Does Economic Development Influence Suicide Rates? An Empirical Analysis

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In many countries across the world, suicide has become a major public health concern. Yet, even with this newfound awareness, researchers and scholars are still widely uncertain as to what factors play a major role in driving people to take their own lives. A variety of socioeconomic variables have been tested to try to find an answer to this puzzle, but it is not plausible for one individual to test all of them. Therefore, in this study, I asked the specific question: does economic development influence suicide rates? In response to this question I have hypothesized that an increase in economic development leads to a decrease in suicide rates in countries around the world. This hypothesis expects a statistically significant negative relationship to be apparent when tested. However, this study ultimately has found that there is no statistically significant relationship between the economic development and suicide rates of countries around the world.

CLA Journal
8 (2020)
pp. 29-40

Literature Review

In the past, suicide rates were thought to only be indicative of the proportion of a country's population that was mentally ill. Recently though, there has been an "increasing awareness that a person's health is affected not only by individual risks but also by exposure to factors in the environment that affect all those who share [the] environment" (Ferretti & Coluccia, 2009, p. S92). There has been a transition from viewing suicide as an action solely influenced by psychological factors, to incorporating much broader social and economic variables. Milner et al. (2010) state a similar thought saying, "the victim's acts which at first seem to express only his personal temperament are really the supplement and prolongation of a social condition which they express externally" (p. 20). In other words, researchers now believe that the decision for one to commit suicide could be an expression of political, societal, or economic conditions. This new perception of suicide has given a greater importance to studying suicide rates, as they can now be used as an indicator of the average citizen's quality of life in a given country.

Indeed, many researchers and scholars have recently conducted studies that tie suicide rates to a host of socioeconomic variables. Milner et al. (2010) performed a study that tested variables such as divorce rates, international migrant rates, percentage of the population over 65 years, fertility rates, and more to see their potential effect on suicide rates. Although some variables were found to be not significant, quite a few of them such as per capita health spending, unemployment, and the proportion of the population over 65 years were found to be important. In the end, Milner et al. (2010) were able to ultimately conclude that "socioeconomic factors influence suicide" (p. 26). A similar study by Ferretti and Coluccia (2009) analyzed "37 socioeconomic variables, classified in 7 ecological dimensions that describe the features of countries" and their relationship to suicide rates in European Union

countries (p. S92). Their dimensions included "population, education, health, living condition and welfare, labour market, economy and environment" (Ferretti & Coluccia, 2009, p. S92). The results indicated that variation in suicide rates are "affected by social, economic, and political features of the countries" (Ferretti & Coluccia, 2009, p. S93). Although this last study specifically used adolescent suicide rates, Jaen-Varas et al. (2019) found that higher levels of "inequality and unemployment were associated with higher rates of suicide" (p. 392). In other words, a positive relationship existed between these socioeconomic variables. Considering that such an extensive range of social and economic factors have been linked to suicide rates, it can be assumed that suicide rates are an important reflection of a country's overall quality of life.

Many of the variables used in the aforementioned studies focus in on specific part of a country's society or economy. However, just like suicide rates are a variable for measuring the overall quality of life in a country, there are variables that can measure a country's overall economic standing. Economic development is one of those variables, and it can influence suicide rates in countries around the world too. According to Blasco-Fontecilla et al. (2012), increasing economic development can lead to or be associated with "the implementation of national mental health policies and infrastructures" or "universal healthcare", which can in turn decrease suicide rates (p. 5). Conversely, "clinical services and mental health infrastructures are typically poor in low-income and middle-income countries" because they have lower levels of overall economic development (Blasco-Fontecilla, 2012, p. 5). With this, it is assumed that good economic development is a key mobilizer for countries to take preventative steps to reduce suicide rates.

Blasco-Fontecilla et al. (2012) go on to make the connection that "suicide rates drop in times of economic expansion and increase in times of recession," as that is when economic development increases and

decreases, respectively (p. 2). This is supported by Fountoulakis (2014) who states that an "economic crisis constitutes a stress factor" (p. 2). Economic crises place pressure on many individuals, which can damage their mental health and culminate in suicide. In fact, after the 2008 global recession "close to 5,000 excess suicides occurred in the year 2009 around the world" (Fountoulakis, 2014, p. 2). Similarly, Yin et al. (2016) cited that the stock market in the People's Republic of China crashed in 2007 and experienced "sharp volatility" which lead to "investment failure" shortly after (p. 3126). In the following year, there were "increased suicide rates" in China (p. 3126). A plethora of aspects and components of life rest on the economic development of a country. Therefore, changes in economic development profoundly affect the quality of people's lives, for better or for worse. Those changes "influence people's attitudes towards life" (Yin et al., 2016, p. 3120). In the best-case scenario, increasing economic development improves people's outlook on life, steering them away from suicide. On the opposite hand, deteriorating economic development can worsen people's mindset on life, persuading them to take such action.

