

Happiness and Development

The Unlikely Power Couple



Project Overview

The World Happiness Index

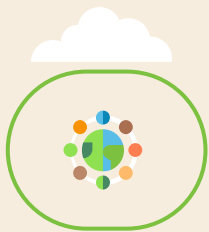
- annual United Nations report
- measures and *rank*s *countries* based on various factors
- focuses on *happiness and life satisfaction*



The Human Development Index (HDI)

- developed by the United Nations
- measures a country's level of human development
- three main dimensions: *health*, *education*, and *standard of living*

Research Questions



**World Happiness
Geo Mapping**



**HDI and Happiness
Correlation**



**Human
Development
Time Series**



**Individual HDI
Components &
Happiness
Correlation**



Data Cleaning



Data Cleaning

```
# Dependencies and reading in the files
import pandas as pd
from pathlib import Path
```

```
HDI_raw = Path('resources/HDI_dataset.csv')
Happiness_raw = Path('resources/World Happiness Index by Reports 2013-2023.csv')
```

```
HDI_data = pd.read_csv(HDI_raw)
Happiness_data = pd.read_csv(Happiness_raw)
Happiness_data = Happiness_data[['Country', 'Year', 'Index', 'Rank']].copy()
Happiness_data.head()
```

	Country	Year	Index	Rank
0	Afghanistan	2013	4.040	143.0
1	Afghanistan	2015	3.575	153.0
2	Afghanistan	2016	3.360	154.0
3	Afghanistan	2017	3.794	141.0
4	Afghanistan	2018	3.632	145.0

HDI and Happiness Merge

```
# HDI cleaning for 2021
HDI_2021 = HDI_data[['Country', 'HDI Rank (2021)', 'Human Development Index (2021)', 'Life Expectancy at Birth (2021)',
                    'Expected Years of Schooling (2021)', 'Mean Years of Schooling (2021)',
                    'Gross National Income Per Capita (2021)']].copy()
```

```
# Happiness cleaning for 2021
happiness_2021 = Happiness_data.loc[Happiness_data['Year'] == 2021]
```

```
# merge two dataframes
```

```
HDI_Happiness_merge = pd.merge(HDI_2021, happiness_2021, how='left', on=['Country'])
HDI_Happiness_merge.rename(columns={'Year': 'Happiness Year', 'Index': 'Happiness Index', 'Rank': 'Happiness Rank'}, inplace=True)
HDI_Happiness_merge
```

```
# Clean merged DF
HDI_Happiness_merge.dropna(inplace=True)
HDI_Happiness_merge.reset_index()
HDI_Happiness_merge
```

	Country	HDI Rank (2021)	Human Development Index (2021)	Life Expectancy at Birth (2021)	Expected Years of Schooling (2021)	Mean Years of Schooling (2021)	Gross National Income Per Capita (2021)	Happiness Year	Happiness Index	Happiness Rank
0	Afghanistan	180.0	0.478	61.9824	10.263844	2.985070	1824.190915	2021.0	2.523	149.0
2	Albania	67.0	0.796	76.4626	14.448000	11.286455	14131.110390	2021.0	5.117	93.0
4	United Arab Emirates	26.0	0.911	78.7104	15.717690	12.694030	62573.591810	2021.0	6.561	25.0
5	Argentina	47.0	0.842	75.3899	17.874870	11.147269	20925.268140	2021.0	5.929	57.0
6	Armenia	85.0	0.759	72.0431	13.116760	11.330300	13157.993900	2021.0	5.283	86.0
...
187	Venezuela	120.0	0.691	70.5536	12.816080	11.107277	4810.882621	2021.0	4.892	107.0
191	Yemen	183.0	0.455	63.7534	9.098710	3.200000	1314.270189	2021.0	3.658	141.0
192	South Africa	109.0	0.713	62.3410	13.643710	11.373160	12948.373250	2021.0	4.956	103.0
193	Zambia	154.0	0.565	61.2234	10.928760	7.187091	3217.767739	2021.0	4.073	137.0
194	Zimbabwe	146.0	0.593	59.2531	12.110969	8.710909	3809.887158	2021.0	3.145	148.0

