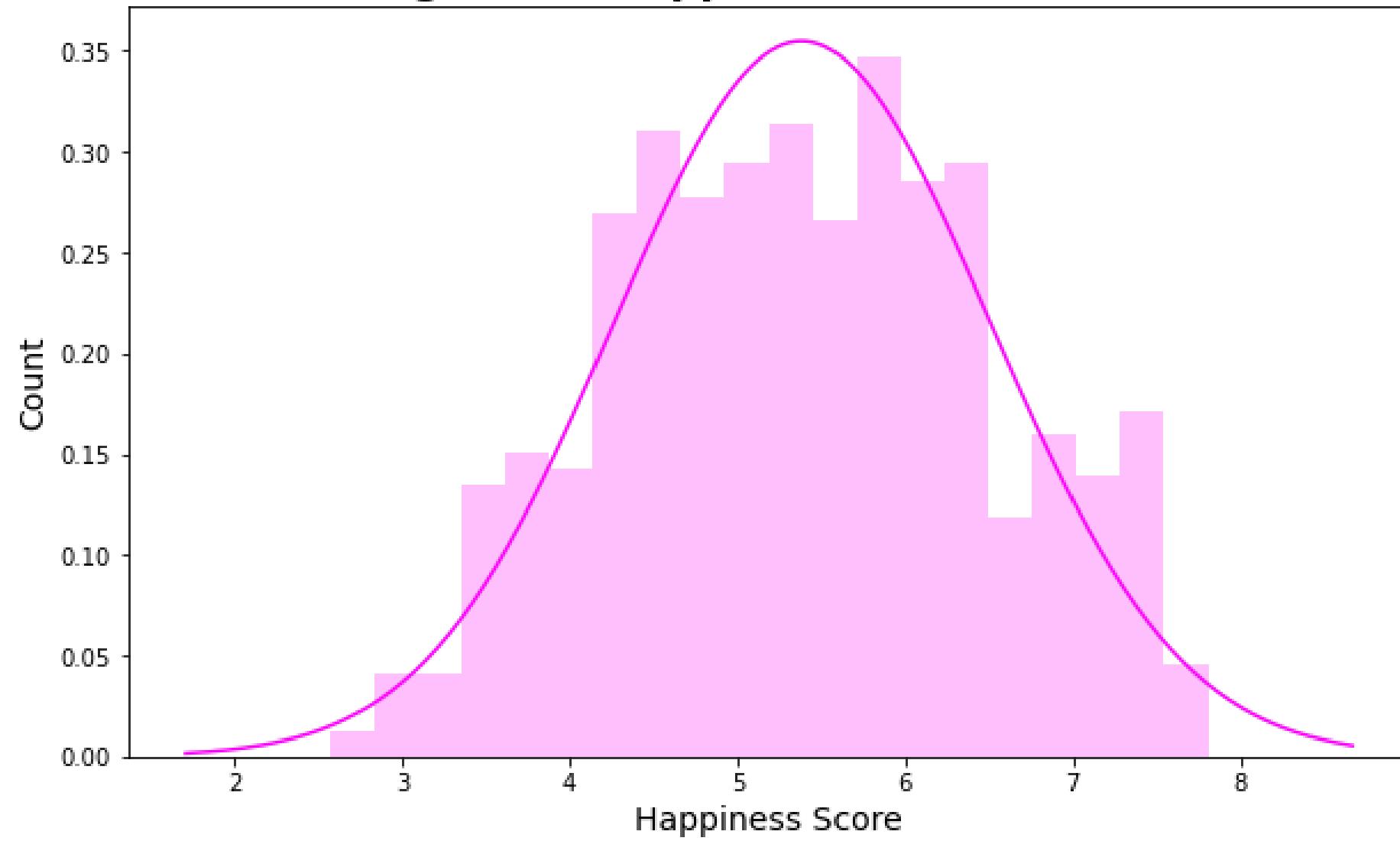
- Temperature
- Feels Like
- Humidity
- Pressure
- Wind Speed
- Cloudiness

