

# World Happiness Index Report

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## About the Report

The **World Happiness Report** is a landmark survey of the state of global happiness that has gained worldwide recognition as governments, organizations, and civil society increasingly use happiness indicators to inform policy-making decisions.

Leading experts across diverse fields including economics, psychology, survey analysis, national statistics, health, and public policy contribute to understanding how measurements of well-being can effectively assess national progress. The reports examine the current state of global happiness and demonstrate how the emerging science of happiness explains both personal and national variations in well-being

## Core Metrics

### Country Name

The official name of the country included in the happiness analysis.

### Regional Indicator

Geographic region classification for comparative analysis across different areas of the world.

## Happiness Measurements

### Ladder Score / Happiness Score

The primary happiness index for each country, derived from the **Cantril Ladder** methodology. Respondents rate their life satisfaction on a scale where:

- **10** = Best possible life
- **0** = Worst possible life

### Upper Whisker & Lower Whisker

Statistical confidence intervals that define the range of uncertainty around the happiness score:

- **Upper Whisker:** Maximum estimated happiness score
- **Lower Whisker:** Minimum estimated happiness score

## Economic Factors

### Log GDP per Capita

Natural logarithm of the country's Gross Domestic Product per person, adjusted for **Purchasing Power Parity (PPP)** to account for cost-of-living differences between nations.

## Social & Individual Well-being

### Social Support

Average percentage of citizens who respond "Yes" to having relatives or friends they can count on during times of trouble.

## **Healthy Life Expectancy** 🩺

Expected number of years a newborn will live in good health, calculated using mortality rates and age-specific life expectancy data.

## **Freedom to Make Life Choices** 🏛️

National average satisfaction rating regarding personal autonomy and freedom to choose one's life path.

## **Civic Engagement** 📈

### **Generosity**

Charitable giving behavior, measured as the residual after accounting for GDP per capita influence on donation rates to charity.

## **Perceptions of Corruption** 🏛️

Average citizen perception of corruption levels in both government institutions and business sectors.

## **Emotional Well-being** 🧠

### **Positive Affect** 😊

National average of responses measuring positive emotions experienced in the previous day (joy, happiness, contentment).

### **Negative Affect** 😞

National average of responses measuring negative emotions experienced in the previous day (sadness, worry, anger).

## **Benchmark Comparison** 📈

### **Dystopia + Residual**

A composite benchmark score consisting of:

- **Dystopia:** Hypothetical country representing the world's least happy population
- **Residual:** Unexplained variance specific to each country

## **TASK 1**

### 1. Load and Pre-process the Dataset

- a. Task: Search the data about Global Happiness Index and other related data. Import the Global Happiness dataset using pandas, handle missing values, and standardize column names.
- b. Visualization: Display a sample of the dataset using a table.

**Result:** Shape of Dataset – 2506 rows and 11 columns

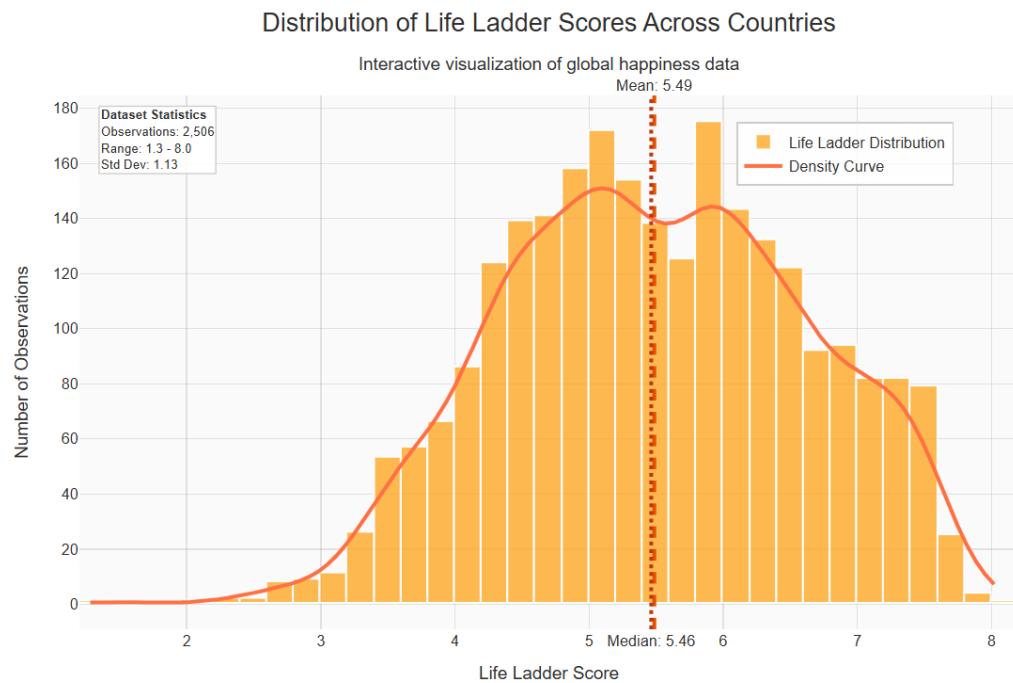
Columns Names - 'Country name', 'year', 'Life Ladder', 'Log GDP per capita', 'Social support', 'Healthy life expectancy at birth', 'Freedom to make life choices', 'Generosity', 'Perceptions of corruption', 'Positive affect', 'Negative affect'