HDI 2011-2021 Data Cleaning

```
# Keep only Human Development Index from 2011-2021
HDI_range = HDI_data[['Country', 'Human Development Index (2011)', 'Human Development Index (2012)',
                    'Human Development Index (2013)', 'Human Development Index (2014)',
                    'Human Development Index (2015)', 'Human Development Index (2016)',
                    'Human Development Index (2017)', 'Human Development Index (2018)',
                    'Human Development Index (2019)', 'Human Development Index (2020)',
                    'Human Development Index (2021)']].copy()
```

```
HDI_range.head()
# Save as CSV
HDI_range.to_csv('resources/HDI_range.csv', index=False)
```

#1

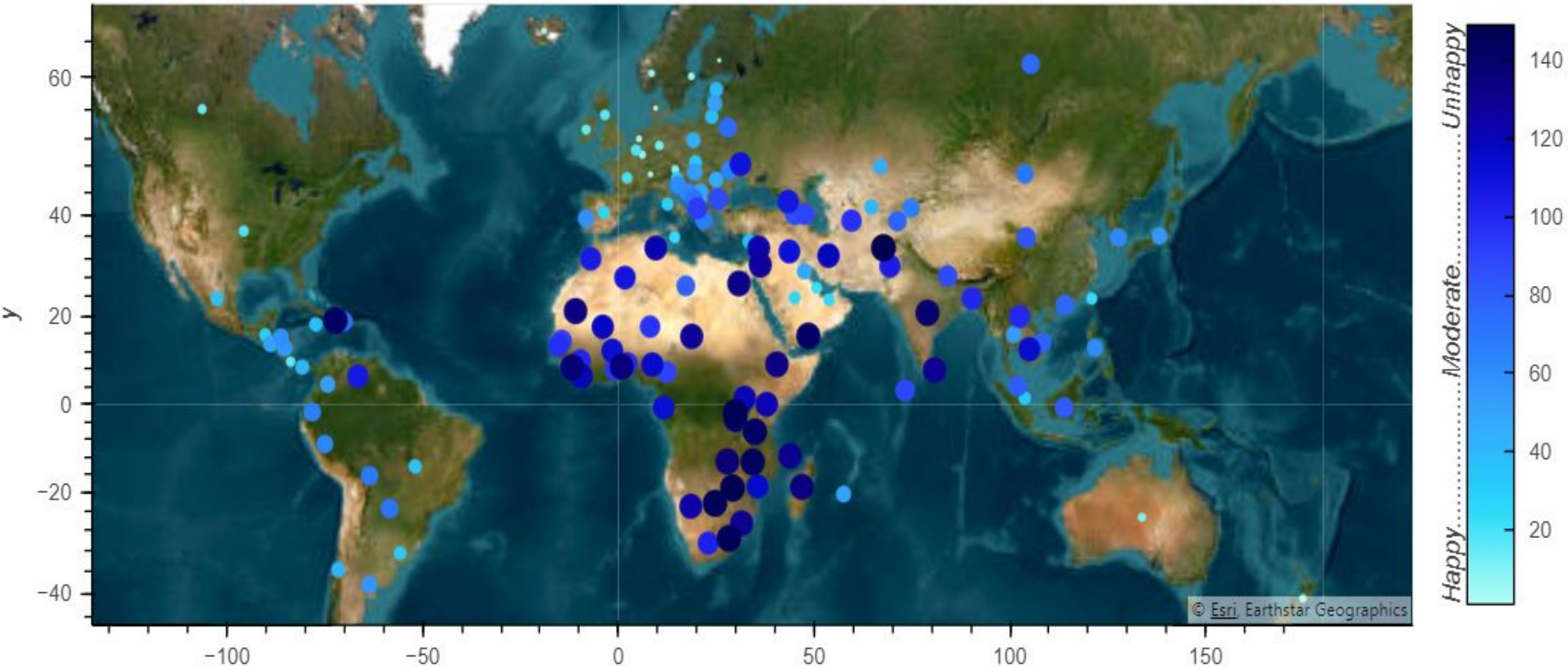
API Geoapify Happiness Visualization

What does the happiness data look like
around the world?



