

Write-Up Summary

Write-up Objective:

Create a write-up summarizing your major findings. This should include a heading for each "question" you asked of your data, and under each heading, a short description of what you found and any relevant plots.

Core Message:

According to the **World Happiness Report** there are several **subjective well-being measures (SWB)** that can be used to measure **happiness**. Our main objective was to explore the measures of subjective well-being to determine which ones had the most influence on happiness. We also set out to examine the different factors to determine the correlation of each of these with overall happiness.

Research Questions:

1. Which **countries** had the lowest happiness score? highest happiness score? (data from 2017, 2018, and 2019).
2. Which of the measures of SWB (i.e., social support, healthy life expectancy, generosity, freedom to make life choices, GDP per capita, and perception of corruption) are most highly correlated with a higher happiness score?
3. Which of these measures are most likely to influence the happiness score?

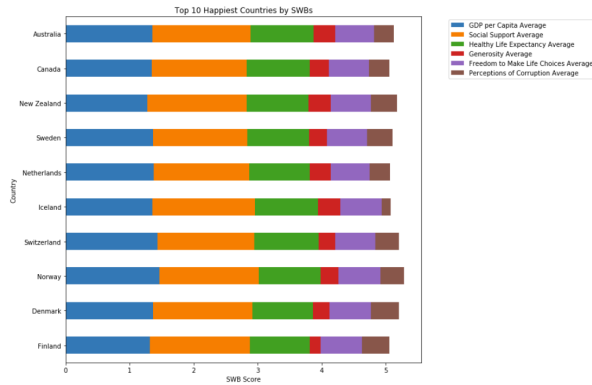
Findings:

1. Over the past three years, which countries had the lowest happiness score? highest happiness score?

- Answer: The average over the last three years shows Finland as having the happiest overall score. Rounding out the top five is Denmark, Norway, Switzerland, and Iceland. Inversely, the lowest happiness scores fall on South Sudan, Afghanistan, and Central African Republic.
- Plots: Average Sorted DF-Top 10 (img 1.1) and Lowest 10 (img 1.2) and Stacked Bar Charts (img 1.3 and img 1.4)

	Country	Region	Score Average	GDP per Capita Average	Social Support Average	Healthy Life Expectancy Average	Generosity Average	Freedom to Make Life Choices Average	Perceptions of Corruption Average
0	Finland	Western Europe	7.736567	1.316667	1.559509	0.940424	0.171557	0.646439	0.421286
2	Denmark	Western Europe	7.600200	1.361667	1.555483	0.947778	0.259598	0.646680	0.437753
1	Norway	Western Europe	7.545333	1.466667	1.553058	0.965691	0.281662	0.653067	0.371700
4	Switzerland	Western Europe	7.508967	1.430667	1.515801	1.009511	0.262685	0.620318	0.369315
3	Iceland	Western Europe	7.497833	1.355333	1.605189	0.980281	0.356443	0.643327	0.133514
5	Netherlands	Western Europe	7.459300	1.372667	1.491215	0.950892	0.330439	0.602875	0.320523
8	Sweden	Western Europe	7.336833	1.365667	1.473783	0.969490	0.274943	0.627766	0.396355
7	New Zealand	North America and ANZ	7.310200	1.279667	1.548406	0.970046	0.340242	0.633597	0.410089
6	Canada	North America and ANZ	7.279367	1.341667	1.490797	0.985834	0.295843	0.627009	0.316901
9	Australia	North America and ANZ	7.240933	1.350667	1.532715	0.989536	0.339325	0.608626	0.309332