## Total Happiness Score 2015-2020

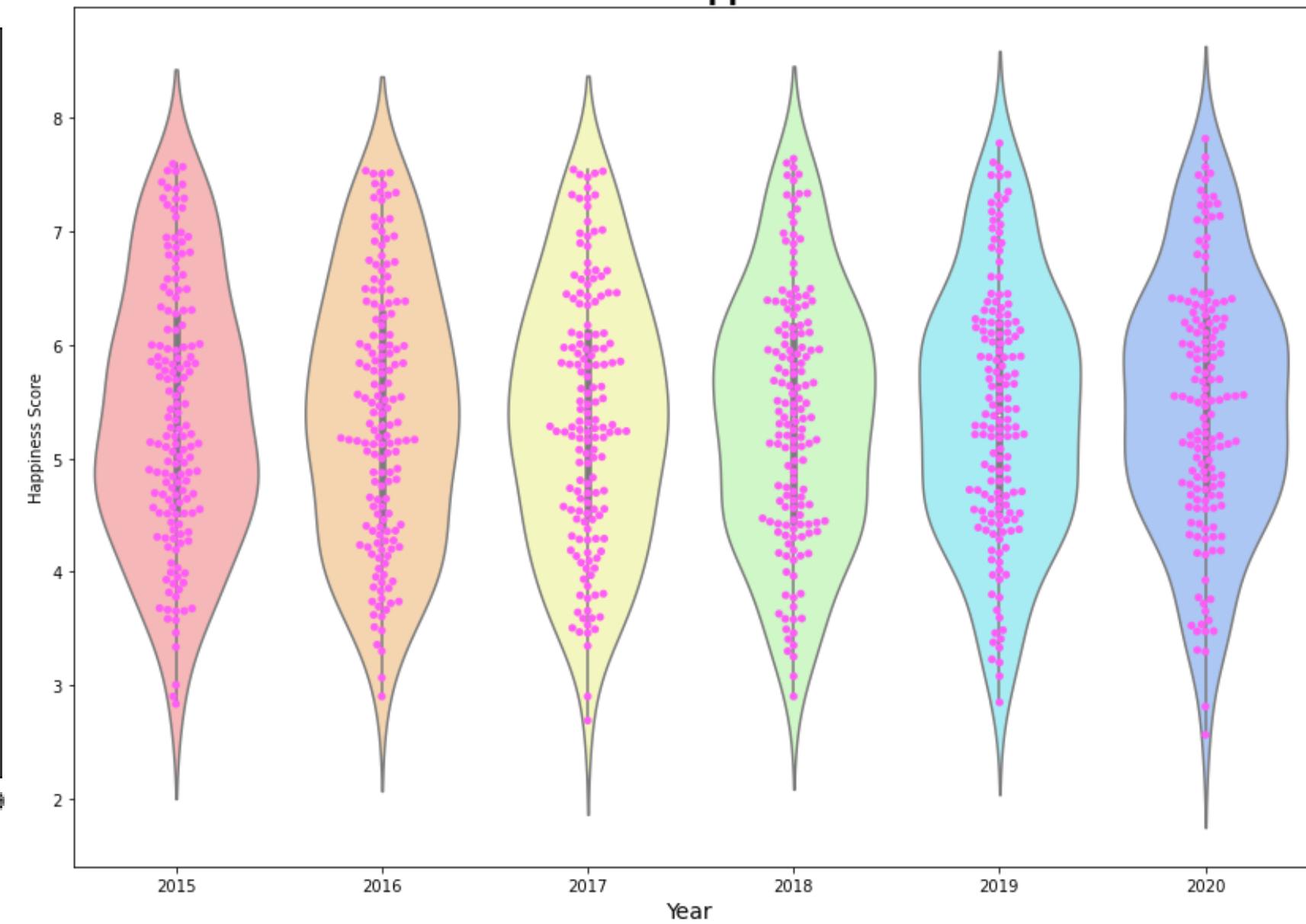


# Happiness Over Time

**Histogram of Happiness Score Over Time**



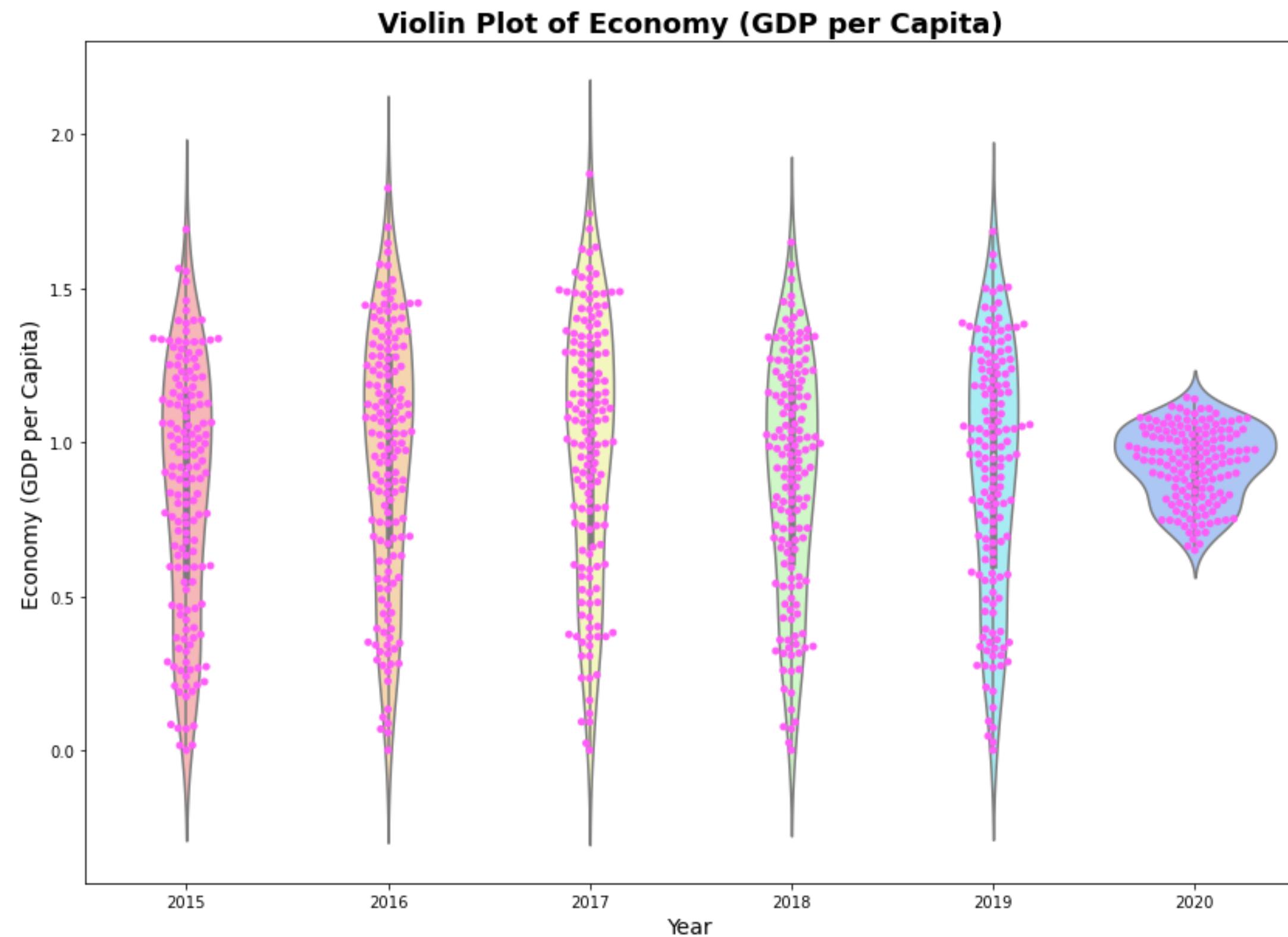
**Violin Plot of Happiness Score**



# ANOVA

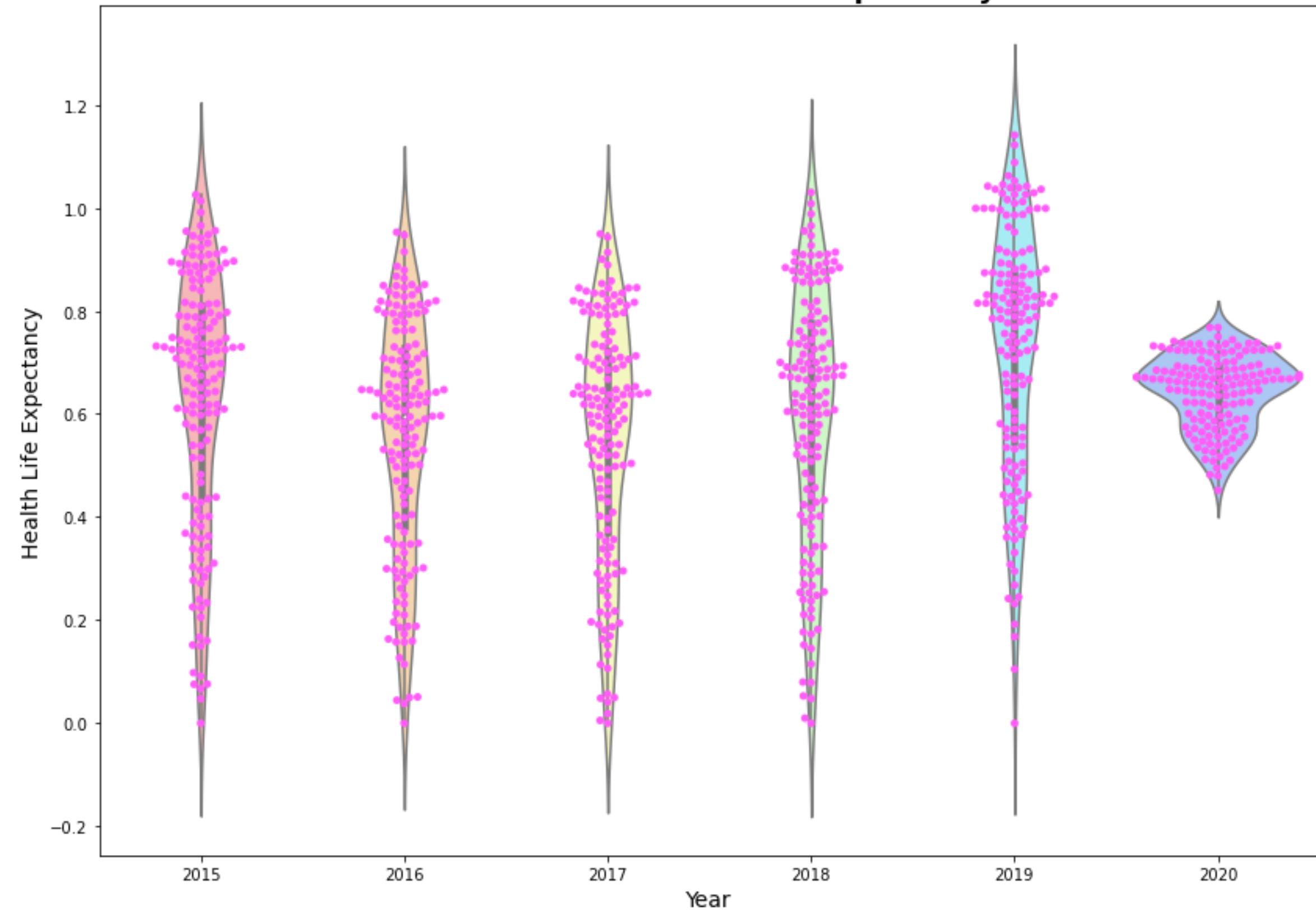
Mean of Economy (GDP per Capita) over time:

2015	0.846137
2016	0.953880
2017	0.984718
2018	0.883677
2019	0.905147
2020	0.929571