World Happiness by Country

World Happiness by Country Rank



Map Summary

✨ Top Countries

Country	Year	Rank
Finland	2021.0	1.0
Denmark	2021.0	2.0
Switzerland	2021.0	3.0
Iceland	2021.0	4.0
Netherlands	2021.0	5.0



Bottom Countries ✨

Country	Year	Rank
Lesotho	2021.0	145.0
Botswana	2021.0	146.0
Rwanda	2021.0	147.0
Zimbabwe	2021.0	148.0
Afghanistan	2021.0	149.0

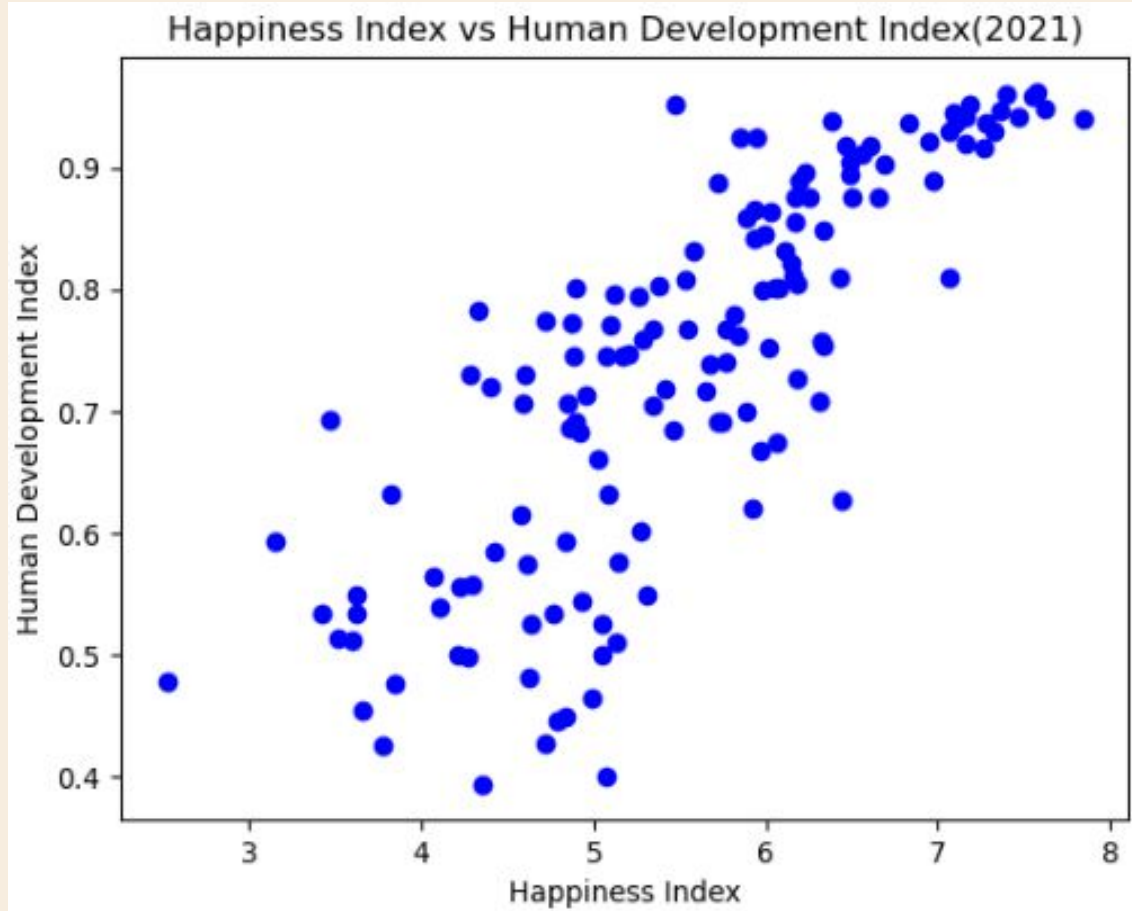
#2



Correlation & Comparison

What is the correlation between a country's Happiness Score and their HDI (Human Development Index) value?