	df.head()										
	Country name	year	Life Ladder	Log GDP per capita	Social support	Healthy life expectancy at birth	Freedom to make life choices	Generosity	Perceptions of corruption	Positive affect	Negative affect
0	Afghanistan	2008	3.724	7.350	0.451	50.5	0.718	0.164	0.882	0.414	0.258
1	Afghanistan	2009	4.402	7.509	0.552	50.8	0.679	0.187	0.850	0.481	0.237
2	Afghanistan	2010	4.758	7.614	0.539	51.1	0.600	0.118	0.707	0.517	0.275
3	Afghanistan	2011	3.832	7.581	0.521	51.4	0.496	0.160	0.731	0.480	0.267
4	Afghanistan	2012	3.783	7.661	0.521	51.7	0.531	0.234	0.776	0.614	0.268

## 2. Visualize Happiness Score Distribution

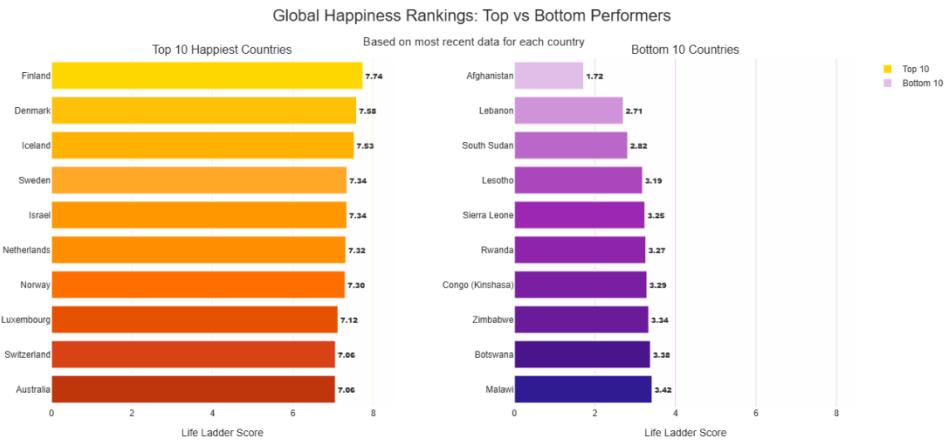
- a. Task: Analyze the distribution of the happiness score across countries.
- b. Visualization: Use histograms to visualize the score across countries.

Result: The data follows a roughly normal (bell-shaped) distribution, slightly skewed to the left which is excellent for understanding the overall global happiness landscape and identifying which happiness levels are most common versus rare among world nations



## 3. Top and Bottom 10 Happiest Countries

- a. Task: Identify the top and bottom 10 countries by happiness score.
- b. Visualization: Horizontal bar chart with colored bars (e.g., green for top, red for bottom).



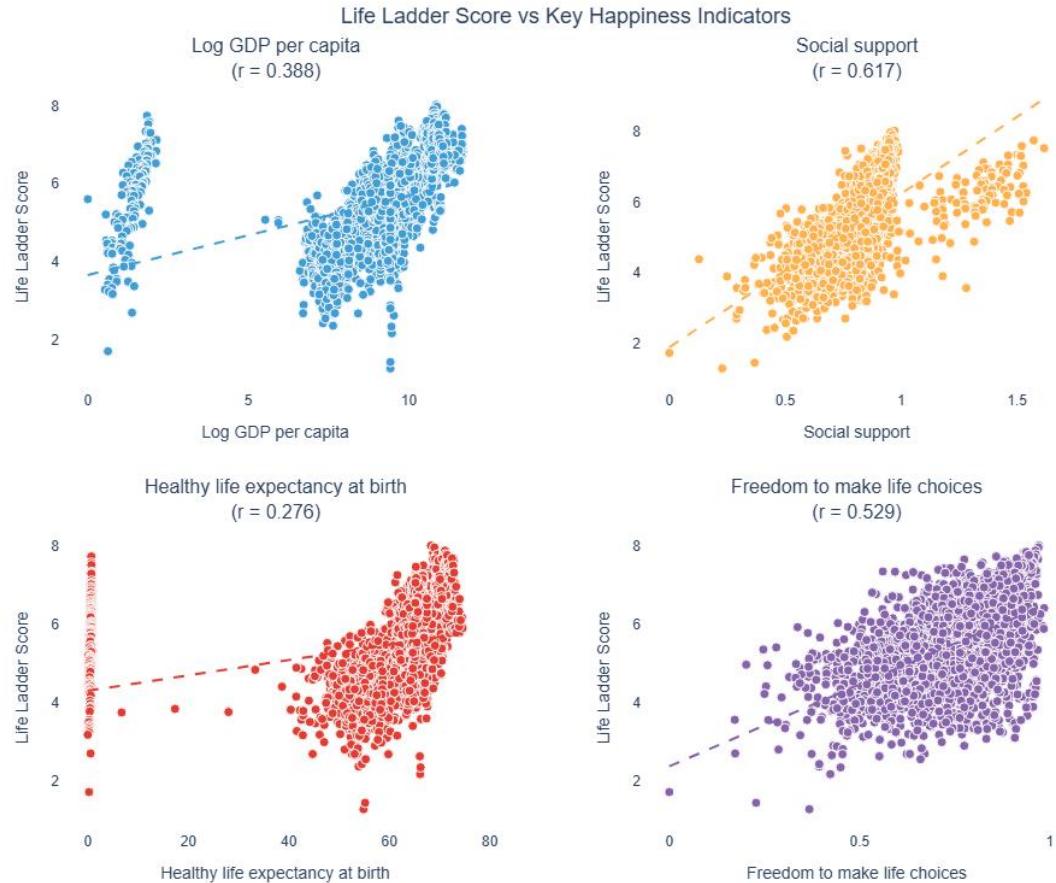
**Result:** This graph represents top 10 and bottom 10 Happiest Countries where Finland is leading for being the happiest however on the other side Afghanistan come is least happiest countries.