Model Specification

For this study, the independent variable was economic development. This was defined as the improvement in a country's economy. The dependent variable of suicide rates was defined as the number of deaths deliberately performed by a person in full knowledge of the fatal outcome in a population. Economic development was measured by a country's gross domestic product per capita (GDP/C) and a country's suicide rate was measured by the number of suicide deaths per 100,000 people in the population for a given year. For this study, fifty randomly selected countries around the world made up the sample size. The year of analysis for this study was 2016. The data for both the independent

and dependent variables came from searching the data located on the World Bank website.

Numerous variables outside of a country's level of economic development could potentially affect a country's suicide rate. However, some of the ones frequently cited by researchers and scholars are unemployment rates, health issues, and education levels. These three variables will serve as the control variables for this study. Unemployment rates could increase suicide rates "because job-loss violates the regular functioning of a society" (Milner et al., 2010, p. 20). In other words, being employed is a norm in modern society, therefore unemployment may cause some to feel left behind, alienated, or anxious about their job status, resulting in more suicides. As discussed earlier, health issues like those of mental health disorders affect suicide rates. As is, "over 90% of the people who die from suicide suffer from some kind of mental illness" (Fountoulakis, 2014, p. 2). It is commonly understood that "mental patients constitute a particularly vulnerable population" when it comes to suicide, as they are much more susceptible to fall into those harmful patterns (Fountoulakis, 2014, p. 1). The last control variable, education levels, affects suicides rates in that better education leads to a higher standard of living and feeling of security. Milner et al. (2010) states that "education is related to lower suicide rates" (p. 20). All of these three control variables could affect the suicide rates in some way.

Research Design

The procedure I used to test the relationship between economic development and suicide rates was a regression analysis, also known as an ordinary least squares (OLS) or regression estimators. This is because variables measured with interval level data are best estimated using regression analysis or OLS estimators. In addition, the hypothesis attempted to find a causal relationship between economic development

and suicide, and a regression analysis best determines those relationships.

Model Estimation and Analysis

The OLS model is given by: Y= a + bX + e; where Y is the dependent variable, a is the Y-intercept, b is equal to the slope, X is the independent variable, and e is the error term.

The data analysis for this study used the SPSS module and provided the following equation of the regression line: Y= 8.326 + 0.00007577X. The t-value was equal to 1.641, the p-value was 0.107, and the R^2 was 0.053.

I had hypothesized that an increase in economic development would decrease a country's suicide rates. This would expect a negative relationship to be present between the two variables. However, the relationship ended up being positive because the slope was positive at 0.00007577. Although, upon examining the t-value and p-value, the model was determined to not be statistically significant. For positive correlations, such as the one for this study, the t-value must be greater than 2.0 in order for the model to be statistically significant. The t-value for this model was less than that at 1.641. In addition, the p-value or probability had to be less than or equal to 0.05 to hold significance. The one produced in this study was 0.107, which is considerably more.

While the model was not significant at the 0.05 level of probability, it might be worth noting that it was nearly significant at the 0.10 level. The p-value of 0.107 was just slightly above the threshold of 0.10 for determining significance at that level. This would mean that, at best, there is a statistically significant weak positive relationship between economic development and suicide rates. However, it is only truly accurate to claim that there is no statistically significant relationship between economic development and suicide rates. More specifically, the data suggests that suicide rates do not seem to be that different between poorer and richer countries.

The equation of the regression line for this study can be interpreted substantially. The Y-intercept of 8.326 suggested that for no economic development, 8.326 people per 100,000 in a population still commit suicide. Furthermore, the slope of 0.00007577 indicated that for every $1 US increase in a country's gross domestic product per capita (GDP/C), the suicide rate would increase by 0.00007577 per 100,000 people in the population. Lastly, the R^2 of 0.053 suggested the about 5.3% of the variance of difference in the suicides rates of countries around the world is explained by the variance or difference in their level of economic development.

Conclusion

In recent decades, suicide has become a commonly discussed problem. Researchers and scholars have tested a multitude of variables to try to explain the variation in suicide rates of countries around the world. This study asked the question: does economic development influence suicide rates? To address this question, I hypothesized that that an increase in economic development leads to a decrease in suicide rates in countries around the world. I had expected a negative relationship to be present. Instead, the relationship ended up being weakly positive. This weak positive relationship though, only ended up being almost weakly significant at the 0.10 level of significance. The relationship between the two variables was not statistically significant at the much more widely accepted 0.05 level of significance. Ultimately, this study found that no relationship exists between economic development and suicide rates in countries around the world.