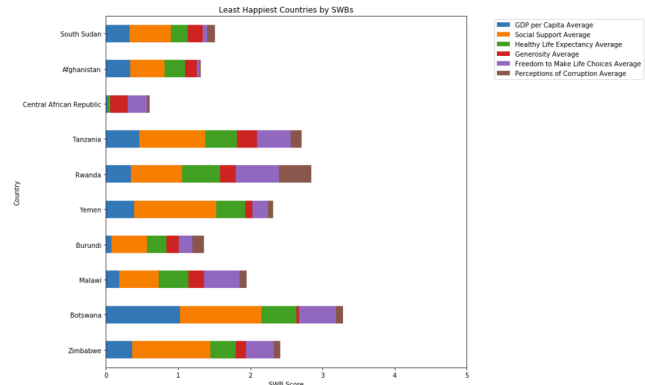
1.1



1.3

	Country	Region	Score Average	GDP per Capita Average	Social Support Average	Healthy Life Expectancy Average	Generosity Average	Freedom to Make Life Choices Average	Perceptions of Corruption Average
132	Zimbabwe	Sub-Saharan Africa	3.551400	0.360000	1.085278	0.352013	0.144783	0.381468	0.089643
134	Botswana	Sub-Saharan Africa	3.518967	1.025000	1.134898	0.483004	0.033469	0.507030	0.097829
135	Malawi	Sub-Saharan Africa	3.511667	0.187667	0.543789	0.415721	0.213728	0.487130	0.100211
143	Burundi	Sub-Saharan Africa	3.485100	0.078000	0.490525	0.273404	0.170801	0.186800	0.166002
139	Yemen	Middle East and North Africa	3.420800	0.390333	1.137826	0.407000	0.095230	0.210240	0.076117
138	Rwanda	Sub-Saharan Africa	3.351433	0.341000	0.709659	0.528794	0.217568	0.598363	0.446847
140	Tanzania	Sub-Saharan Africa	3.336733	0.462000	0.916225	0.440893	0.272514	0.469114	0.149294
142	Central African Republic	Sub-Saharan Africa	3.213967	0.024667	0.000000	0.038333	0.235504	0.274271	0.033755
133	Afghanistan	South Asia	3.133967	0.338000	0.470145	0.294017	0.161412	0.028333	0.020742
141	South Sudan	Sub-Saharan Africa	2.974533	0.326967	0.578760	0.226936	0.211978	0.062536	0.102719

1.2



1.4

2. Which of the measures of SWB (i.e., social support, healthy life expectancy, generosity, freedom to make life choices, GDP per capita, and perception of corruption) are most highly correlated with a higher happiness score?

***Pearson's correlation coefficient (r)** is a measure of the strength of the association between the two variables.

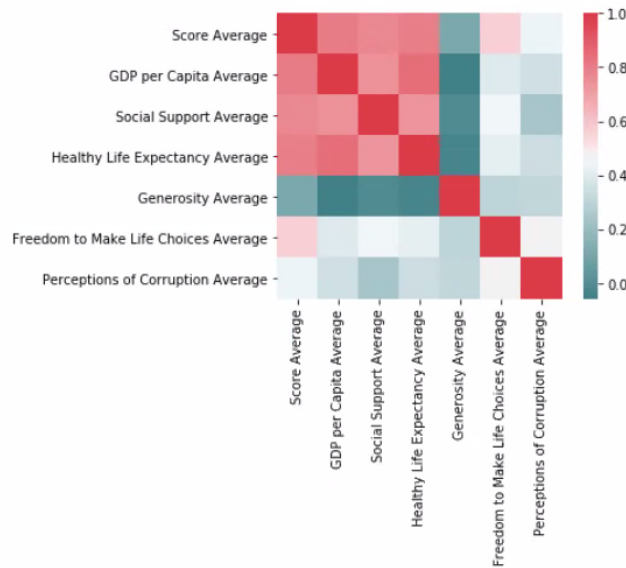
- Answer: We found that GDP had a highest correlation (at .807), Healthy Life Expectancy a close second (at 0.798), and Social Support was third (at 0.774)
- Plots: Pearson Comparison Chart (img 3.1). Other visualizations to show correlation and outliers (imgs 3.2, 3.3)