Afghanistan has endured decades of war from Soviet occupation through civil strife, the U.S. invasion, and the 2021 Taliban takeover which have devastated its society and eroded public trust

Finns value simple pleasures clean air, pure water, and forest walks and spend much of their time outdoors, even in extreme weather. “Everyman's Right” lets people freely roam and forage and doctors can even prescribe time in nature to relieve stress

#### 4. Correlation of happiness and Indicators

- a. Task: Find correlations between happiness and other indicators.
- b. Visualization: Use scatter plot to visualize the correlation.



Result:

**Social support (r = 0.617): Moderate-to-strong positive correlation**

- As social support increases, Happiness scores tend to increase significantly

**Freedom to make life choices (r = 0.529): Moderate positive correlation**

- More freedom is associated with higher happiness, but with more variation

**Log GDP per capita (r = 0.388): Moderate positive correlation**

- Wealth is positively linked to happiness, but the relationship isn't very tight

**Healthy life expectancy (r = 0.276): Weak positive correlation**

- Health and happiness are related, but weakly many other factors matter more

#### 5. Year-over-Year Comparison

- a. Task: Analyze how the rankings of top countries changed over the last five years.

- b. Visualization: Line plot showing happiness trends for top 5 countries.

Result:

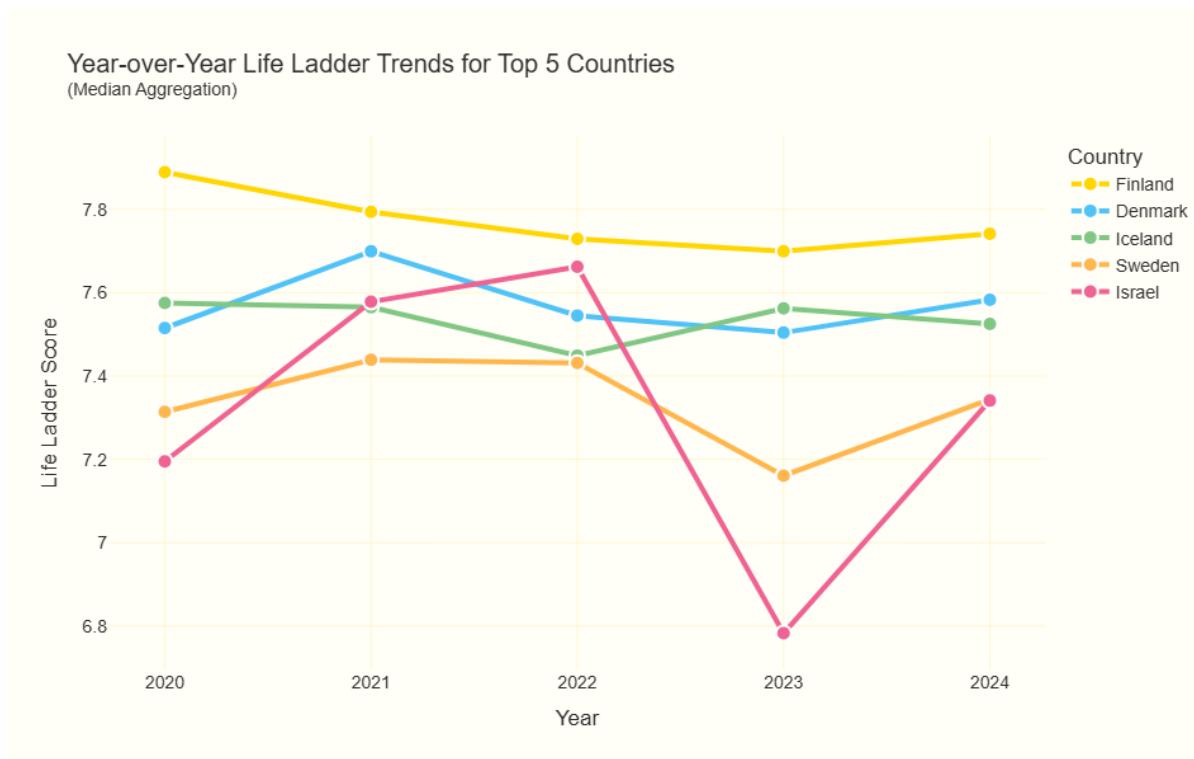
**COVID-19 Impact:** Most countries-maintained stability despite the pandemic

**Israel's Volatility:** Shows how external events (conflict, political crisis) can dramatically affect national happiness

**Nordic Resilience:** Finland, Denmark, and Iceland show remarkable stability

**Recovery Trend:** 2024 shows recovery for most countries after 2023 dips

This visualization effectively demonstrates how global events and national circumstances can impact happiness levels, even in the world's happiest countries.