Happiness vs. Human Development



Correlation Summary



Top Countries

	Happiness Index	Human Development Index (2021)
Country		
Switzerland	7.571	0.962
Denmark	7.620	0.948
Finland	7.842	0.940
Iceland	7.554	0.959

Bottom Countries

	Happiness Index	Human Development Index (2021)
Country		
Afghanistan	2.523	0.478
Burundi	3.775	0.426
Sierra Leone	3.849	0.477
Yemen	3.658	0.455

#3

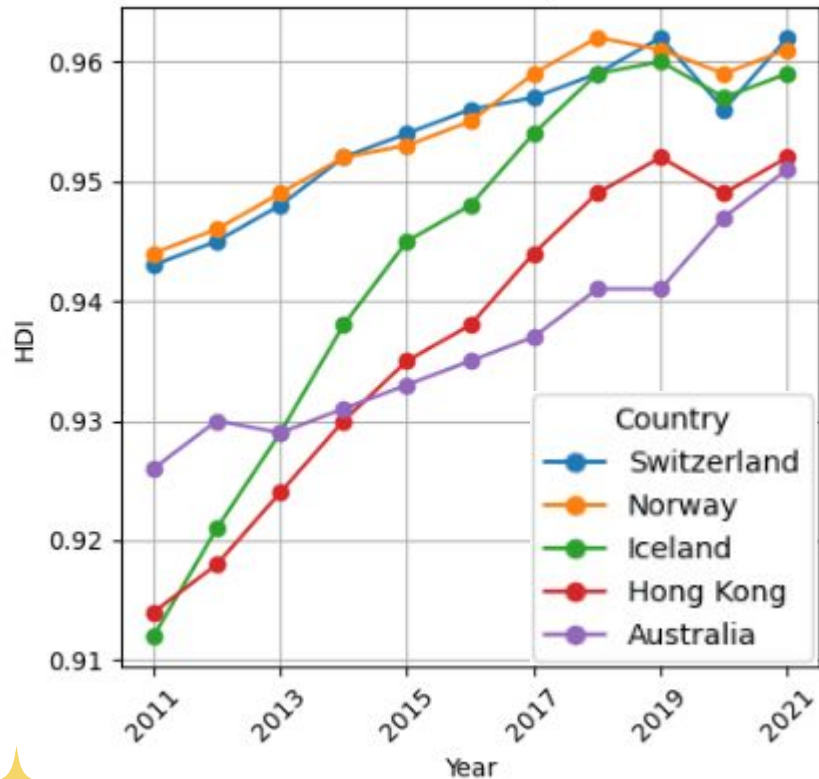
Time Series Comparison

How have the HDI scores of the top and bottom countries changed in the span of 10 years (2011-2021)?

