Life Expectancy Explored

A cross-sectional study on how economic, environmental and social factors shape life expectancy

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RESEARCH QUESTION

" How do GDP per Capita, number of smokers, people's satisfaction, environmental performance, political situation, unemployment, and population shape life expectancy?

HYPOTHESES

Life Expectancy at birth might increase if:

- GDP per capita is higher
- Number of smokers is lower
- Population's satisfaction is higher
- The country's environmental performance is better
- The country is politically free
- Unemployment is lower
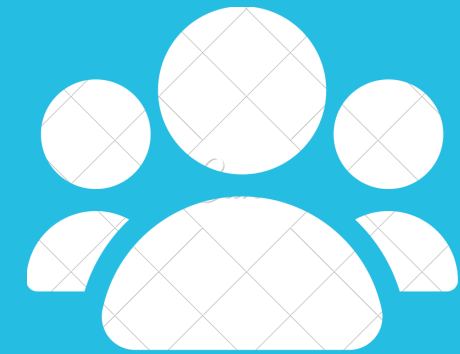- The country has a larger population

DATA NEEDED (2022)

DATA SOURCES

LIFE EXPECTANCY AT BIRTH
https://www.cia.gov/the-world-factbook/about/archives/2022/field/life-expectancy-at-birth/country-comparison

ENVIRONMENTAL PERFORMANCE INDEX (EPI)
https://epi.yale.edu/downloads/epi2022report06062022.pdf

GDP PER CAPITA
https://data.worldbank.org/indicator/ny.gdp.pcap.cd?

POPULATION SATISFACTION
https://ourworldindata.org/happiness-and-life-satisfaction

POPULATION
https://databankfiles.worldbank.org/public/ddpext_download/POP.pdf

SMOKING RATES
https://www.cia.gov/the-world-factbook/about/archives/2022/field/life-expectancy-at-birth/country-comparison
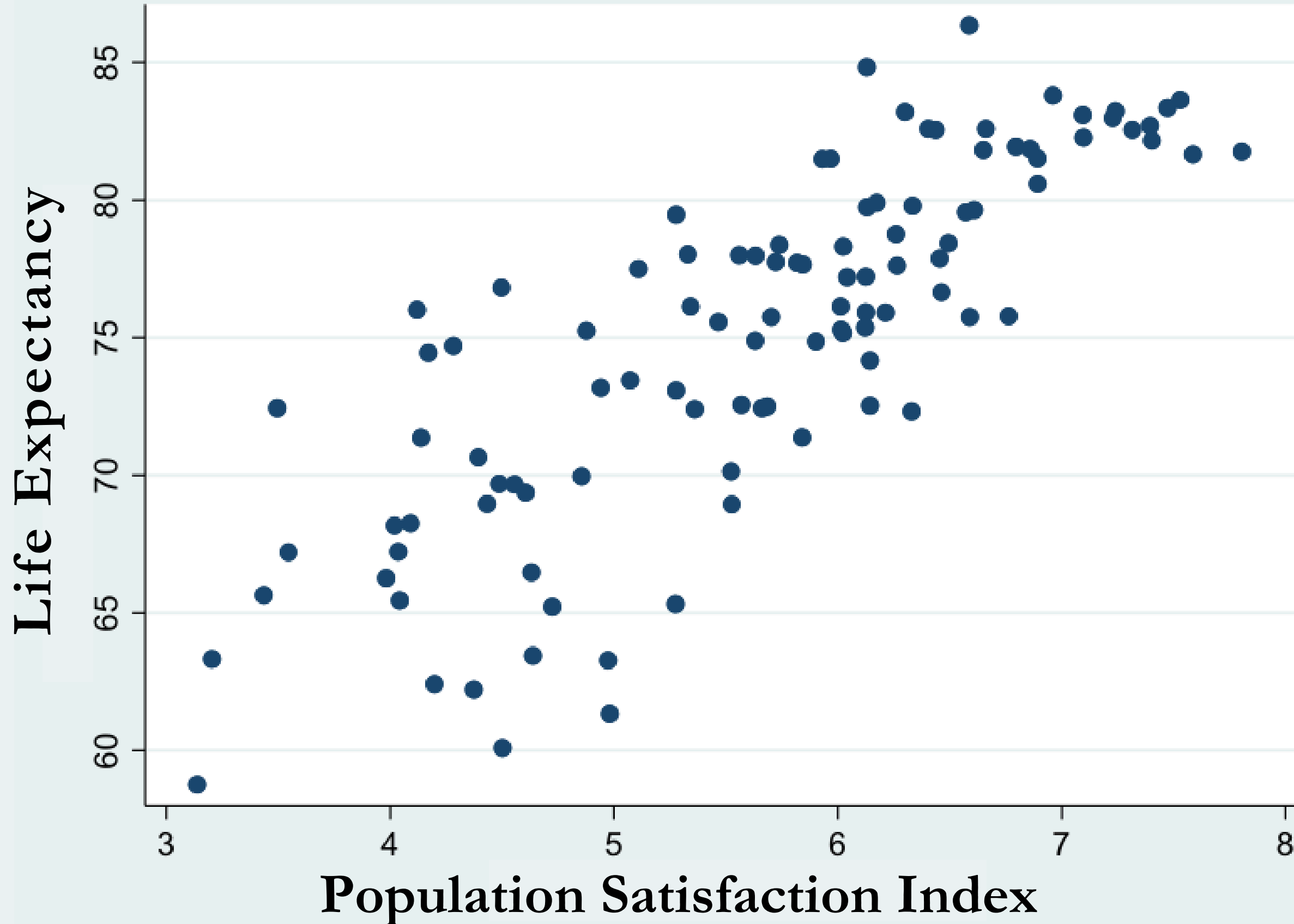
UNEMPLOYMENT RATE
https://data.worldbank.org/indicator/SL.UEM.TOTL.ZS