## 6. World Map of Happiness

- a. Task: Plot happiness scores on a world map.

- b. Visualization: Create Choropleth map

Result:

Happiness tends to cluster geographically, suggesting shared cultural, economic, or political factors

**Development Correlation:** Higher-income regions generally show better happiness scores

**The "Happiness Divide": Stark contrast between wealthy northern countries and developing regions**

World Map of Life Ladder/ Happiness Scores

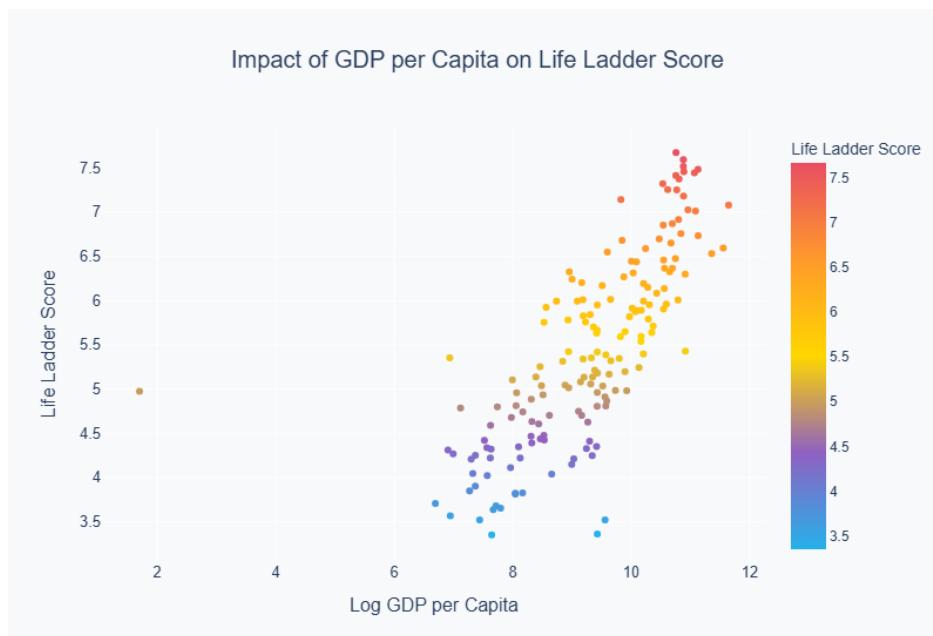


This visualization effectively demonstrates that happiness is not randomly distributed globally but follows clear patterns related to geography, development, and regional characteristics.

#### 7. Impact of GDP on Happiness

- Task: Analyze the relationship between GDP per capita and happiness score.
- Visualization: Scatter plot

**Result:** This scatter plot that reveals important insights about the "money vs. happiness" debate



Once countries reach middle-to-upper income levels, factors like social support, freedom and governance become more important determinants of national happiness than additional wealth.

## 8. Compare Continents or Regions

- Task: Group countries by continent and compute average happiness.
- Visualization: Box plots or violin plots to show the spread per continent.

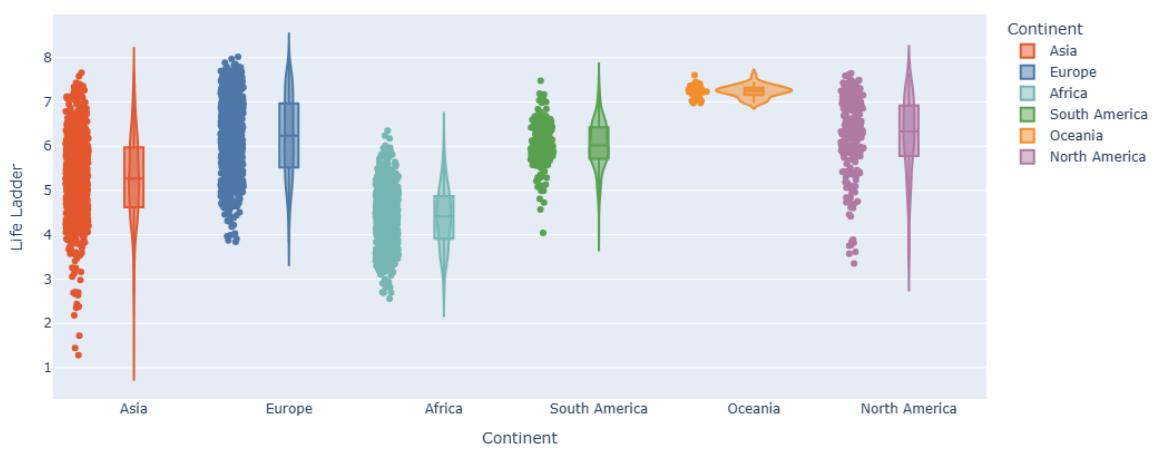
Result:

**Violin plot represents the order as Oceania > North America ≈ Europe > South America > Asia > Africa**

### Regional Consistency vs. Diversity:

- Europe shows consistent high performance
- Asia shows the most internal variation
- Africa shows consistently lower scores