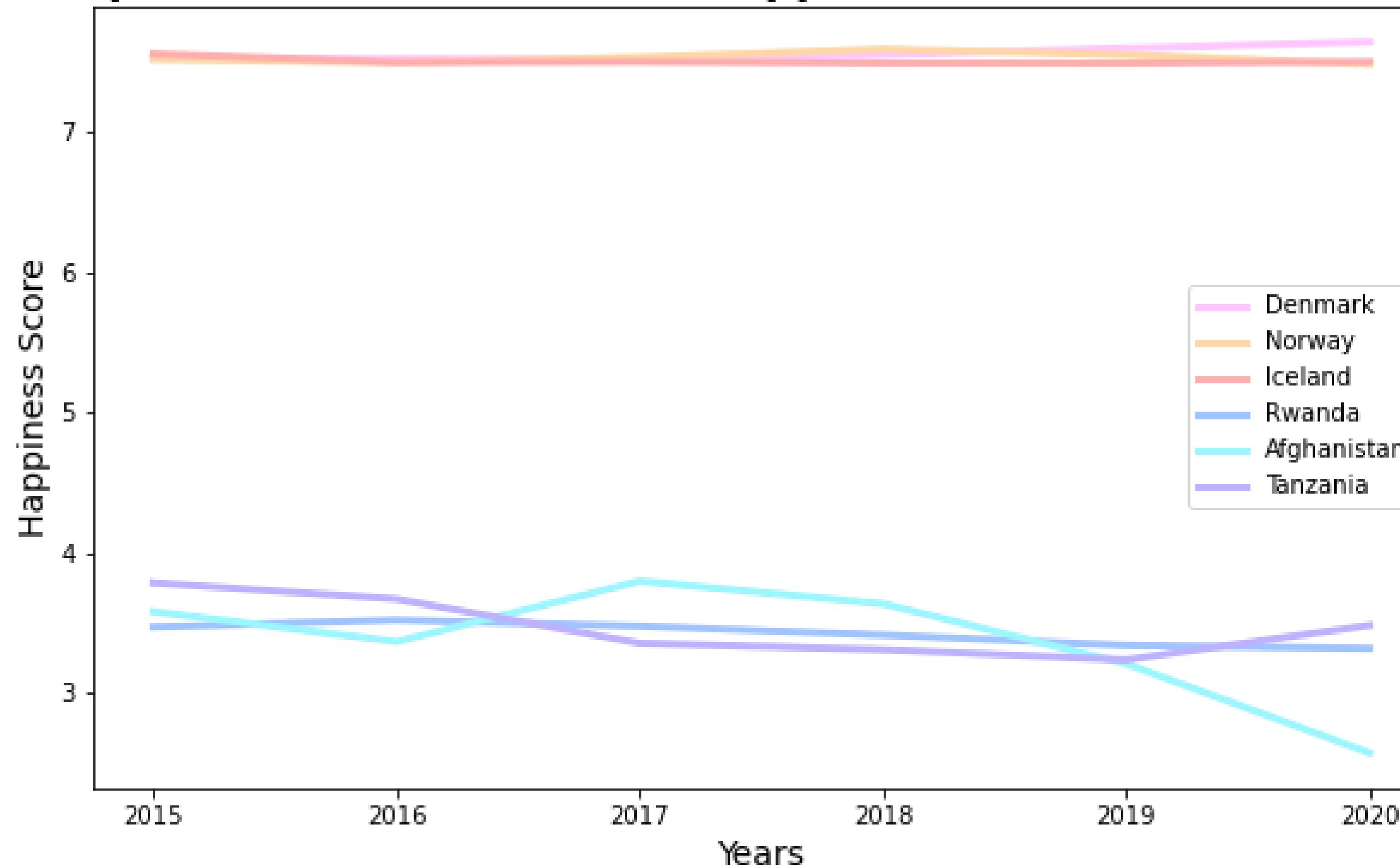


# ANOVA

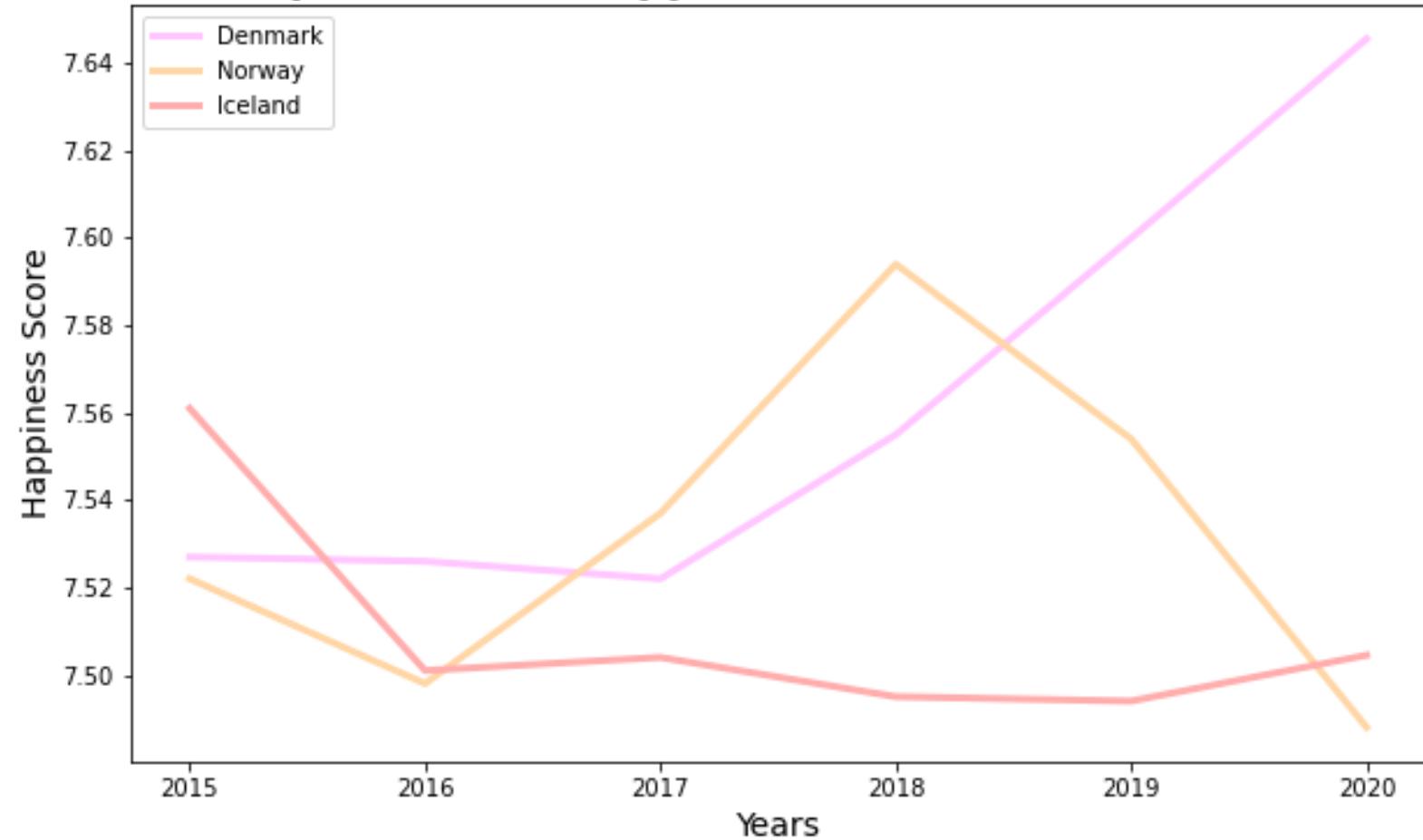
Violin Plot of Health Life Expectancy



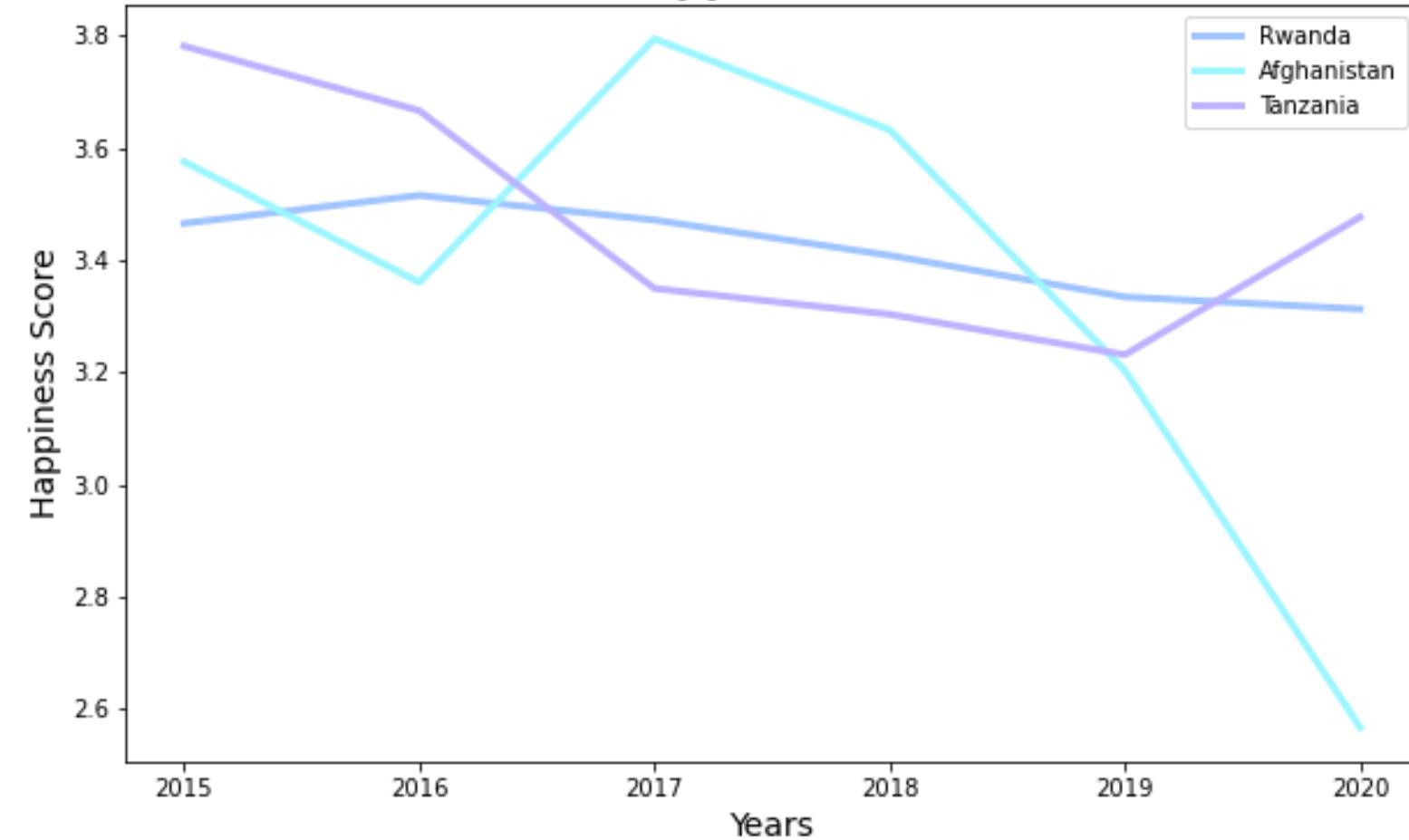
## Top and Bottom Countries Happiness Score over the Years