POLITICAL FREEDOM
https://freedomhouse.org/report/freedom-world

Descriptive Statistics

Variable	Mean	Standard Deviation	Min.	Max.
Life Expectancy	75.0876	6.394745	58.76	86.35
EPI	43.13942	13.60055	18.9	77.9
GDP Per Capita	20112.63	25389.74	475.7957	125006
Population in thousands	65486.35	199263.7	382	1417173
Smoking Rate	19.50769	5.05635	3.3	39.5
Unemployment Rate	6.847631	.5000933	.13	28.84
Population Satisfaction	5.656415	1.098851	3.1376	7.8042

n = 104

Relationship between Population Satisfaction Index and Life Expectancy

Life Expectancy (y-axis): 60, 65, 70, 75, 80, 85

Population Satisfaction Index (x-axis): 3, 4, 5, 6, 7, 8
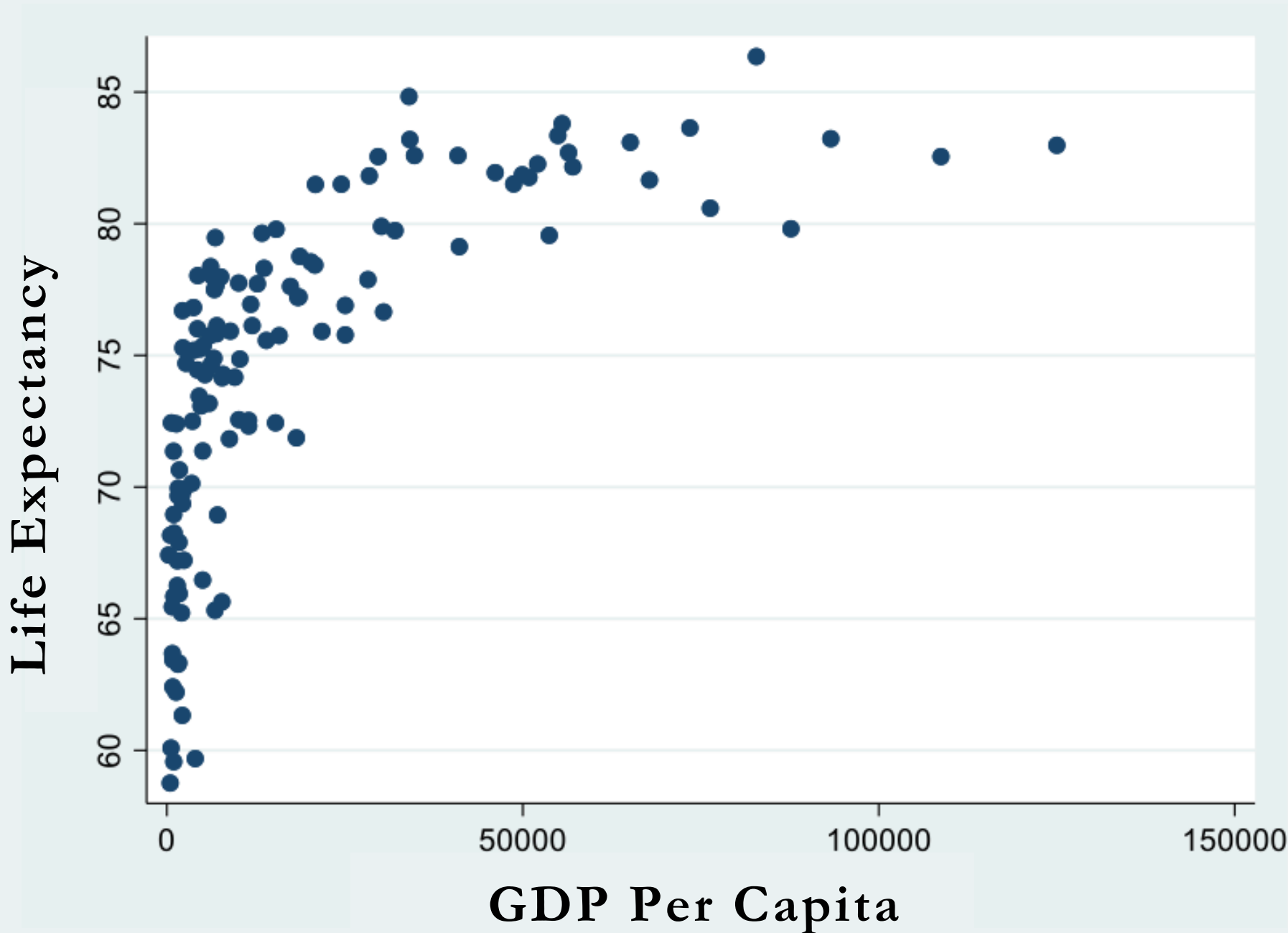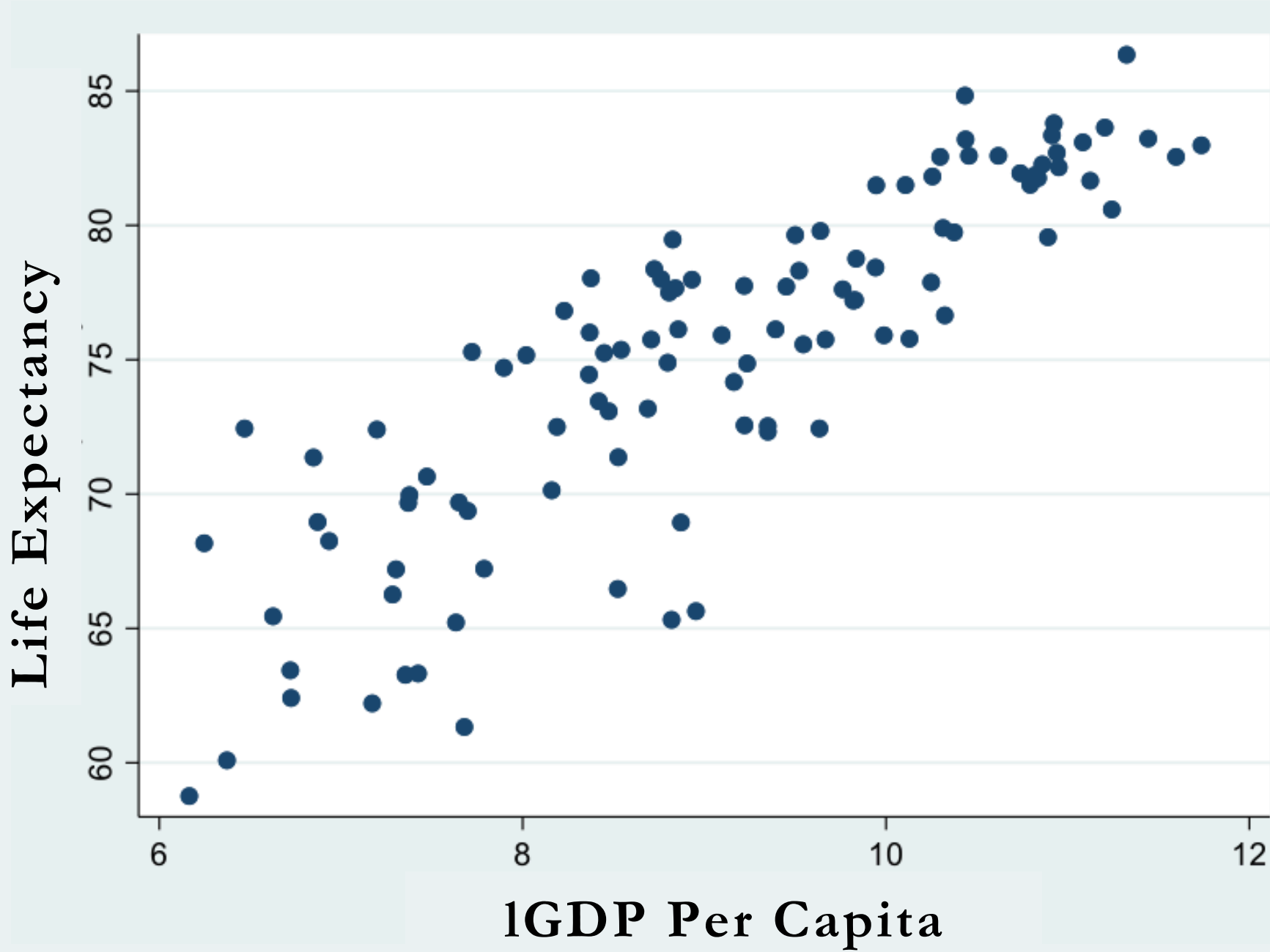
Relationship between EPI and Life Expectancy
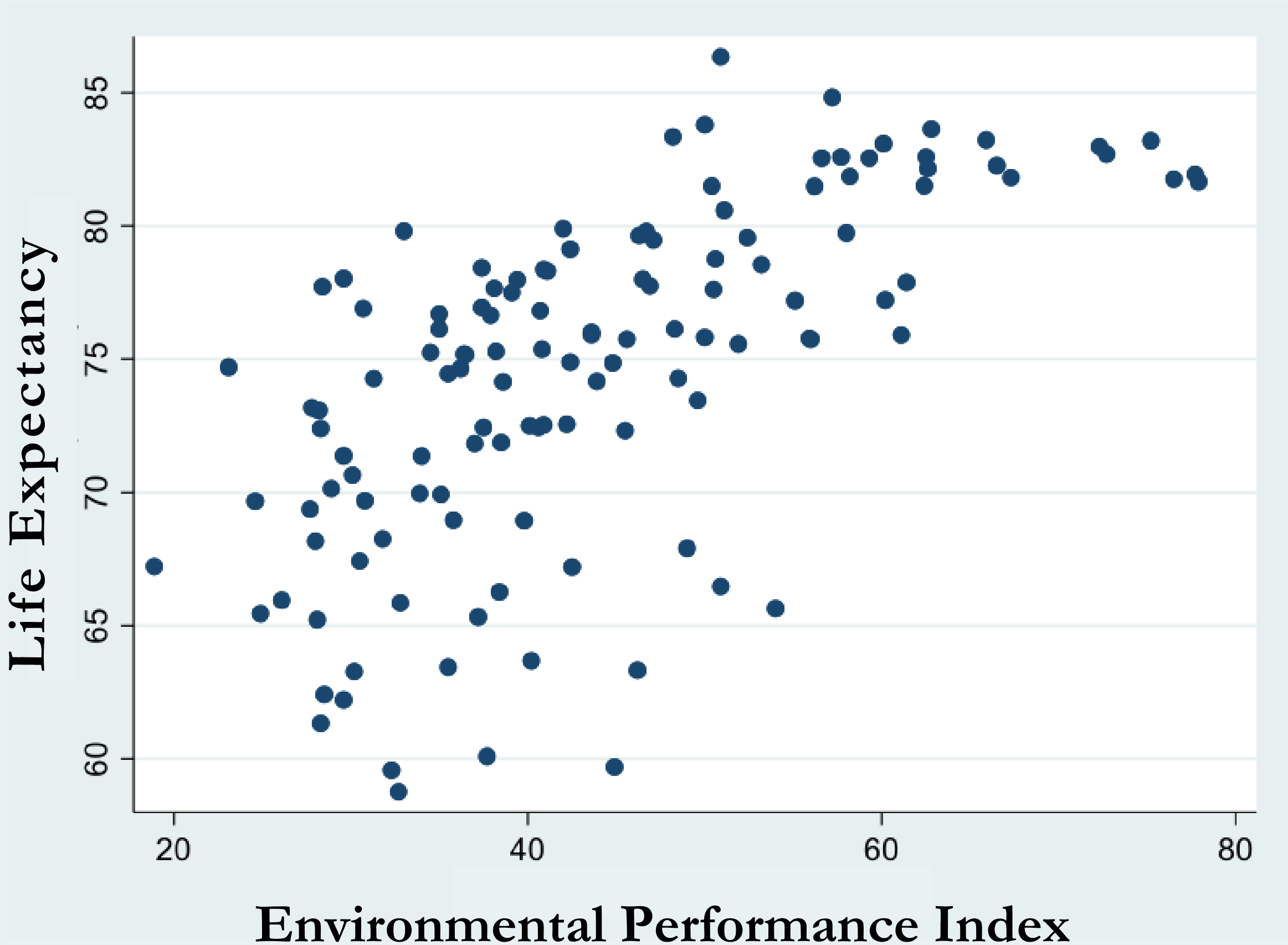
Relationship between GDP Per Capita and Life Expectancy