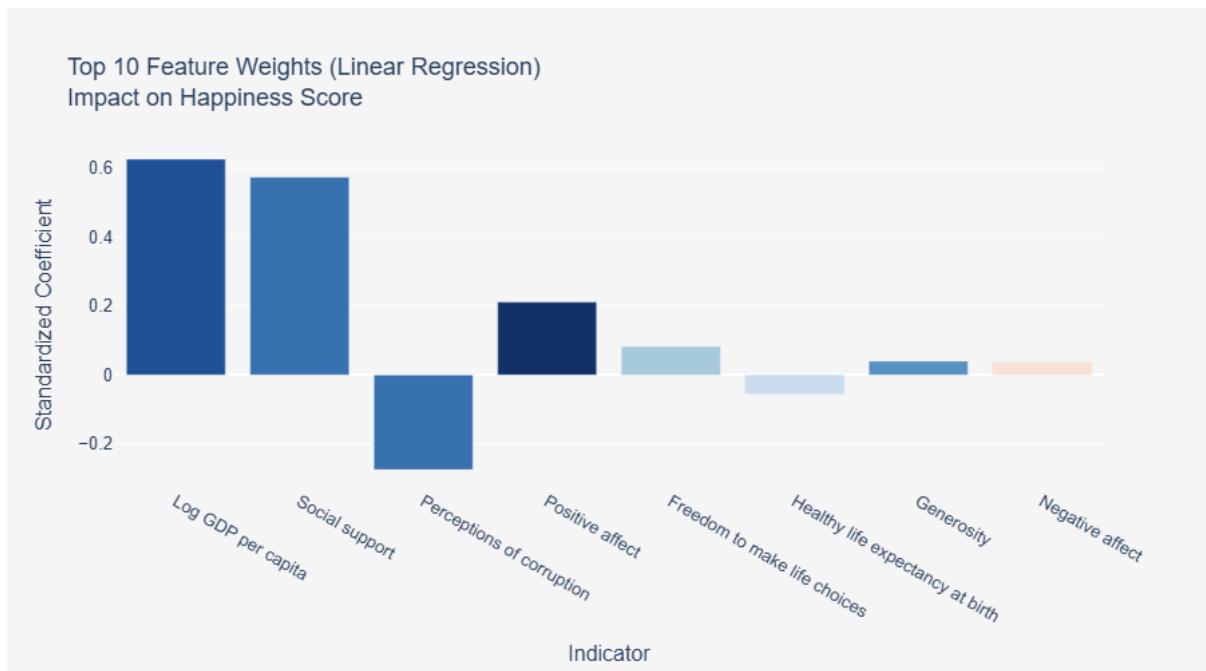
Life Ladder Score Distribution by Continent



## 9. Indicator Importance (Feature Contribution)

- Task: Perform linear regression or feature importance to understand which factors most affect happiness.
- Visualization: Bar plot of feature weights or importance.

Result: While many factors correlate with happiness, **economic prosperity and social support are the dominant drivers, with good governance (low corruption) being the major detractor**. This suggests policy should focus on these core areas for maximum happiness impact.



## 10. Interactive Dashboard

- Task: Combine multiple visualizations in an interactive dashboard. Use any tool of your choice.

Result:

Dashboard link: <https://datavizprojectmasters-question10.streamlit.app/>

GitHub link: [https://github.com/saverin0/data\\_viz\\_project\\_masters/blob/main/10\\_happiness\\_dashboard.py](https://github.com/saverin0/data_viz_project_masters/blob/main/10_happiness_dashboard.py)



## 11. Trend of Happiness vs. Corruption Perception

- Task: Examine how perception of corruption correlates with happiness.
- Visualization: Scatter plot with linear regression and optional trendline over time.