	Score Average	GDP per Capita Average	Social Support Average	Healthy Life Expectancy Average	Generosity Average	Freedom to Make Life Choices Average	Perceptions of Corruption Average
Score Average	1.000000	0.807388	0.774377	0.798818	0.112926	0.569723	0.439359
GDP per Capita Average	0.807388	1.000000	0.744840	0.848141	-0.058766	0.393532	0.352392
Social Support Average	0.774377	0.744840	1.000000	0.735922	-0.001536	0.449281	0.239814
Healthy Life Expectancy Average	0.798818	0.848141	0.735922	1.000000	-0.031951	0.412639	0.348450
Generosity Average	0.112926	-0.058766	-0.001536	-0.031951	1.000000	0.301899	0.316261
Freedom to Make Life Choices Average	0.569723	0.393532	0.449281	0.412639	0.301899	1.000000	0.461814
Perceptions of Corruption Average	0.439359	0.352392	0.239814	0.348450	0.316261	0.461814	1.000000

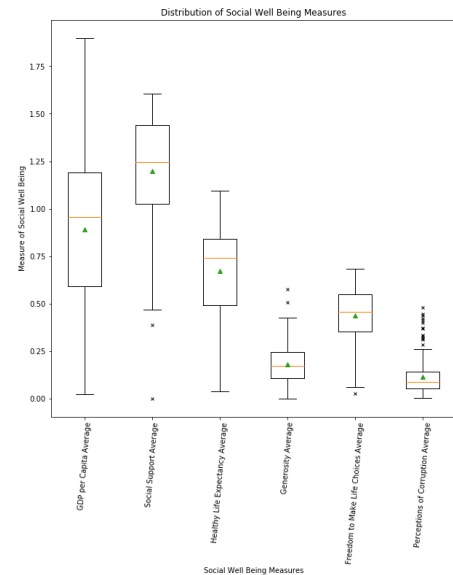
3.1

	Coefficient r	
	Positive	Negative
Strong	1 to 0.8	-0.8 to -1
Moderate	0.8 to 0.5	-0.5 to -0.8
Weak	0.5 to 0.3	-0.3 to -0.5
No Correlation	0.3 to 0	0 to -0.3

Key



3.2



3.3

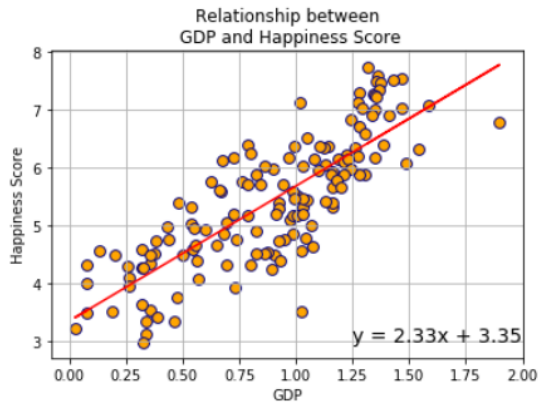
3. Which of these measures have the most influence on the happiness score?

Answer:

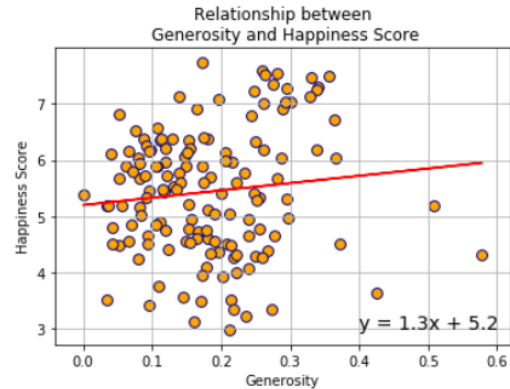
- We ran a linear regression between each SWB and Happiness. We found that GDP per capita, Social Support, Health Life Expectancy, Freedom to make Life Choice, and Perception of Corruption had a significant linear relationship with the Happiness score, except for generosity.
- We utilized a multiple linear regression model to examine influence. We found evidence to support our hypothesis. For each unit increase in the absence of corruption, the happiness score increases by 1.13% - holding all other variables constant.
- The four most influential measures of SWB are *Freedom to Make Life Choices*, *Perceived Absence of Corruption*, *Healthy Life Expectance*, *Social Support* have the most influence on the Happiness score.
- Although, one would assume that more developed nations would have a higher perceived happiness score, GDP per Capita is not as effective at predicting a higher happiness score, so less developed countries would still be considered Happier.
- Previous studies suggest that economic expansion does not lead to increased happiness at the country level (Easterlin, 1974, Shin, 1980, Rose,

2020).