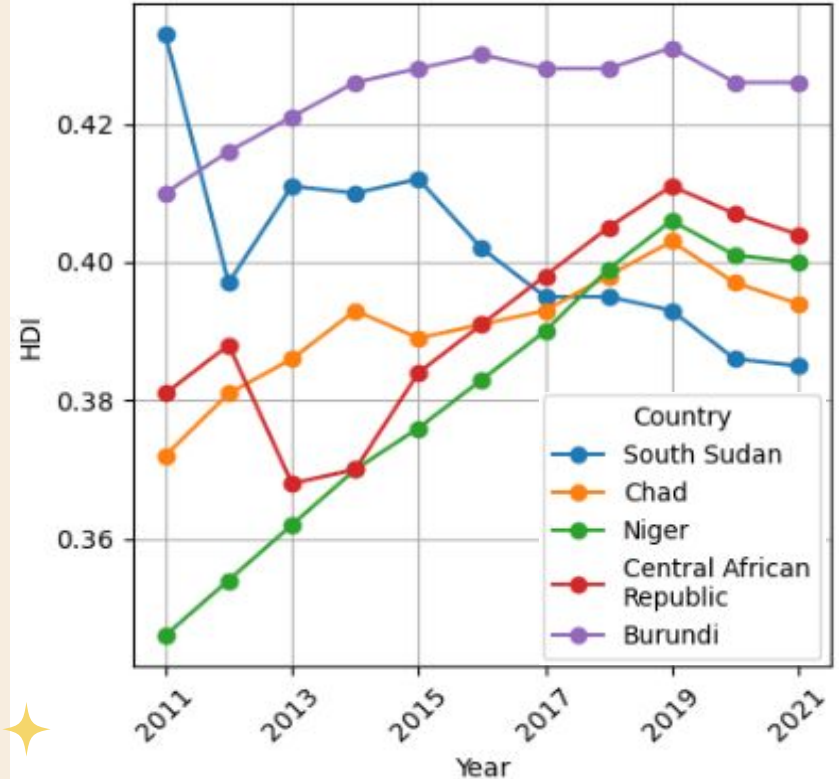


Time Series Summary

10 Year HDI Values - Top 5 Countries



10 Year HDI Values - Bottom 5 Countries



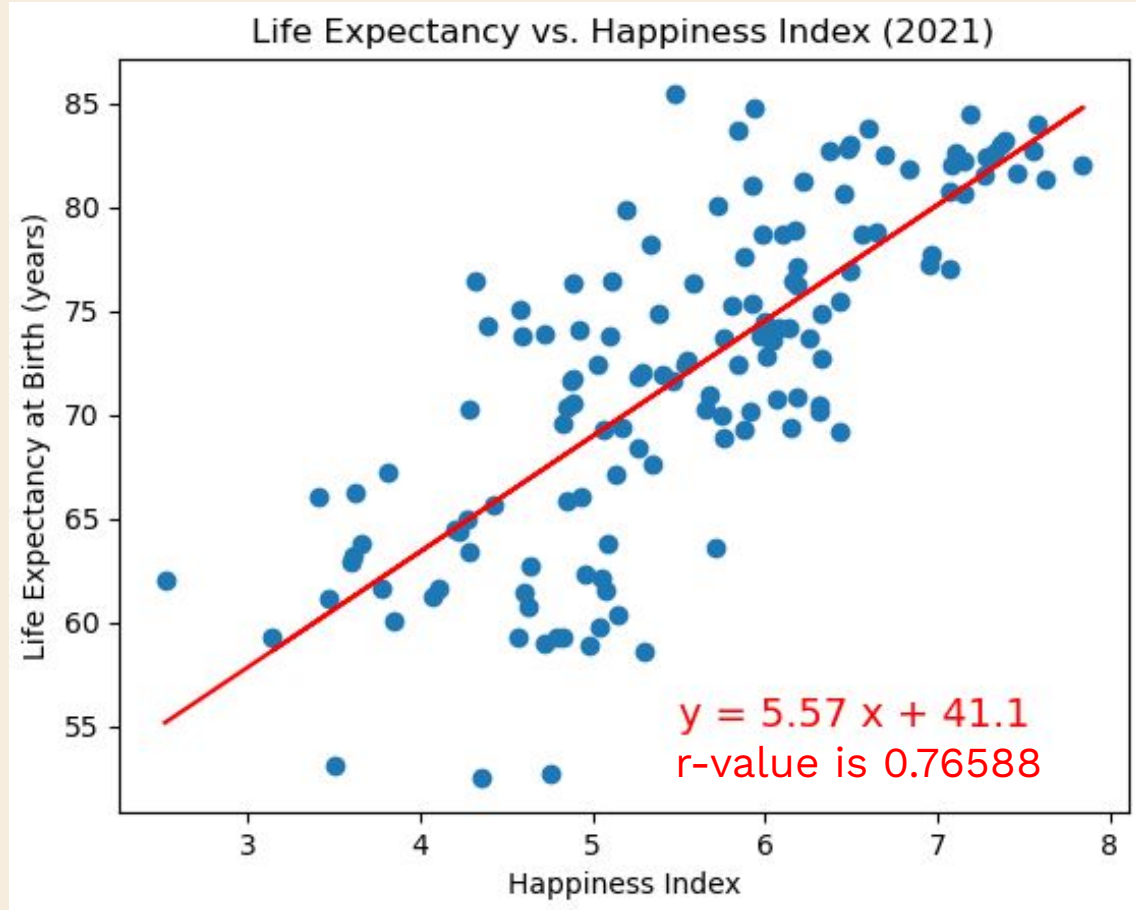
#4