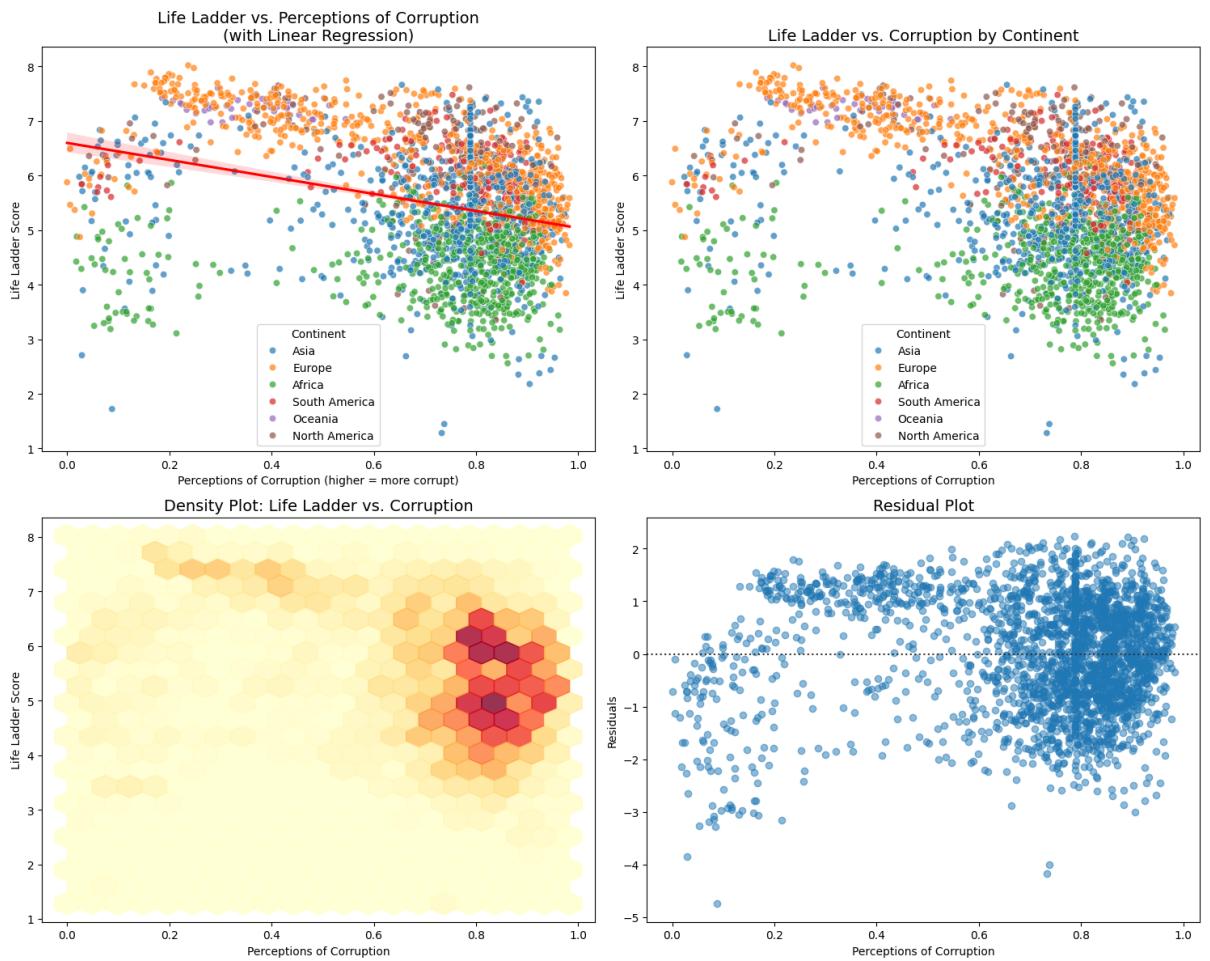
Result:

### Linear Regression Analysis

- **Strong negative correlation:** Clear downward trend showing corruption severely impacts happiness
- **Red regression line:** This slope tells us for every X increase in corruption, happiness decreases by Y points
- **Continental clustering:** Europe (orange) dominates the low-corruption, high-happiness quadrant
- **Africa (green)** and parts of **Asia (blue)** cluster in the high-corruption, low-happiness area

### Continental Patterns Without Regression

- **Europe's advantage:** Consistently low corruption, high happiness
- **Africa's challenge:** Wide spread but generally higher corruption levels
- **Asia's diversity:** Huge variation from very corrupt to very clean countries



### Density Heatmap

- **Dark red concentration:** Many countries fall in the 0.6-0.8 corruption range with 4-6 happiness scores

### Residual Analysis

- **Model quality check:** Tests how well the linear model fits the data

- **Random scatter:** Good sign - means linear relationship is appropriate

### Key Insights:

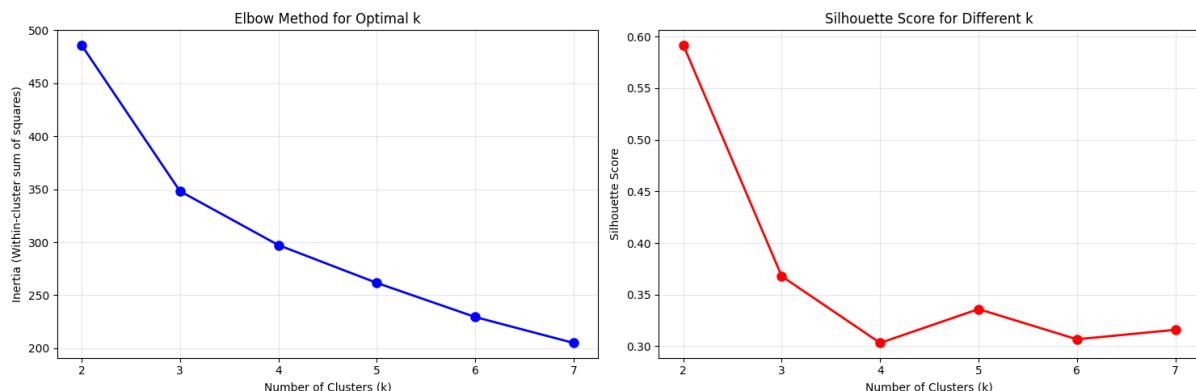
- **Corruption is a happiness killer:** One of the strongest negative relationships in the dataset
- **Continental divide:** Europe has cracked the code on low corruption; Africa and parts of Asia still struggle
- **Statistical robustness:** The residual plot confirms this is a genuine, strong relationship

## 12. Cluster Countries by Happiness Factors

- a. Task: Apply clustering algorithms like K-Means to group countries based on indicators such as GDP, social support, and health.
- b. Visualization: 2D or 3D scatter plot showing clusters using plotly or seaborn.