### Top Countries Happiness Score over the Years



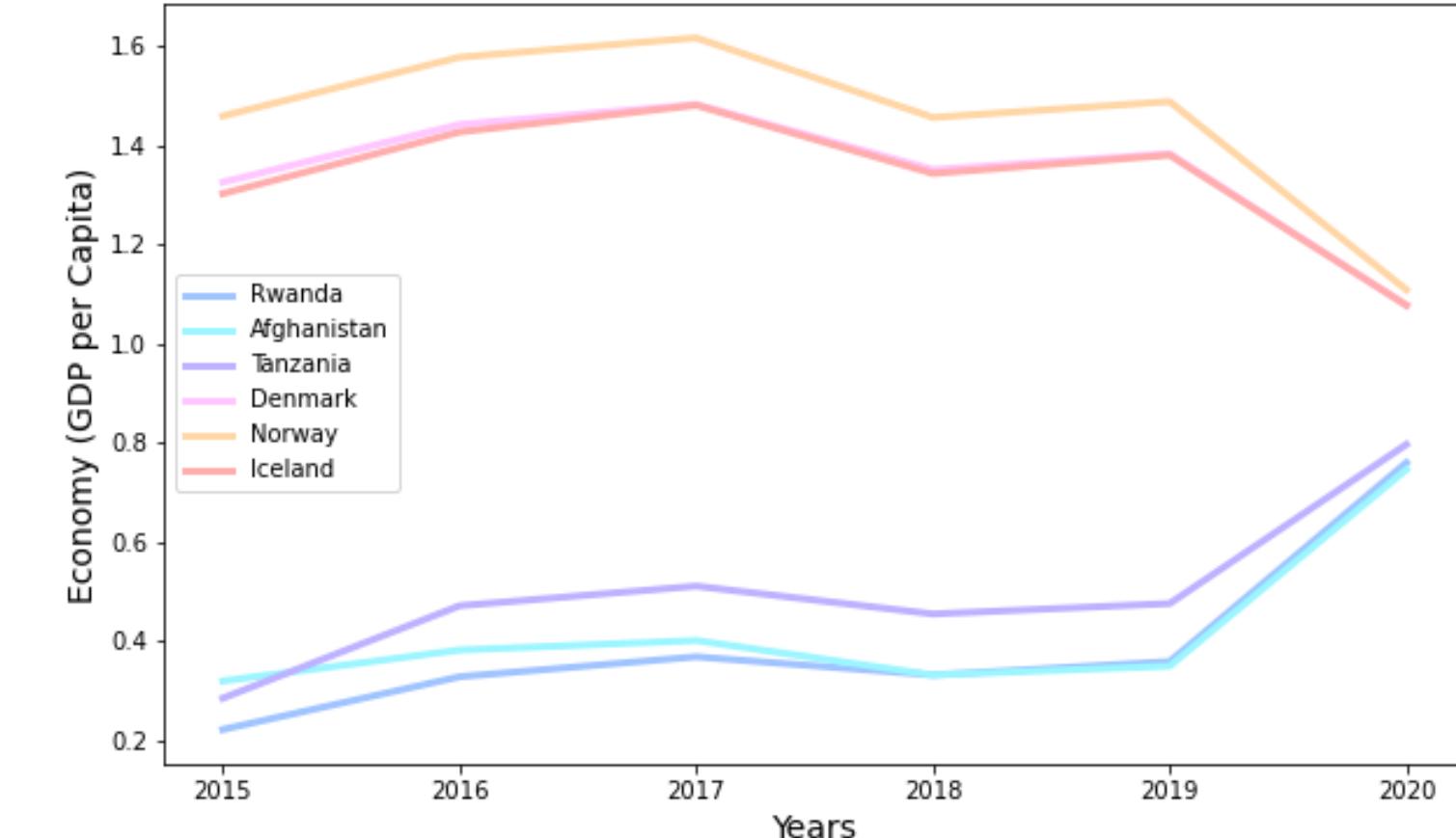
### Bottom Countries Happiness Score over the Years