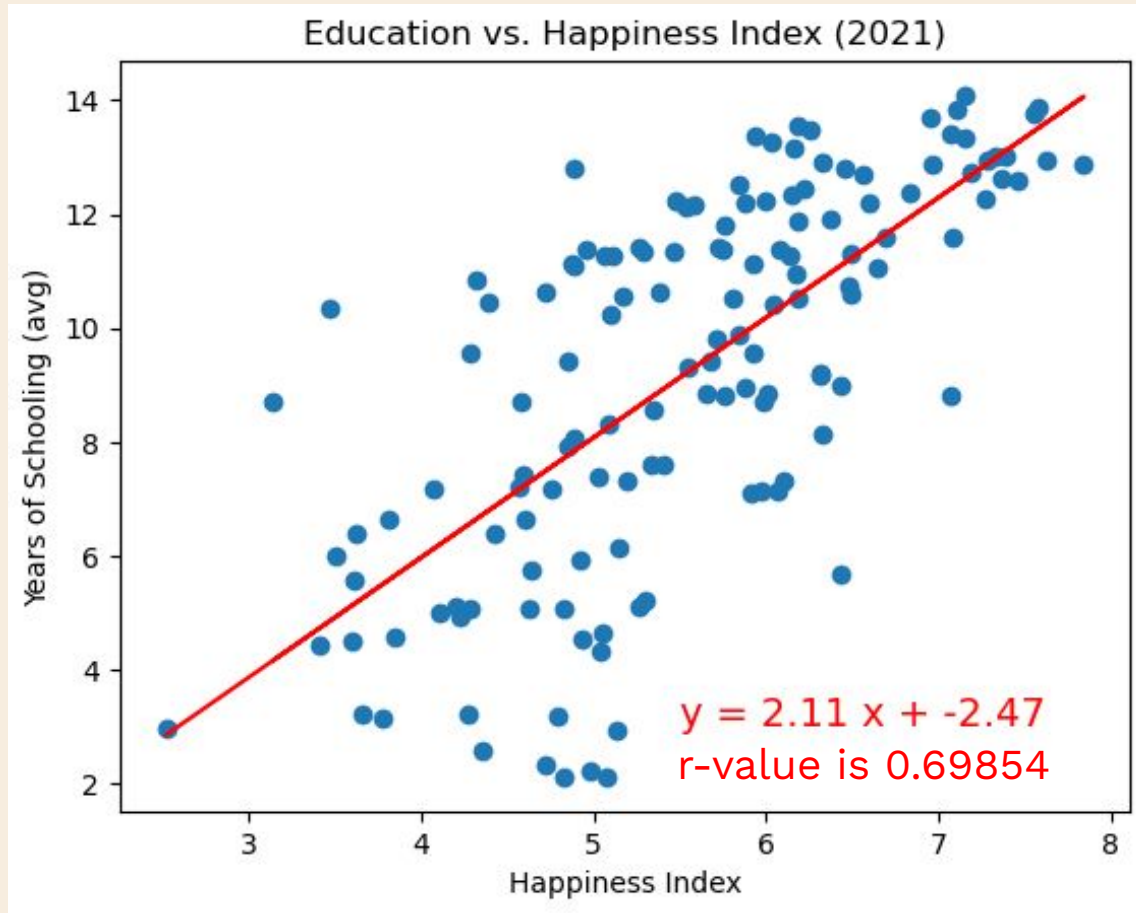
Correlation and Linear Regression

Which component of the HDI has the strongest correlation with the country's Happiness Score- health, education, or standard of living?