### Result:

Optimal number of clusters = 2 as highest silhouette score: 0.592



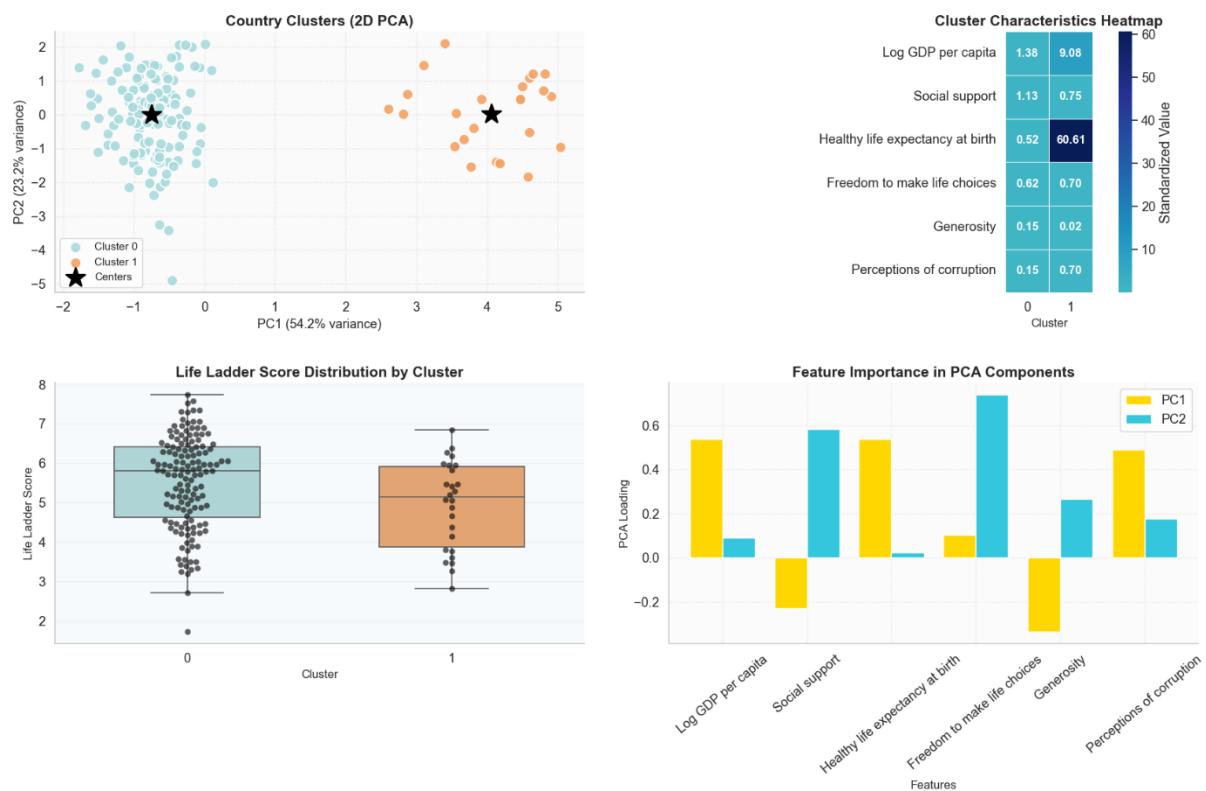
### Geographic Divide

**Nordic countries** (Finland, Denmark, Iceland) consistently lead with scores above 7.5, while **conflict-affected regions** (Afghanistan, Lebanon) score below 3.0. The world map shows clear clustering: Europe and wealthy Western nations in pink/red (high happiness), Sub-Saharan Africa in blue (low happiness).

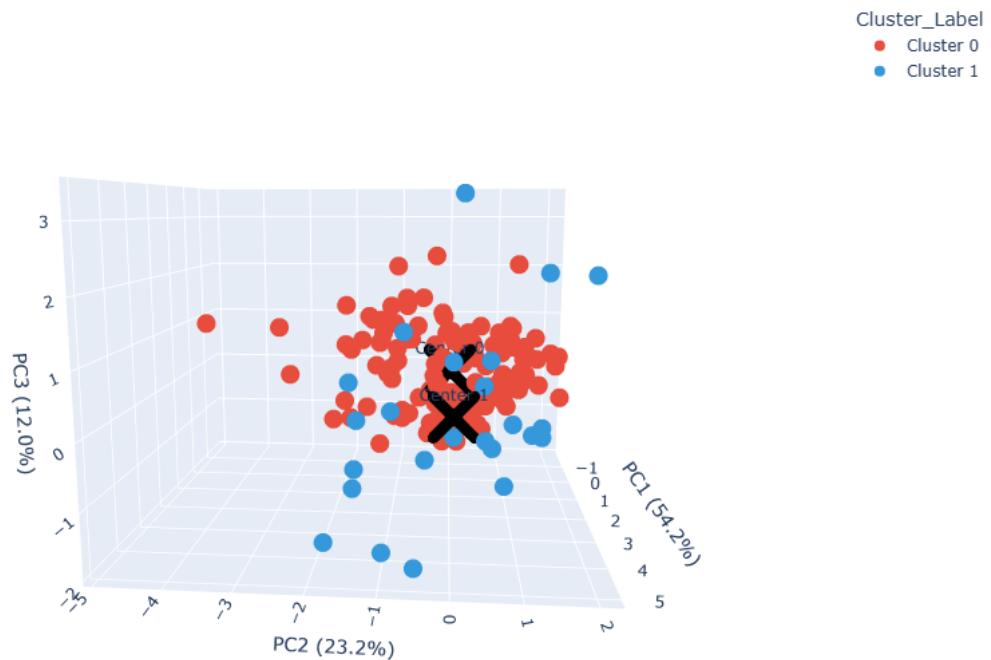
### Key Drivers

Correlation analysis reveals **social support** ( $r=0.617$ ) and **freedom** ( $r=0.529$ ) matter more than **GDP** ( $r=0.388$ ) or **health** ( $r=0.276$ ). However, regression analysis shows **GDP and social support** are the strongest statistical predictors, while **corruption** has the largest negative impact.

