# Alternative Indicators of World Happiness

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## I. Introduction

My research explores a few nontraditional factors that potentially contribute towards a company's happiness ranking, as defined by the World Happiness Report. Existing literature, most prominently the UN's World Happiness Report, focus on economic indicators, healthcare metrics, and government action when investigating self-reported happiness. My project hopes to expand the view of research and try to include other factors which may come into play when talking about country-level happiness. My hypothesis is that if an added variable shows significance in predicting happiness ranking, a significance comparable to the traditional factors of GDP per Capita and Life Expectancy, then it is a significant factor that should be considered when talking about country level happiness.

## II. Literature Review

In a review of existing literature, I utilized, "*Does Climate Undermine Subjective Well-Being? A 58 nation study.*" by Ronald Fischer and Evert Van de Vliert, in order to justify the addition of Air Pollution as a variable in my model. Their study found a significant relationship between quality of climate and subjective well-being across a smaller sample of countries, and building upon that, my paper wishes to consider air pollution as a factor contributing to happiness rankings. We also utilized, "*Some Social Implications of High Density Housing,*" by Robert Edward Mitchell, in order to justify the additions of population density and percent of urban population. This study found that while urban population itself doesn't seem to create stress, congestion creates significant stress. Finally, this research derives, not only its dependent variable, happiness ranking, but also its theory and inspiration from the "*World Happiness Report, 2017"* funded by the United Nations, edited by John Helliwell, Richard Layard and Jeffery Sachs. The 2017 report considered GDP, Life Expectancy, and social satisfaction factors (trust, social support, perceived absence of government corruption, perceived freedom, and generosity).

## III. Theoretical Model

The original multivariate linear model was:

Happiness Ranking = GDP per Capita + Life Expectancy + Unemployment Rate + Fertility Rate + People per Square Kilometer + Percent Population in Cities + Air Pollution (ppm) + Electricity Access + Broadband Internet Access

The dataset has Happiness Ranking, which ranks countries from the World Happiness Index from 1 (most happy) to 155 (least happy), as its dependent variable. This is sourced from the World Happiness Report itself. All other variables (GDP per Capita, Life Expectancy, Unemployment Rate, People per Square Kilometer, Percent Urban Population and Air Pollution) are from the World Bank Data bank. After clearing out missing values, our dataset has ended with 6 independent variables, 1 dependent variable and

139 observations. A clarifying reminder: as ranking is a measure which places the happiest country at the lowest value, any factor which contributes to happiness will have a *negative* relationship with ranking, as it reduces the ranking, which effectively means a happier country.

After correcting for multicollinearity between life expectancy, percent electricity access, and fertility rate; as well as getting rid of insignificant variables (p value > .1):

Happiness Ranking = GDP per Capita + Life Expectancy + Unemployment Rate + People per Square Kilometer + Percent Population in Cities + Air Pollution.

| Variable | Measured in |
|---|---|
| GDP Per Capita | US Dollars |
| Life Expectancy | Years |
| Unemployment Rate | Percent |
| People per Square Kilometers | People |
| Percent Population in Cities | Percent |
| Air Pollution (PPM) | Micrograms Per Cubic Meter |

GDP per Capita, Unemployment Rate and Life Expectancy are included in the model to represent the major factors used by the World Happiness Report, and to be stand ins for the well-supported factors which correlate with country-level happiness.

People per square kilometer, percent population in cities, and Air Pollution are the factors we are testing for significance and influence upon happiness ranking. The first and second are supported as potential significant on a wider scale by Mitchell's paper (in prior literature section), while the third, Air Pollution, is supported as potentially significant on a wider scale by Fischer's study. In order to see their significance on a wider, near global basis, they're included in this study, compared with the other 3 factors in order to put their significance in context.

## IV. Results

| Variable | Parameter | Significance Level |
|---|---|---|
| Intercept | 274.6400 | *** |
| GDP Per Capita | -0.0005 | ** |
| Life Expectancy | -2.2960 | *** |
| Unemployment Rate | 1.4034 | ** |
| People per Square Kilometer | 0.0044 | * |
| Percent of Population in Cities | -0.6604 | *** |
| Air Pollution (PPM) | 0.1562 | ** |

This model has shown that Percent of Urban Population is highly significant, having a p-value less than .01, a similar level of significance to a factor such as Life Expectancy, and positively correlated with

happiness (as it's negatively correlated with ranking). Furthermore, Air pollution has proven itself also highly significant in predicting happiness ranking. Finally, although population density is only significant (p value < .1 but > .05), it does have a negative relationship with happiness (i.e, a positive relationship with ranking, meaning it decreases happiness), which confirms some of the conclusions of prior literature and, thus, is still kept within the final model.

## V. Conclusion

The major practical application of this research is as an imperative: when we find what makes us happy, we know what to focus on as a society, in order to create a happier, more prosperous society. By confirming and carrying forward prior literature on a global scale, this study puts more weight behind their words. Furthermore, while studies like the World Happiness Report may like to focus on things like government trust, we also find some justification into observing less subjective measures, such as infrastructure or population movement.

First, on the front of urban population percentages and population density, we affirm Mitchell's study, which stated that while having a higher percentage of a country's population being urban doesn't hinder a country's happiness ranking (it helps it, actually), a very high population density does hurt the ranking. These higher densities are suggestive of congestion or slum formation, and point towards the importance of investing in urban centers in order so they can comfortably hold a greater population capacity. This could be in the form of affordable housing, more efficient intra-city transportation, food access, or any other form.

Second, our study suggests an increase in air pollution hinders happiness, confirming Fischer's 58 country study on a 139 country basis and giving us more reason to support measures that reduce air pollution.

In further iterations of this research, I would likely try to find more climate factors, such as a measure of water pollution, desertification, or sea level. The problem with a more in-depth look into environmental degradation is this: different countries have different symptoms of environmental degradation. For example, a landlocked, arid country would most likely experience more desertification than, say, a change in sea level, as a symptom of environmental degradation. Quite frankly, climate disruption would struggle significantly as a variable applied across regions because of this. Air pollution is somewhat of an exception, as it can be measured in similar ways across the world (and perhaps, to some degree, water quality testing can also be tested just as evenly, though it may also be more reflective of the water infrastructure of a country rather than the pollutants). Regardless, more depth in our understanding of how climate disruption affects the happiness of a population would be advised.

Furthermore, I would test for infrastructure and urban infrastructure with more detail: perhaps re-introducing electricity access and getting rid of life expectancy, including railway transportation or water access or internet access. This faces a similar issue as does climate: some countries derive more value from some kinds of infrastructure as opposed to others. For example, India uses its railway system for human and good transportation a lot more than say, the United States. Regardless, a more thorough look at infrastructure and its contribution to happiness would be advised as well.