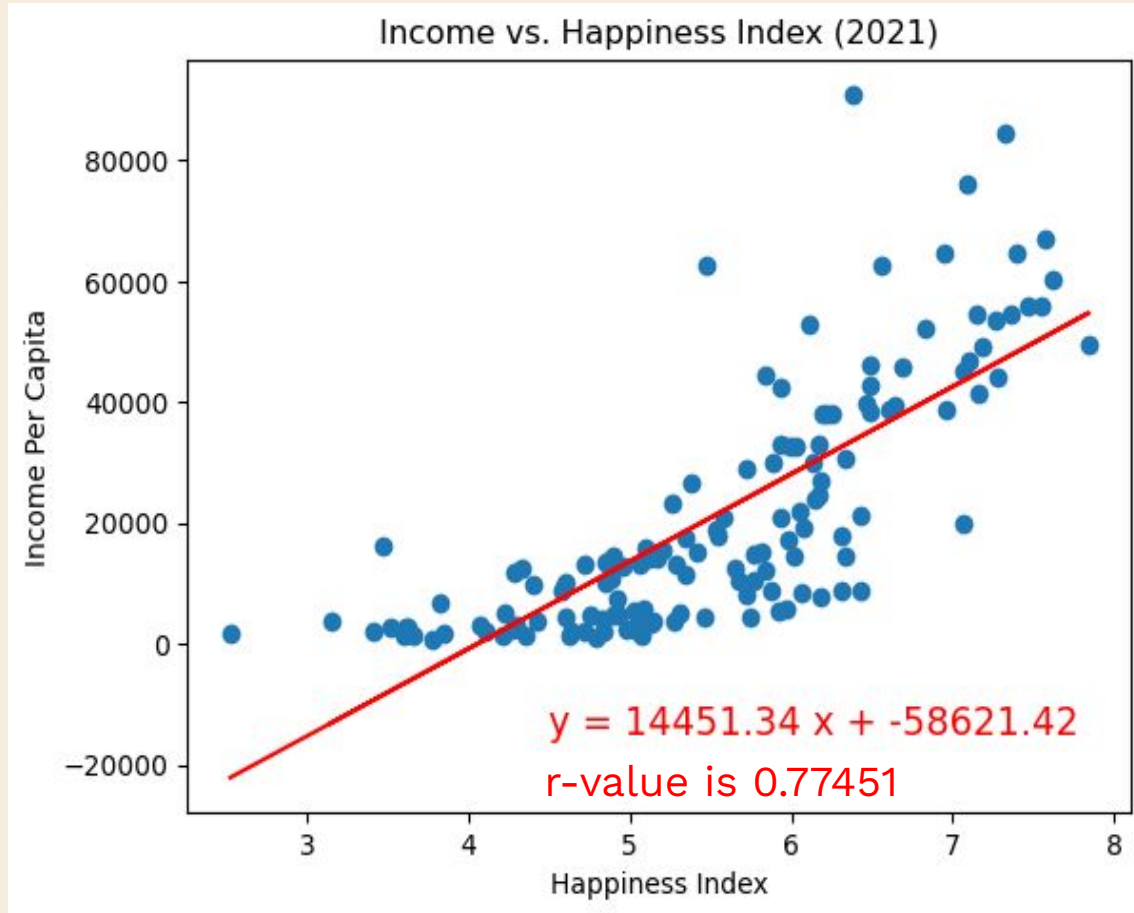
Health vs. Happiness



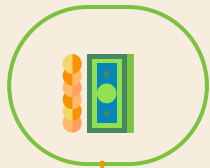
Education vs. Happiness



Standard of Living vs. Happiness



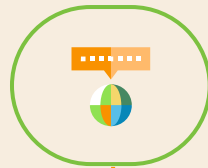
Linear Regression Summary



INCOME
r-value
0.77451



HEALTH
r-value
0.76588



EDUCATION
r-value
0.69854

Our analysis showed:

- *positive correlation with all three components*
- *income* and *health* have highest correlations

Closing Summary



Analysis Summary

- positive correlations
- not directly interchangeable



Limitations

- government data 2 year lag
- comprehensive data



Possible next steps

- subgroup analysis



THANK YOU

What questions do you have?

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