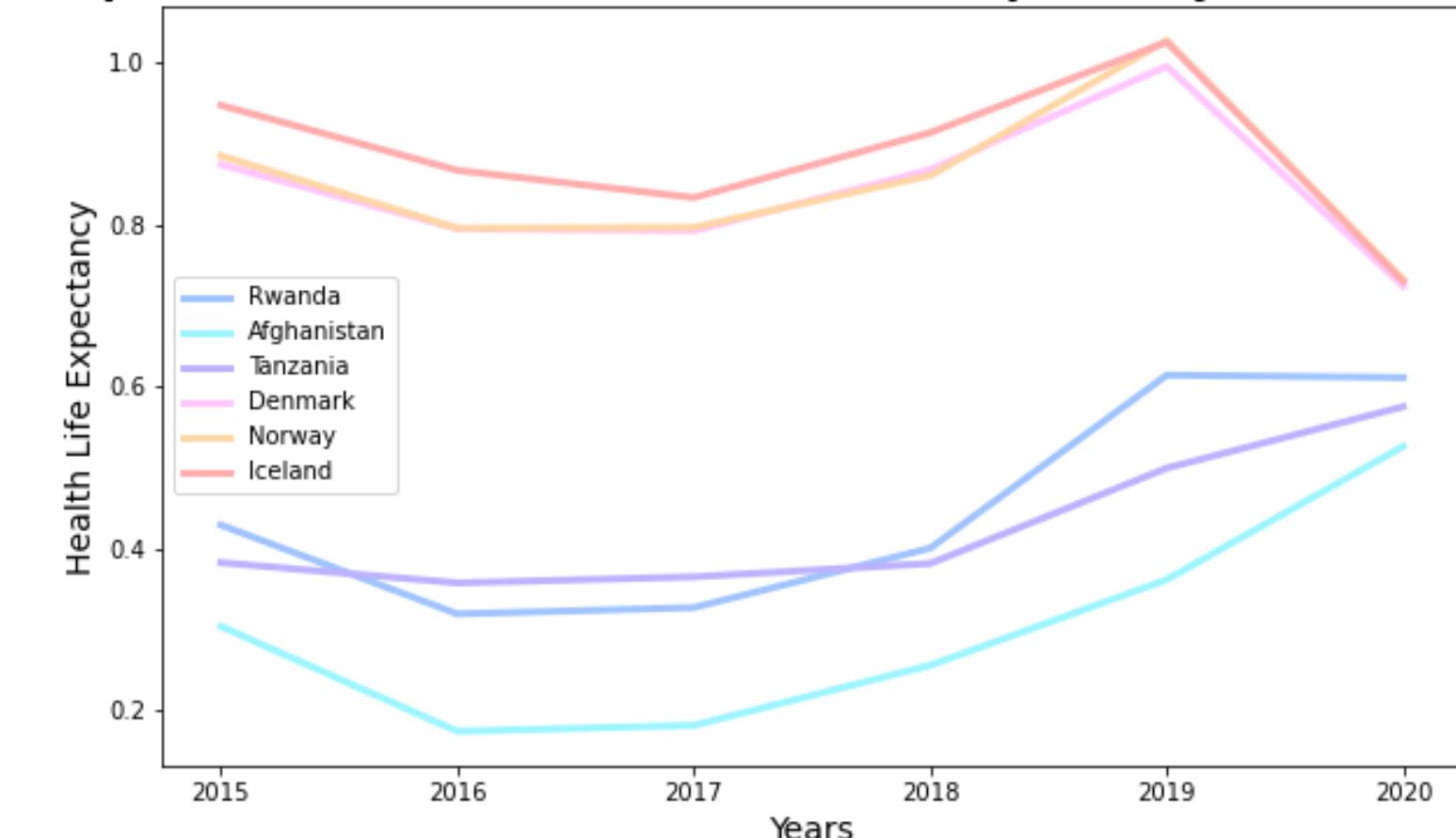
# Comparisons

## Economy and Health

**Top and Bottom Countries Economy (GDP per Capita) over the Years**



**Top and Bottom Countries Health Life Expectancy over the Years**



# T-tests 2015 & 2020

## HAPPINESS SCORE

Top 10:  
P-value > 0.05

Bottom 10:  
P-value > 0.05

## ECONOMY

Top 10:  
P-value < 0.05

