Happiness, Inequality & Mental Health Policy

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17 March 2020 | PUBPOL 542

Introduction

Background

Happiness is a feeling that comes over you when life is good. According to current studies, six key variables are found to support happiness: income; healthy life expectancy; social support; freedom; trust; and generosity. Of these six predictors of happiness, the most important is income, which at the national level is measured as the Gross Domestic Product (GDP) or economic growth. We admit that economic security drives greater contentment, and thus leads to higher happiness scores. In more developed countries, however, economic growth may not buy citizens as much gains in well-being as poor countries.

In this case, our group is assessing income in a different way—Income Inequality & Economic Inequality. We assume that if a country's economic growth is not equally distributed, it will lead to lower levels of happiness for its citizens. Moreover, a sense of fairness and trust is the cornerstone of community, and having satisfying social relationships in the community is essential to improving well-being.

Before exploring the relationship between happiness and inequality, we need to rule out some potential impacts, among which the impact our group is focusing on comes from governments' actions to improve happiness. It is well known that some countries provide mental health support in order to support their citizens, such as funding, coordination, legislation, the establishment of information systems, and the procurement and distribution of essential medicines. Given the huge influence of governmental efforts, our group decided to separate the countries with and without published mental health policies.

In general, our group's research topic is ***how inequality relates to reported happiness in countries with and without mental health programs***.

Data and Variables

<u>Happiness Score by Country</u>

- Description: The national happiness level based on respondents' rating of their own lives
- Source: 2019 United Nations World Happiness Report, using data collected by Gallup
- Data Type:
    - Numerical, from 0 to 10
    - Higher is better

- Limitation: Happiness is hard to quantify and measure, which can mean different things to different people, and across cultures. Since there is no worldwide standard for happiness, the research associated with it is considered to be less reliable.

GINI Index

- Description: The degree of inequality in the distribution of family income in a country
- Source: Central Intelligence Agency, The World Factbook
- Data Type:
    - Numerical, from 0 to 100
    - Higher indicates greater inequality
- Limitation: The data in this set span a number of years and are not standardized, with years ranging from the early 2000s to 2020, with most falling in the early-to-mid-2010s. Additional analysis should use data from the same year as the Happiness Score.

Mental Policies Summary

- Description: Whether a country is in action for mental health
- Source: 2017 World Health Organization (WHO)
- Data Type:
    - Binary, 0 or 1
    - 1 indicates the country has at least one mental policy, 0 indicates no policy
- Processing Detail: The original data lists the specific mental-health related public policies of each country. We define a new binary variable based on the summary so that we can see directly whether a country's government publishes their mental policy or not
- Limitation: Binary variable can be in only one of two categories—either yes or no—so we can only learn if a country has a related policy. However, among these policies, some are heavily invested while some are still in the planning stage. In order to better distinguish their specific impacts on the happiness score, it would be useful to suggest a ladder which can represent the scale of these policies.

Clustering Analysis

Density Based Clustering

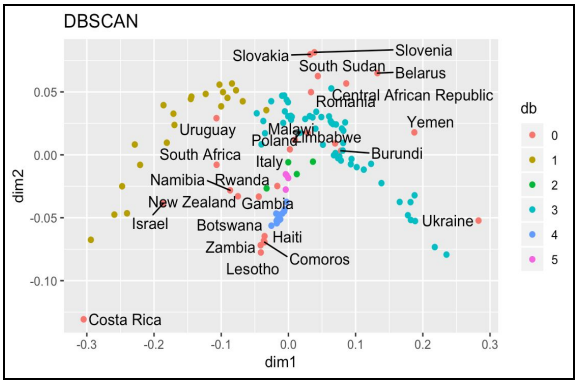
For clustering the database, we chose a density-based (DBSCAN) method for our research. Our research sample is based on the GINI Index and scores of happiness in all countries, as well as comparing those that do and do not publish their mental-health-related public policy.

The reason why we chose DBSCAN as the clustering method is to gather the country samples that have a high density of observations and mark out the outlier points, which are less dense with observations. Through dropping outlier points and exploring the clusters, we could determine the correlation between our variables of GINI Index, happiness score, and publication status of the mental-health policy on the country-level.

Clustering Findings

At the beginning of the research, we set up the similarity distance equal to 0.05, with the minimal points equal to 4 to explore the correlations among three variables on the country-level. We got 5 clusters based on different density-levels and 26 outliers with the lowest density from 121 sample countries in total. We compared the GINI coefficient variables with happiness scores and with mental health policy publication status separately.

For both of the comparisons, we placed the GINI Index on the horizontal axis to facilitate a correlation between the happiness score and the publication status of the mental health policy. The GINI Index ranges from 0 to 100, with 0 representing perfect equality and 100 representing the perfect inequality.