First Regression Model

```
. reg LifeExpectancy EPI lGDP Populationinthousands SmokingRate UnemploymentRate Satisfaction F NF
```

Source	SS	df	MS
Model	3214.94054	8	401.867567
Residual	997.013562	95	10.4948796
Total	4211.9541	103	40.8927582

Number of obs	= 104
$F(8, 95)$	= 38.29
Prob > F	= 0.0000
R-squared	= 0.7633
Adj R-squared	= 0.7434
Root MSE	= 3.2396

LifeExpectancy	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
EPI	.0265116	.0445788	0.59	0.553	-.0619885	.1150116
lGDP	2.784854	.6444932	4.32	0.000	1.505373	4.064335
Populationinthousands	-7.84e-07	1.77e-06	-0.44	0.658	-4.29e-06	2.72e-06
SmokingRate	.0748126	.0376791	1.99	0.050	.0000102	.149615
UnemploymentRate	-.0160613	.0642825	-0.25	0.803	-.1436782	.1115556
Satisfaction	1.473593	.6674583	2.21	0.030	.1485212	2.798666
F	-1.406956	.9830582	-1.43	0.156	-3.358574	.5446609
NF	-.0071243	.9590002	-0.01	0.994	-1.910981	1.896732
_cons	39.65977	2.613223	15.18	0.000	34.47187	44.84768

Regression Equation

$\widehat{\text{Life Expectancy}}$ = 39.6597 + 0.0278 * GDP Per Capita (percent increase)+ 0.0265 * EPI - 7.84e-07 * Population (in thousands) + 0.0748 * Smoking Rate - 0.016 * Unemployment Rate + 1.4735 * Satisfaction - 1.4069 * Free Country - 0.0071 * Not Free Country

R-squared = 0.7633
Adjusted R-squared = 0.7434

Final Regression Model

```
. reg LifeExpectancy lGDP SmokingRate Satisfaction

      Source |       SS           df       MS         Number of obs   =       104
-------------+----------------------------------      F(3, 100)       =    103.61
       Model | 3186.69911          3  1062.23304      Prob > F        =    0.0000
    Residual | 1025.25499        100  10.2525499      R-squared       =    0.7566
-------------+----------------------------------      Adj R-squared   =    0.7493
       Total | 4211.9541         103  40.8927582      Root MSE        =     3.202

------------------------------------------------------------------------------
LifeExpect~y |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        lGDP |   2.671246   .5128211     5.21   0.000     1.653823    3.688668
 SmokingRate |   .0754693   .0366254     2.06   0.042     .0028056     .148133
Satisfaction |   1.464992   .6439712     2.27   0.025     .1873714    2.742613
       _cons |   41.12374   2.061783    19.95   0.000     37.03322    45.21426
------------------------------------------------------------------------------
```

Regression Equation

$\widehat{\text{Life Expectancy}}$ = 41.1237 + 0.0267 * GDP Per Capita (percent increase)+ 0.0754 * Smoking Rate + 1.4649 * Satisfaction

R-squared = 0.7566
Adjusted R-squared = 0.7493

Conclusions

- According to our analysis, **country's population, unemployment rate, and level of political freedom have a minor impact** on the average life expectancy in that country.

- Both **GDP per capita and EPI have a major effect on the average life expectancy**, but they are highly correlated (economies that are more developed have a greater EPI).

- Additionally, **overall satisfaction and happiness of country's population, and country's smoking rate** affect the average life expectancy in that entity.

Thank you!
Canva