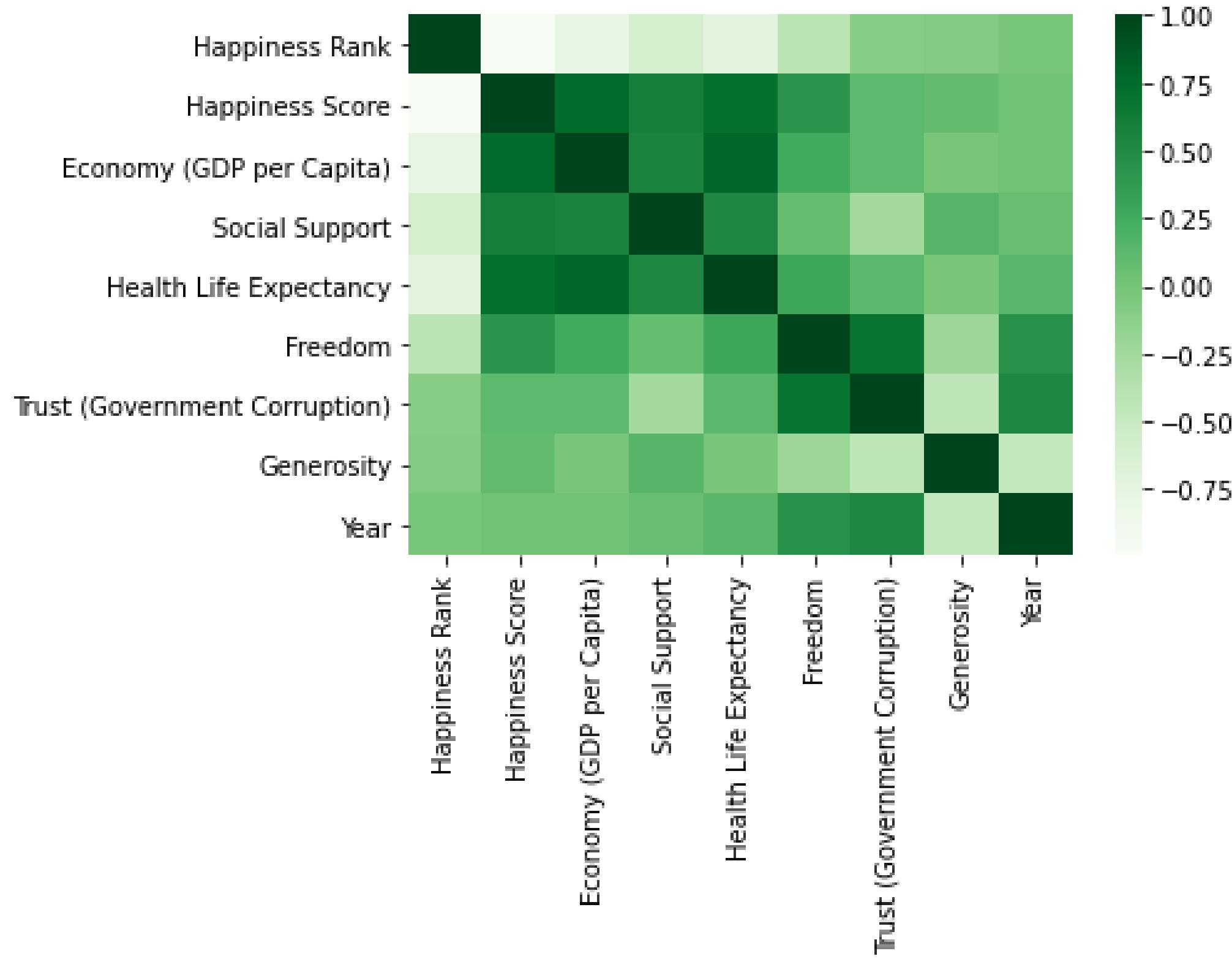
Bottom 10:  
P-value < 0.05

## HEALTH

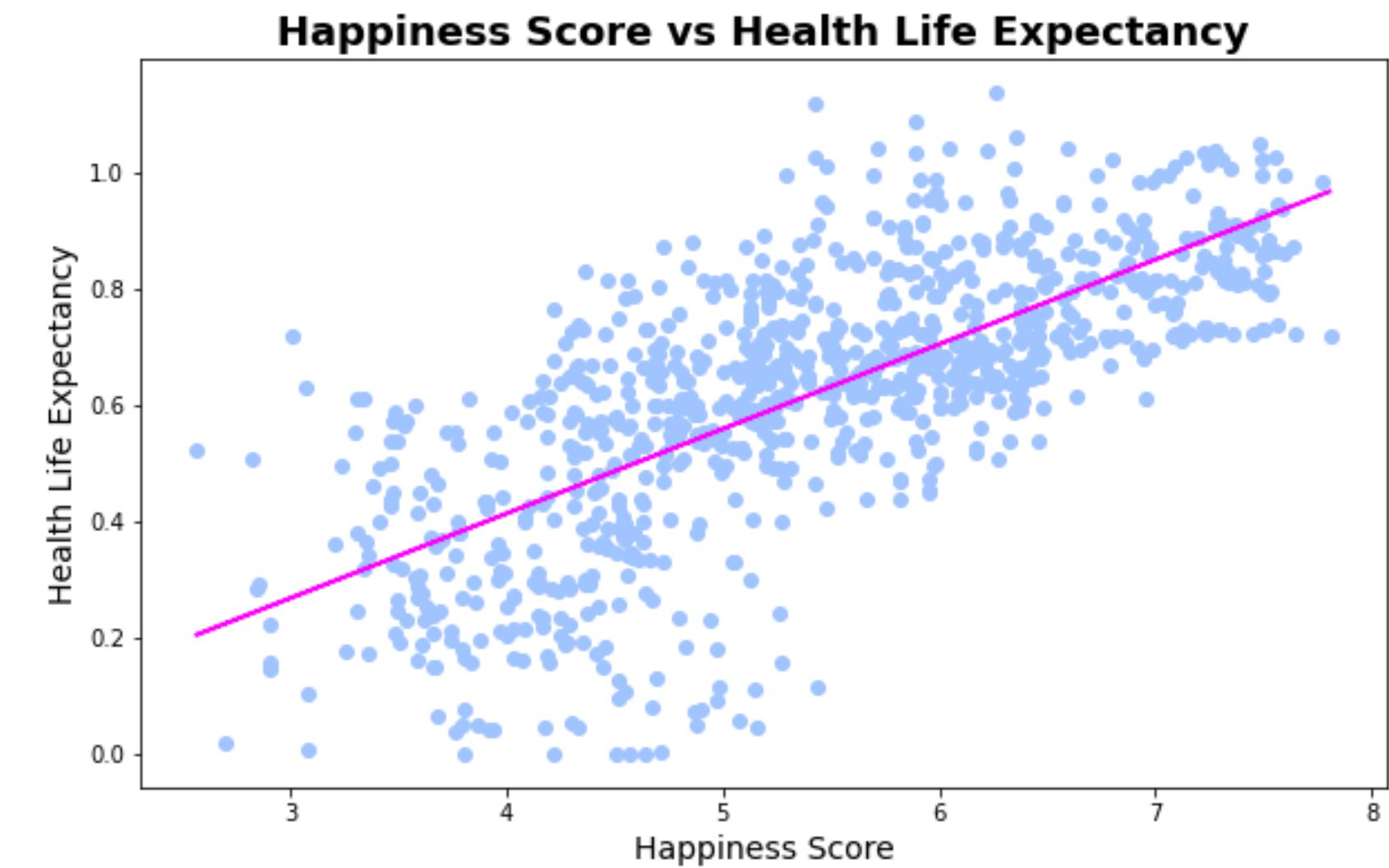
Top 10:  
P-value < 0.05

Bottom 10:  
P-value < 0.05

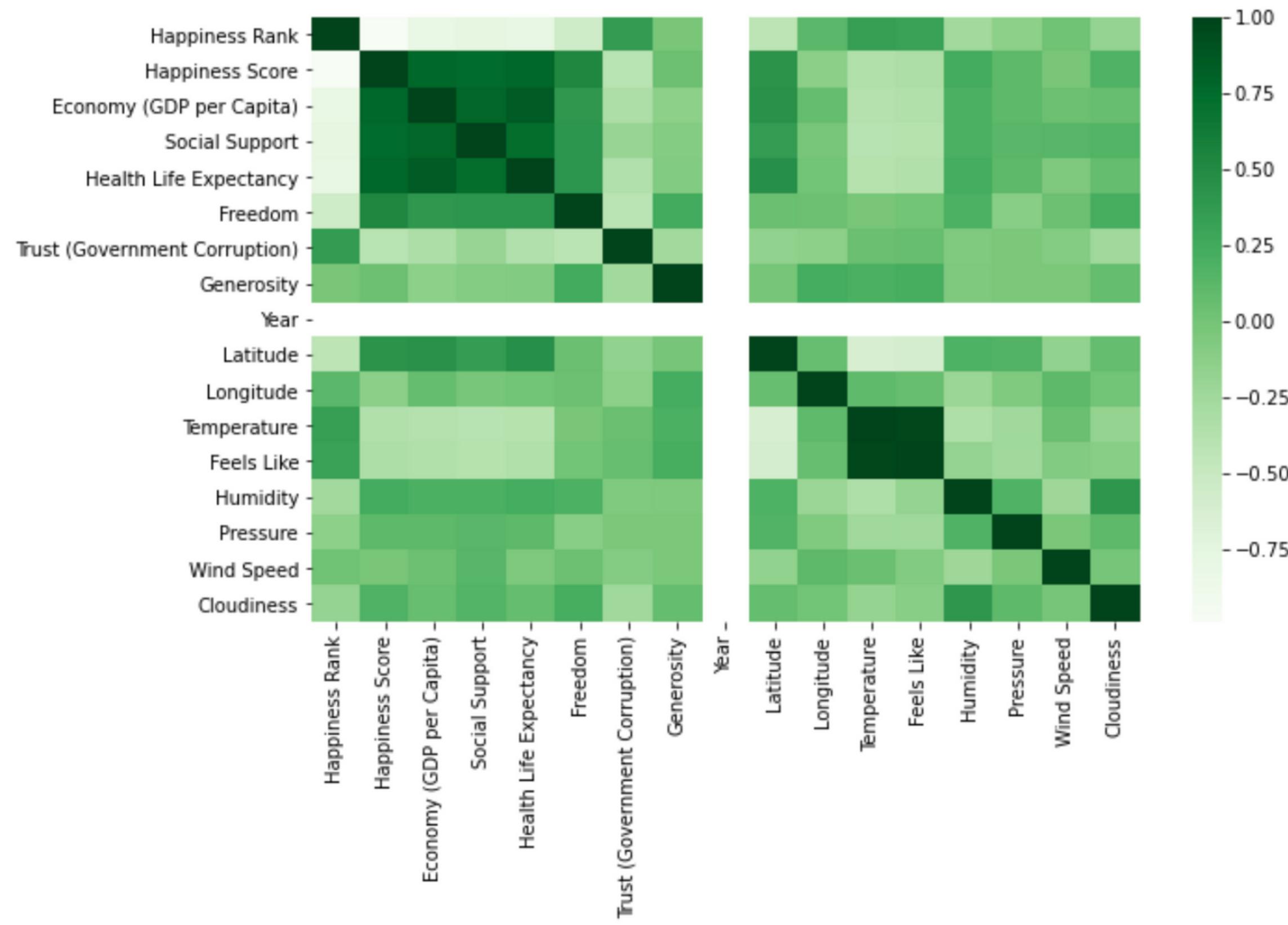
# Correlation Heatmap



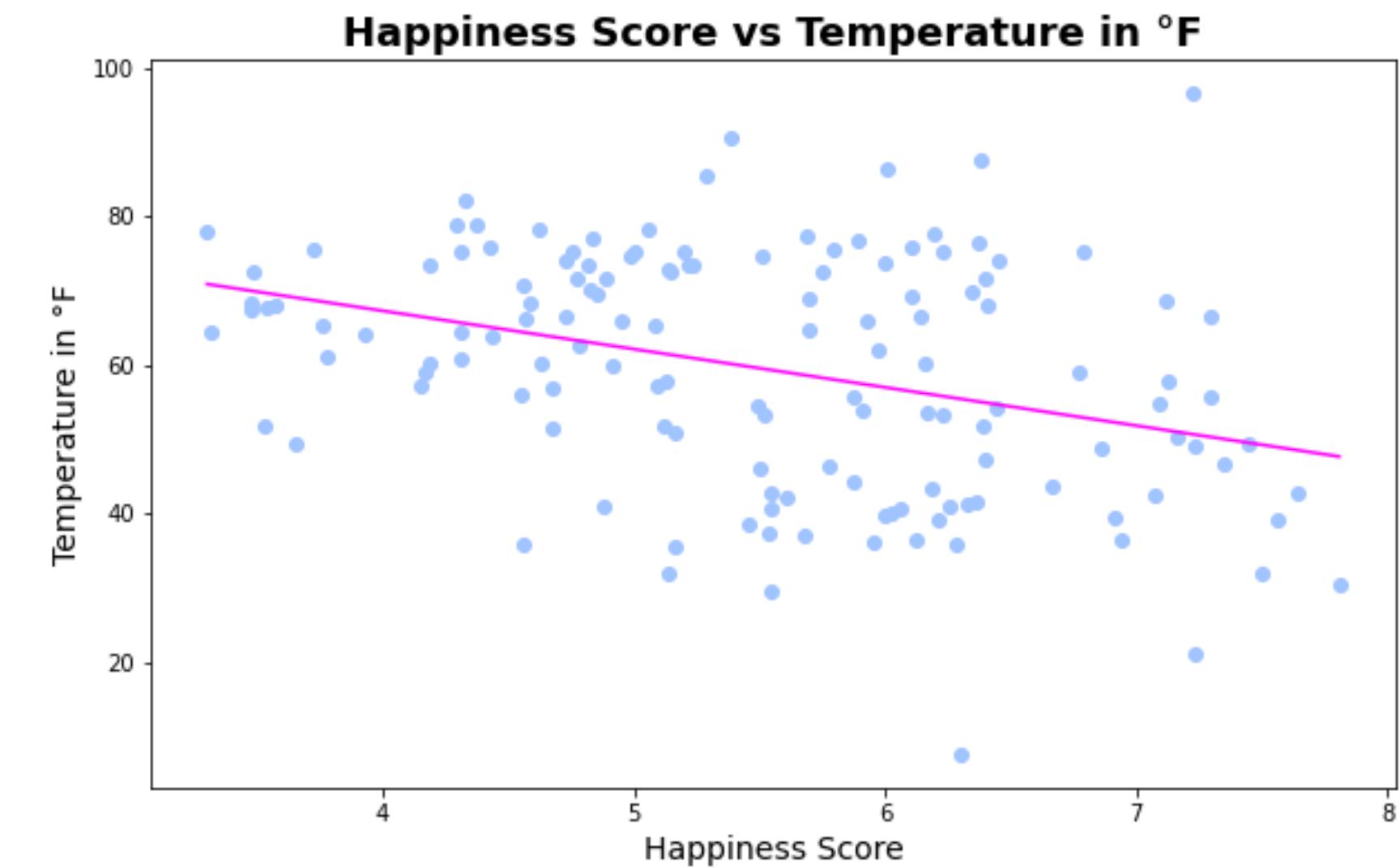
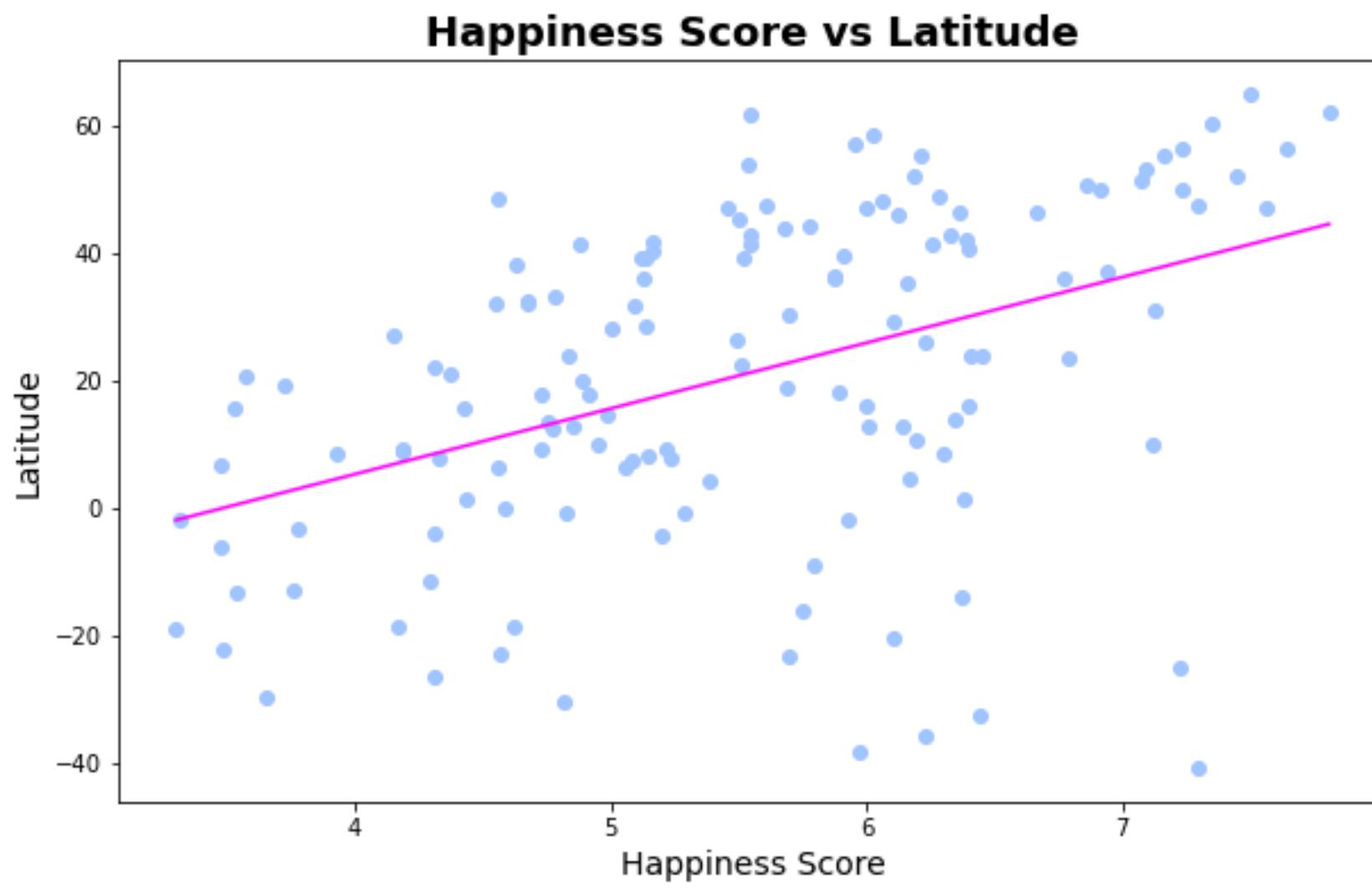
# Correlations



