The Pursuit of Happiness

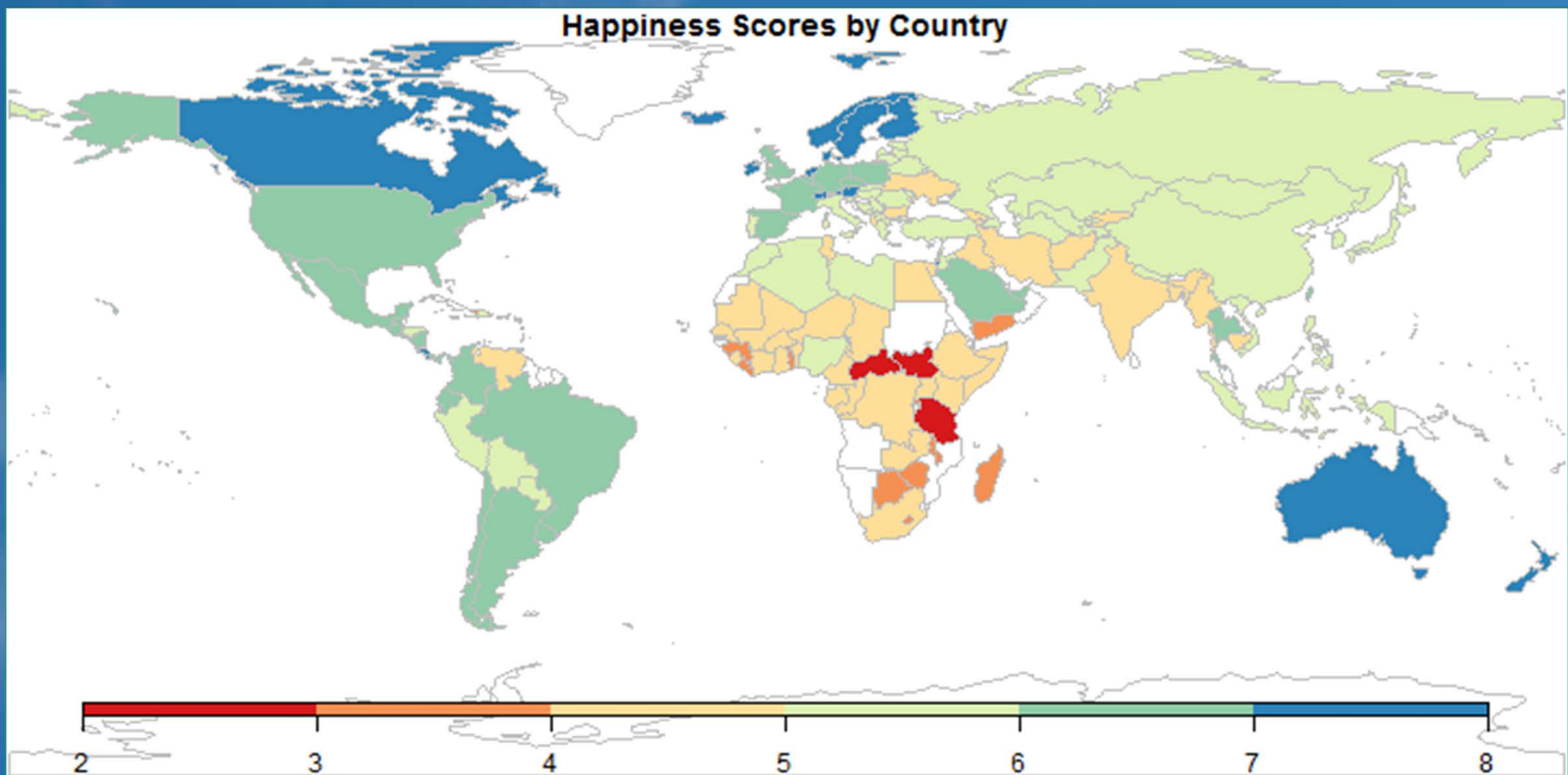
By Joshua Gorman, Luke Hardcastle, Nathan Quinn, and Yuqiu Yang

1. INTRODUCTION

In recent years happiness has overtaken measures such as GDP and life expectancy as the primary indicator of social progress, therefore policy makers throughout the world are increasingly looking for ways to improve the overall happiness of the population. Our research explores how happiness is affected by various socio- economic indicators, and how this relationship might change in different regions. These are:

- GDP per Capita – the measure of a country's economic output as a proportion of its population.
- Healthy Life Expectancy – the number of years a person is expected to live healthily for in a particular country.
- Freedom – the percentage of people satisfied with the freedom of choice in a particular country.
- Support – the percentage of people that feel as though they have someone to count on in times of trouble.
- Positive Affect – a quantitative measurement of positive factors such as laughter and enjoyment.
- Negative Affect – a quantitative measurement of some negative factors such as sadness and anger.