- Plots: Scatterplots of SWBs linear relationship w/Happiness (4.1 and 4.2), Linear regression results of all SWBs (img 4.3), Multiple Linear Regression with Generosity Output (img 4.4), Multiple Linear Regression Output without Generosity (img 4.5).



4.1



4.2

Statistical Values	r-squared	p-value
GDP per Capita Average	0.65	0.0000
Social Support	0.60	0.0000
Healthy Life Expectancy	0.64	0.0000
Generosity	0.01	0.1778
Freedom to make Life Choices	0.32	0.0000
Perceptions of Corruption	0.12	0.0000

4.3

OLS Regression Results						
Dep. Variable:	Score Average	R-squared:	0.792			
Model:	OLS	Adj. R-squared:	0.783			
Method:	Least Squares	F-statistic:	86.82			
Date:	Tue, 21 Jul 2020	Prob (F-statistic):	3.23e-44			
Time:	21:41:13	Log-Likelihood:	-107.11			
No. Observations:	144	AIC:	228.2			
Df Residuals:	137	BIC:	249.0			
Df Model:	6					
Covariance Type:	nonrobust					
	coef	std err	t	P> t	[0.025	0.975]
const	1.8296	0.211	8.661	0.000	1.412	2.247
GDP per Capita Average	0.8945	0.230	3.893	0.000	0.440	1.349
Social Support Average	1.0368	0.243	4.272	0.000	0.557	1.517
Healthy Life Expectancy Average	1.1017	0.358	3.076	0.003	0.393	1.810
Generosity Average	0.7055	0.499	1.415	0.159	-0.281	1.692
Freedom to Make Life Choices Average	1.3344	0.387	3.446	0.001	0.569	2.100
Perceptions of Corruption Average	0.9328	0.525	1.776	0.078	-0.106	1.971
Omnibus:	10.019	Durbin-Watson:	1.787			
Prob(Omnibus):	0.007	Jarque-Bera (JB):	10.131			
Skew:	-0.575	Prob(JB):	0.00631			
Kurtosis:	3.604	Cond. No.	27.2			

Warnings:
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.

4.4

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                        OLS Regression Results
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Dep. Variable:          Score Average    R-squared:                0.789
Model:                  OLS              Adj. R-squared:           0.781
Method:                 Least Squares    F-statistic:              103.0
Date:                   Wed, 22 Jul 2020  Prob (F-statistic):      8.09e-45
Time:                   16:23:18         Log-Likelihood:           -108.16
No. Observations:       144              AIC:                      228.3
Df Residuals:           138              BIC:                      246.1
Df Model:                5
Covariance Type:        nonrobust
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                        coef      std err          t      P>|t|      [0.025      0.975]
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const                   1.9187      0.202       9.481     0.000       1.519       2.319
GDP per Capita Average   0.8543      0.229       3.734     0.000       0.402       1.307
Social Support Average   1.0440      0.244       4.286     0.000       0.562       1.526
Healthy Life Expectancy Average 1.0802      0.359       3.008     0.003       0.370       1.790
Freedom to Make Life Choices Average 1.4671      0.377       3.891     0.000       0.721       2.213
Perceptions of Corruption Average 1.1289      0.508       2.220     0.028       0.124       2.134
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Omnibus:                11.596    Durbin-Watson:           1.757
Prob(Omnibus):           0.003    Jarque-Bera (JB):        12.159
Skew:                    -0.619    Prob(JB):                 0.00229
Kurtosis:                 3.703    Cond. No.                  25.4
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