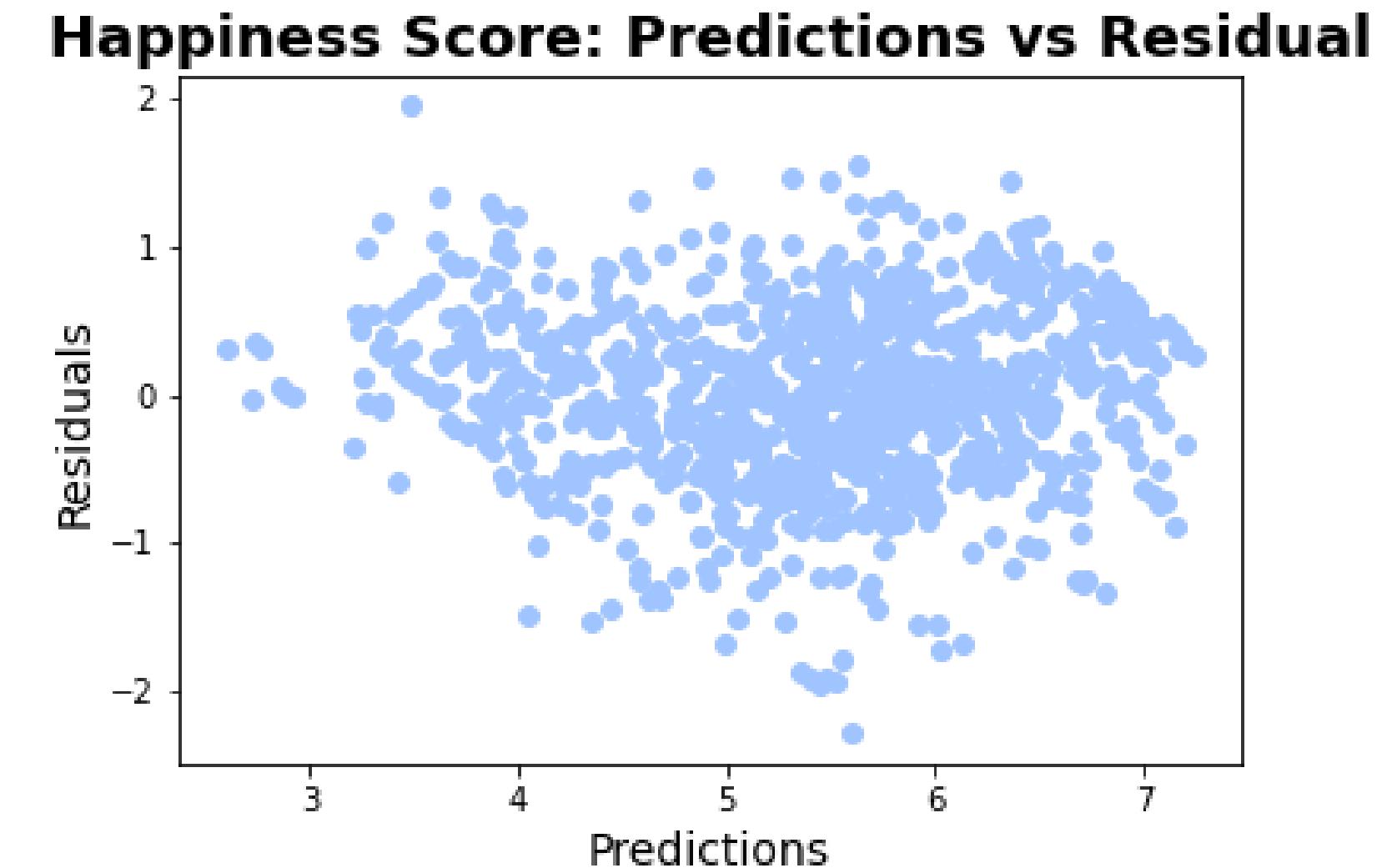
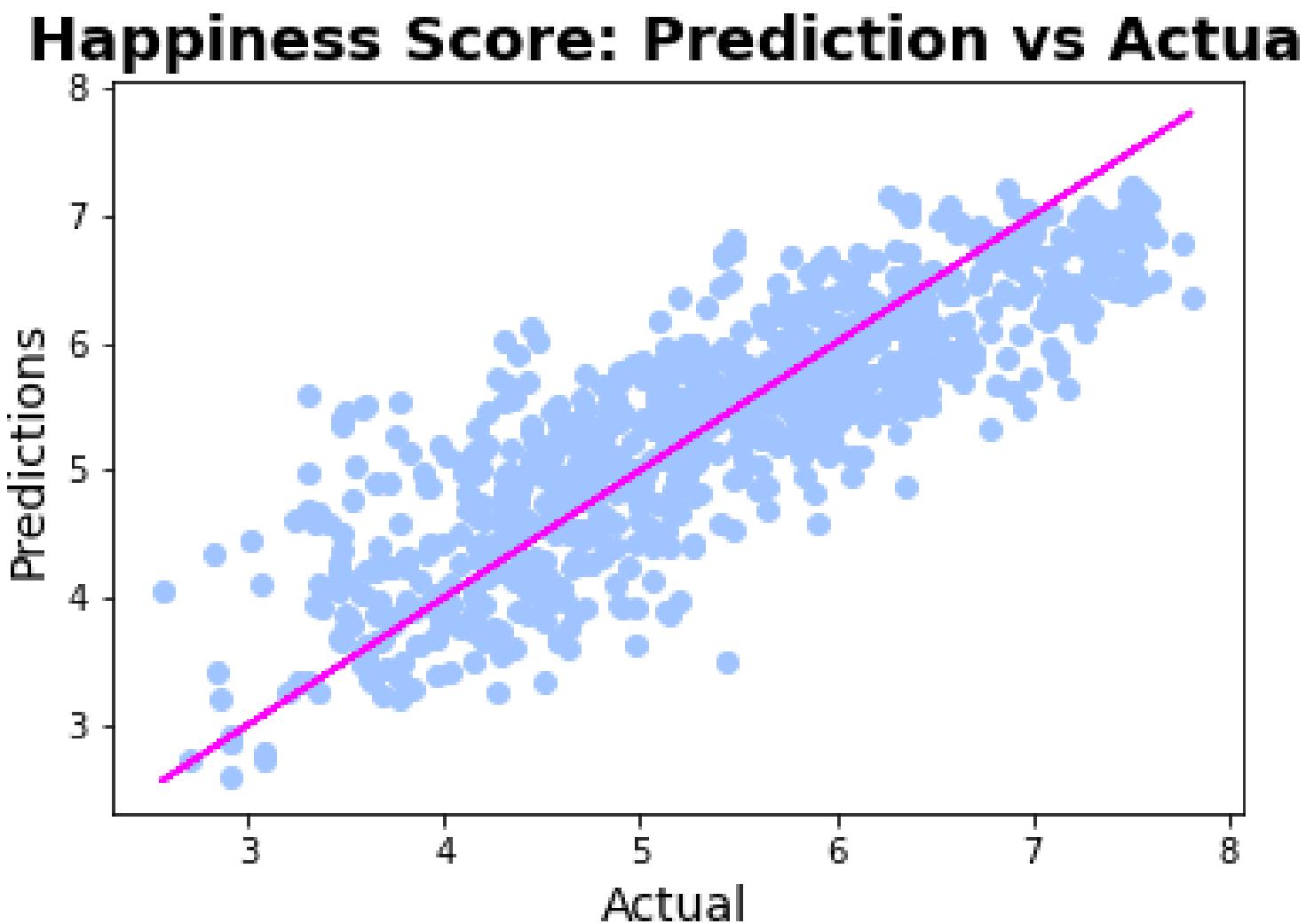
# Correlation Heatmap + Weather