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Country	GDP/C	Suicide Rate
Kenya	1410.53	3.2
Peru	6229.1	4.9
Uganda	608.71	9.9
Honduras	2302.2	2.9
United States	57904.2	15.3
United Kingdom	41074.17	8.9
Greece	18116.46	5
Saudi Arabia	20627.93	3.2
Canada	42279.9	12.5
Argentina	12790.24	9.2
Panama	14356.32	4.3
France	36962.22	17.7
Norway	74355.52	12.2
Denmark	54664	12.8
Russia	8745.38	31
India	1729.27	16.3
Papua New Guinea	2509.63	6
Australia	49971.13	13.2
Pakistan	1368.45	2.9
South Africa	5272.92	11.6
Cameroon	1363.4	12.2
Ghana	1931.39	5.4
Egypt	3525.02	4
Zambia	1280.58	6.1
Portugal	19978.4	14
Bahamas	31588.83	1.7
Uzbekistan	2567.8	7.4
Dominican Republic	7280.87	9.9
Cuba	8060.8	13.9

New Zealand	40026.85	12.1
Vietnam	2192.21	7.3
Cambodia	1278.63	5.3
Mongolia	3660.15	13
Japan	38794.33	18.5
Angola	3506.07	4.7
Ethiopia	717.12	7.2
Chile	13748.09	10.6
Haiti	735.3	11.7
Mexico	8739.76	5.1
Belize	4818.4	4.7
Croatia	12360.47	16.5
Lithuania	14999.48	31.9
Spain	26505.62	8.7
Italy	30936.13	8.2
Macedonia	5129.16	7.9
Yemen	1139.87	8.5
Jordan	4103.73	2.9
United Arab Emirates	38141.85	2.8
Singapore	56724.17	9.9
Malaysia	9817.74	5.5

Model Summary

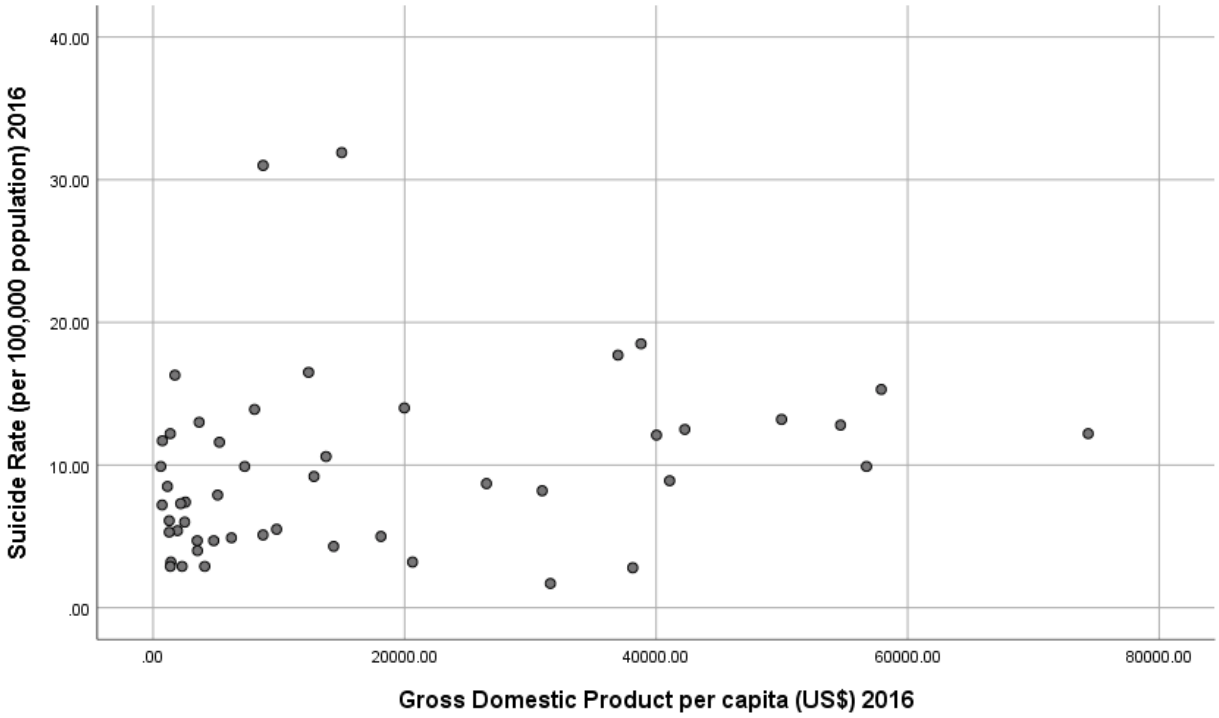
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.231[a]	.053	.033	6.17545

a. Predictors: (Constant), Gross Domestic Product per capita (US$) 2016

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	8.326	1.173		7.095	.000
	Gross Domestic Product per capita (US$) 2016	7.577E-5	.000	.231	1.641	.107

a. Dependent Variable: Suicide Rate (per 100,000 population) 2016


Suicide Rate (per 100,000 population) 2016
40.00
30.00
20.00
10.00
.00
.00
20000.00
40000.00
60000.00
80000.00
Gross Domestic Product per capita (US$) 2016