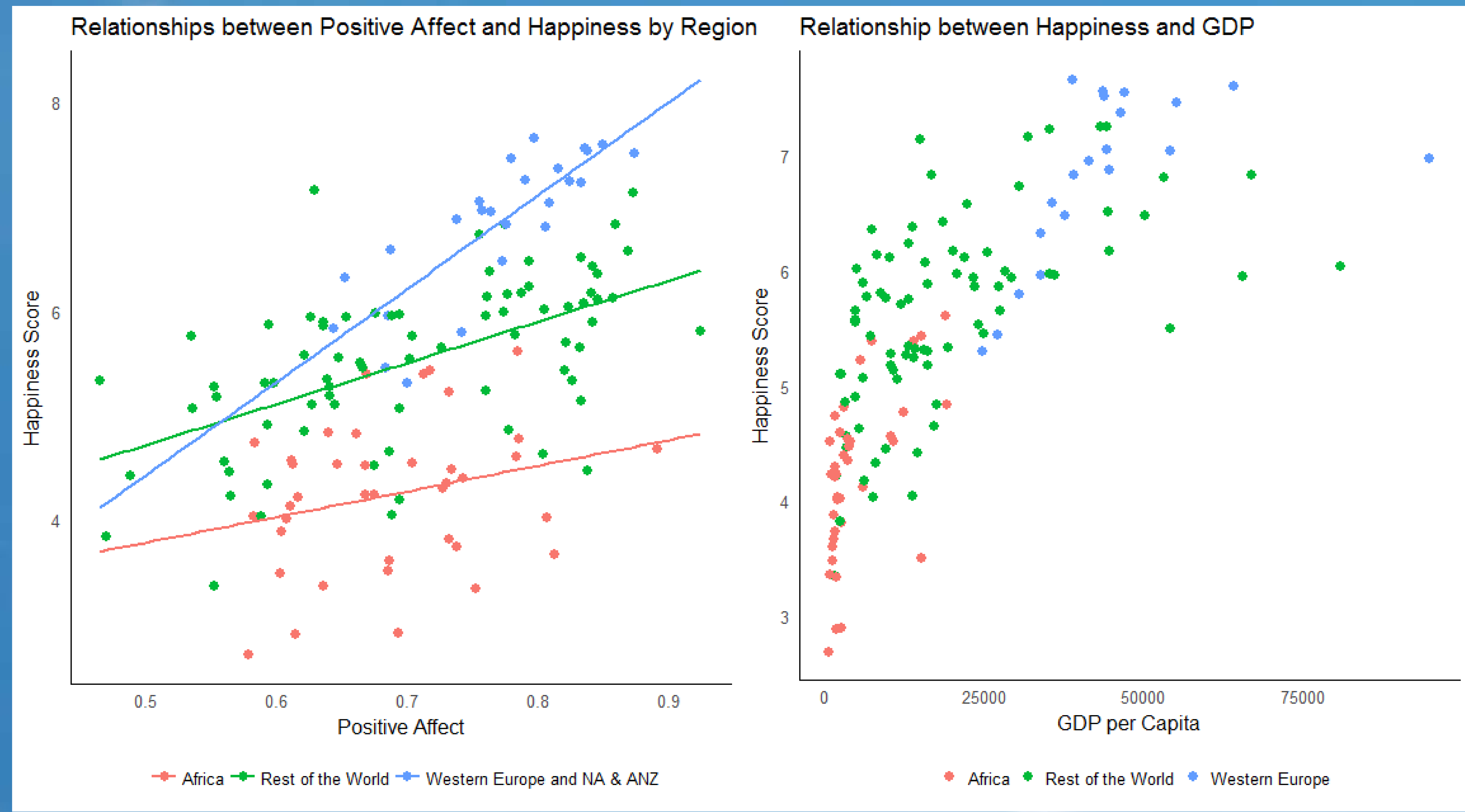
This poster has been made to summarise our analysis and illustrate what we discovered.



2. FINDINGS

We found that out of the measures we had, Support, Freedom, GDP per capita and Positive Affect were the key indicators of a nation's Happiness. Viewing the global picture , the relationships between Ladder Score and GDP per capita, Support, Healthy Life Expectancy, Freedom, Positive Affect are all positive, but the relationship with Negative Affect is negative. When we look at the regional context an increase in the GDP per capita of a country corresponds to an increase in the Happiness score, but an increase in GDP per capita in a richer country will have less effect than a similar increase on a poorer country. We also note that changes in GDP per capita effect poorer countries more intensely than richer ones. The impact of Positive Affect scores also varies by region. Positive Affect in Africa has little impact on Happiness Scores in comparison to the rest of the world, while in Western Europe, North America, Australia and New Zealand Positive Affect has a much larger impact on Happiness Scores. With this in mind our proposed model is:

$$\textit{Ladder} = -1.77529 + 0.342\log(\textit{GDP per capita}) + 2.257\textit{Support} + 0.839\textit{Freedom} + 2.201\textit{PosAffect} + 2.027 \times \mathbf{1}_{\text{Africa}} - 2.965 \times \mathbf{1}_{\text{WestEU,NA,ANZ}} - 3.597 \times \mathbf{1}_{\text{Africa}} \times \textit{PosAffect} + 4.483 \times \mathbf{1}_{\text{WestEU,NA,ANZ}} \times \text{PosAffect}$$



3. METHODOLOGY

- Using data from the world happiness report we created a regression model of happiness of countries against various socio-economic indicators.
- Missing data was filled using other sources where accurately available. The final model used 138 data points.
- Box-Tidwell tests indicated transforming GDP per capita to log(GDP per capita) would significantly improve the model. ($p=0.0000002$)
- VIF and intuition led to Life Expectancy being removed from the model as it was highly correlated with log(GDP per capita).
- Correlation and regression tests showed Positive Affect was more influential in Western Europe and not influential in Africa. We therefore introduced interaction terms to account for this in the model.
- We tested for outliers using Cooks distance and studentised residuals. Three data points were influential but we chose not to remove them from our analysis as we had no reason to believe that these values were erroneous.
- We finally ensured our model satisfies the assumptions of linear regression by using Residual against Fitted Value plots.
- We checked for independence among the residuals using boxplots of regions and comparing residuals to each indicator.
- All four key assumptions of linear regression held in the final model.

4.CONCLUSION

Our model recommends to improve Happiness, rich countries should focus on improving Freedom, Support and Positive Affect, and poor countries should focus on GDP per capita primarily and then the other measures. It also shows that for African countries Positive Affect has no impact on Happiness, but for countries in Western Europe, North American and Australia & New Zealand, Positive Affect has an increased impact on Happiness.