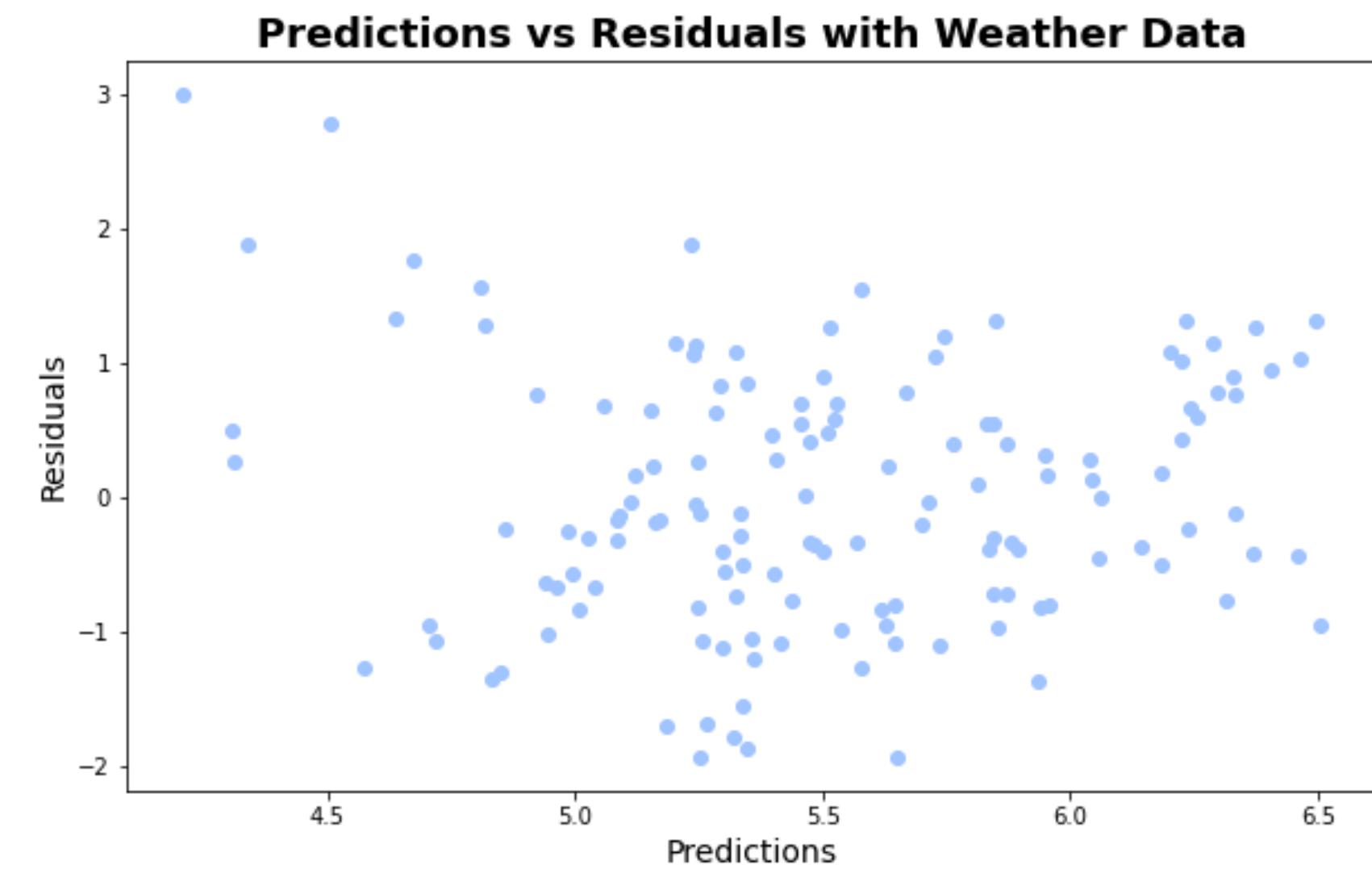
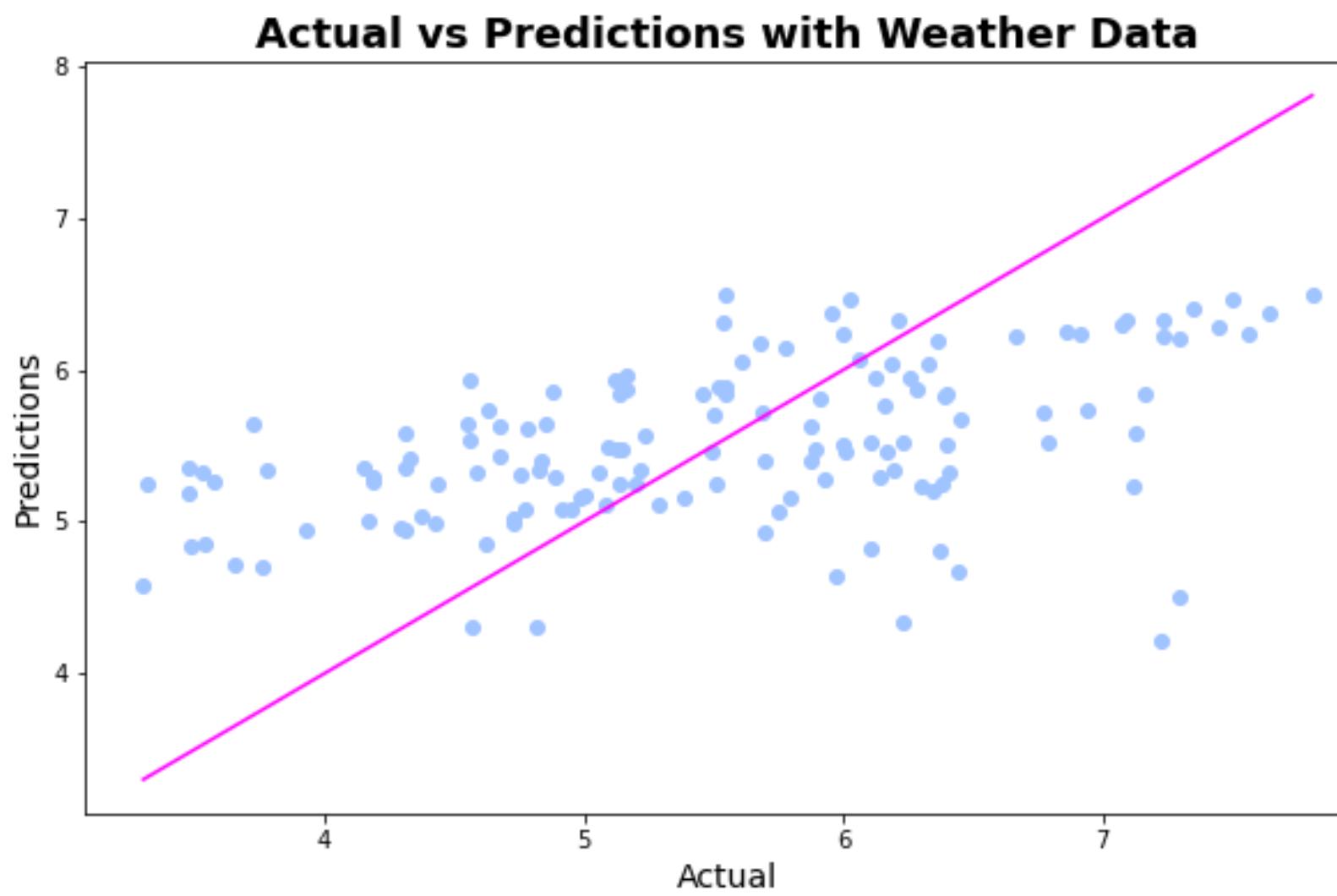
# Correlations



# Prediction Model



# Prediction Model + Weather



# Conclusion

Hypotheses:



- ✓ Happiness has increased over time.
- ✗ Weather positively affects happiness.
- ? We predict happiness will decrease next year.

# Limitations & Future Work

- Data: Subjective Sample
- Historical Weather Data
- Correlating Factors

# References

- **Country Codes:**

[https://raw.githubusercontent.com/plotly/datasets/master/2014\\_world\\_gdp\\_with\\_codes.csv](https://raw.githubusercontent.com/plotly/datasets/master/2014_world_gdp_with_codes.csv)

- **Google Maps API:** <https://cloud.google.com/maps-platform/>

- **Inspiration:**

- <https://au.toluna.com/thumbs/8116344/There-Is-No-Path-To-Happiness,-Happiness-Is-The-Path>
- <https://hms.harvard.edu/coronavirus>

- **Kaggle Notebooks:**

- <https://www.kaggle.com/alexisbcook/interactive-maps>
- <https://www.kaggle.com/mathurinache/world-happiness-report>
- <https://www.kaggle.com/londeen/world-happiness-report-2020>

- **Open Weather API:** <https://openweathermap.org/api>

- **World Happiness Report:** <https://worldhappiness.report/>



Thank You

Q&A