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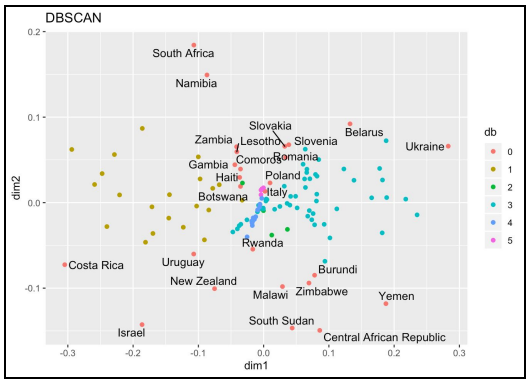

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In two DBSCAN visuals, the two higher-density clusters—Groups 4 and 5—were located in the central area of both graphs. For the GINI Index/Happiness scores graph, we could see the highest density groups are the 0.5-GINI Index countries that were among the average happiness score overall. In the GINI Index/Mental Health Publication Status graph, these two higher-density clusters within the same GINI Index are located below the zero of the vertical axis, which means in these two clusters, those 0.5 Gini coefficient countries, their governments did not publish their mental-health public policy.

The relatively lower-density groups—Groups 1, 2, and 3—are located from the higher GINI Index countries (more economic inequality) to the lower Gini Index countries (less economic inequality) separately, and all of those three clusters are situated within a similar range on the vertical axis.

[1] Based on Gini Index and Happiness Scores for all countries
[2] Based on Gini Index and the publication status of the mental-health public policy by country governments

Clustering Conclusion

Through utilizing the DBSCAN clustering method, we did not find any substantial evidence to prove that there is a direct relationship between the GINI Index, happiness scores, and the government's mental health policy publication status.

Further Clustering Analysis

In some situations, the international comparison of GINI Indices is not straight forward, because different countries might use different equivalence scales. In further research, we might narrow down our locational variables into the region-level, state-level, or city-levels that are under the same equivalence scales and determine the relationship between income inequality and happiness.

Regression Analysis

Regression Hypothesis and Reasoning

To gain insight into the relation between country-level happiness, economic inequality, and mental health, our team conducted a regression analysis using these variables. This linear regression model uses the happiness score as its dependent variable, the GINI Index as an independent variable, and the publication of mental health policy as a 0-1 indicator variable. The model analyzes these data from 121 countries.

We expected to see a relationship between lower levels of inequality and happiness, as the holding of more wealth in a smaller number of people in countries would deprive the majority of the populace the money and resources they need. However, this could be affected by some countries with low GINI Indices being lower-wealth to begin with—for example former Soviet bloc states—confounding the hypothesis. Additionally, we expected publication of mental health policy to cause an increase in happiness, as the publication would indicate a sense of attention to public health and wellbeing, as well as being an indicator of governmental transparency and openness.

Regression Results

Our regression analysis (see: Table 1 below) shows statistically significant results for the impact of the GINI Index on happiness on happiness levels ($p<0.001$), but not for the publication of mental health policy. The intercept is also statistically significant at the $p<0.001$ level. Further, the Adjusted R-squared value for the regression is 0.162, indicating that this model does not predict the happiness score very well, which we would expect given the model has two variables, only one of which is statistically significant

The model estimates a country's happiness level will be equal to 7.31 minus 0.054 times the GINI Index (which ranges from 0 to 100) plus 0.293 if the country publishes their policy plan. For context regarding the GINI Index, the lowest GINI score in the data set is 22.7 (Faroe Islands) and the highest is 63.2 (Lesotho). The United States' GINI score is 45.0, while most of the Nordic countries—which received among the highest happiness scores in the Gallup World Happiness Report—have GINI scores in the mid-20s.

Table 1: Regression Analysis Results

```
Deviance Residuals:
     Min        1Q    Median        3Q       Max
-2.17255  -0.84255  -0.07923   0.73887   2.18745

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  7.30847    0.45743  15.977  < 2e-16 ***
GINI        -0.05406    0.01088  -4.971 2.29e-06 ***
PolicyPlan1  0.29281    0.24009   1.220    0.225
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Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for gaussian family taken to be 1.096321)

    Null deviance: 156.97  on 120  degrees of freedom
Residual deviance: 129.37  on 118  degrees of freedom
AIC: 359.47
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Further Regression Analysis

Further analysis could be conducted to better explore the relationship between various economic and social indicators and happiness. Other variables to include and control for could be per capita GDP, region of the world, political system, presence of conflict or instability, life expectancy, maternal mortality rate, literacy rate, and more. However, the Happiness Score as calculated by Gallup includes a number of these variables in their analysis. Thus, we would recommend delineating these factors from the score, and use only aggregated self-reported happiness scores by country as the measure of happiness, and then utilize these variables in a regression analysis. This would help to better understand factors impacting happiness without collinearity caused by double-counting variables on each side of the regression "equation."

Additional analysis could assess the impact of these various indices and variables on happiness at the state and local levels. Gallup or another such organization could conduct happiness surveys by state, county, metropolitan area, and/or city. This analysis could follow the above suggestion, using aggregated self-reported happiness scores as the dependent variable and the economic and social measures as independent variables.

Lastly, our data were not standardized by year. Additional analysis would require utilizing data all from the same year, rather than GINI Index scores varied by year, happiness scores from 2019, and publication status of mental health programs also varied by year.