## Cluster Analysis



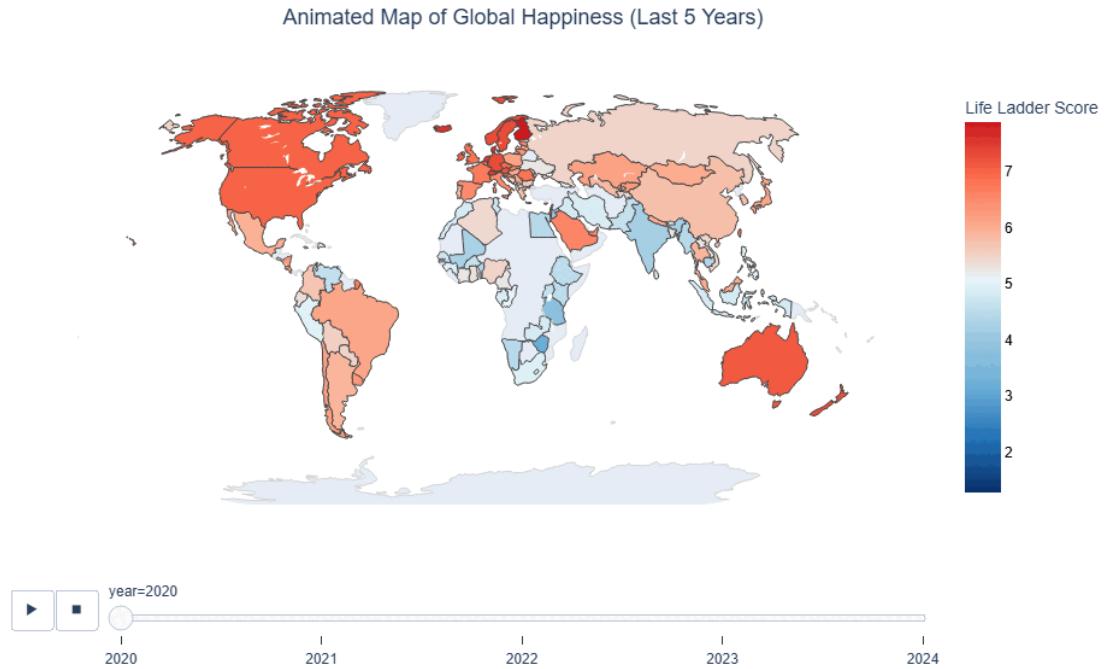
## Country Clusters Based on Happiness Factors (3D PCA)



### 13. Animated Map of Happiness Over Time

- a. Task: Create an animation showing how global happiness has changed over the last five years.
- b. Visualization: Animated choropleth map using plotly.express.

Result:



### World Happiness Dashboard: Key Insights

- **Geographic Inequality:** Clear global divide with Nordic/Western countries consistently scoring 7+ while conflict-affected regions (Afghanistan, parts of Africa) remain below 3, creating a 5+ point happiness gap that persists over time.
- **Remarkable Temporal Stability:** The 2020-2024 animated map shows global happiness patterns are surprisingly resilient, with most countries maintaining relative positions even through COVID-19, except for dramatic outliers like Israel's 2023 conflict-related drop.

### 14. Happiness Score vs. Freedom of Choice

- a. Task: Explore the relationship between the freedom to make life choices and happiness score.
- b. Visualization: Bubble chart with bubble size representing population or GDP.

Result:

Life Ladder Score vs. Freedom of Choice (2024)  
Bubble size: Log GDP per capita



**Golden corner:** Upper right corner shows countries with high freedom (0.7-0.9), high happiness (6.5-8.0) and large bubbles (wealthy) these are the Nordic/Western success stories achieving the triple win.

**Freedom-Happiness Correlation:** Clear upward trend - as freedom increases, happiness generally rises, confirming personal autonomy is crucial for well-being regardless of wealth level.

**Size Matters:** Larger bubbles (wealthier countries) tend to cluster in higher freedom/happiness areas but there are notable exceptions some smaller bubbles (poorer countries) still achieve decent happiness with good freedom.

**The Constraint:** Very few countries achieve high happiness (red) without reasonable freedom (>0.5) - suggesting personal autonomy may be a prerequisite for societal well-being even more than wealth.

## 15. Country Profile Dashboard

- Task: Create an interactive selector that lets users choose a country and view its happiness profile (indicators, trends, rank).
- Visualization: Combine multiple charts (radar chart, line chart, bar chart) into one dynamic display using any Python library.

Result:

Dashboard link: <https://datavizprojectmasters-question15.streamlit.app/>

GitHub link: [https://github.com/saverin0/data\\_viz\\_project\\_masters/blob/main/15\\_dashboard.py](https://github.com/saverin0/data_viz_project_masters/blob/main/15_dashboard.py)

