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Dark Contrasts: The Paradox of High Rates of Suicide in Happy Places

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Abstract

Suicide kills more Americans each year than die in motor accidents. Yet its causes remain poorly understood. We suggest in this paper that the level of others' happiness may be a risk factor for suicide (although one's own happiness likely protects one from suicide). Using U.S. and international data, the paper provides evidence for a paradox: the happiest places tend to have the highest suicide rates. The analysis appears to be the first published study to be able to combine rich individual-level data sets — one on life satisfaction in a newly available random sample of 1.3 million Americans and another on suicide decisions among an independent random sample of about 1 million Americans — to establish this dark-contrasts paradox in a consistent way across U.S. states. The study also replicates the finding for the Western industrialized nations. The paradox, which holds individual characteristics constant, is not an artifact of population composition or confounding factors (or of the ecological fallacy). We conclude with a discussion of the possible role of relative comparisons of utility.

1.1 **Introduction**

Human well-being and positive affect are increasingly studied in science and social science (Easterlin 2003, Layard 2005, Steptoe et al. 2005, Gilbert 2006, Graham 2008, Blanchflower and Oswald 2008a, Napier and Jost 2008, White and Dolan 2009). A claim of commentators in many countries and American states is that their areas are filled with happy and/or satisfied people. Rankings from the World Values Survey and the U.S. General Social Survey frequently appear in the press—and more scholarly outlets—where it is found that Danes, Swedes, and the Swiss are among the most satisfied people in Europe and that it may be better to reside in Alaska than in California (Christensen et al. 2006, Oswald and Wu 2010).

A little-noted puzzle is that many of these happy places have unusually high rates of suicide. While this fact has been remarked on occasionally for individual nations, especially for the case of Denmark, it has usually been attributed in an anecdotal way to idiosyncratic features of the location in question (e.g., the dark winters in Scandinavia), definitional variations in the measurement of well-being and suicide, and differences in culture and social attitudes regarding happiness and taking one's life. Most scholars have not thought of the anecdotal observation as a systematic relationship that might be robust to replication or investigation. A possible cross-country association between happiness and suicide has been mentioned, albeit in passing, in previous research examining whether survey data on subjective well-being might be used as tractable markers of population mental health (Bray and Gunnell 2006); other research has examined the spatial patterns in suicide (such as the important work of Dorling and Gunnell 2003).

This paper attempts to document the existence of a happiness-suicide paradox: 'happier' areas have a higher percentage of suicides. It uses micro data on well-being and on suicide. The latter analysis is able to avoid the so-called ecological fallacy, which is the fallacy that individual members of a group have the *average* characteristics of the group at large. First, we are able to control for each individual's differing personal characteristics. Second, we do not argue that happier individuals are more prone to take their own life; our argument is that there may be a form of psychological 'externality' at work in the decision to take one's own life. Third, we use as a key independent variable an aggregate externality characteristic that is genuinely common to citizens of a state, namely, the level of well-being of other citizens in that state. It certainly might be argued that different people within a state are—depending on which sub-area they live in—exposed to neighbors who are more or less cheery. But that will result in measurement error that can be expected to make it harder, not easier, to find statistically significant effects at the state level.

Put into everyday English, we suggest in this paper that although one's own happiness protects one from suicide (as shown in longitudinal data in Koivumaa-Honkanen, et al. 2001), the level of others' happiness is a risk factor. Personal unhappiness may be at its worst when surrounded by those who are relatively more content with their lives.

There is a precedent for such reasoning. Relative concerns are known to be important in the domain of feelings over money: people consciously or subconsciously compare their income to those of others (modern evidence is contained in, for example, Luttmer 2004). In other domains of life, including those of unemployment, obesity, and crime, similar kinds of cross-effects have been observed: Clark 2003, Clark et al. 2010, Graham 2009, Blanchflower et

al. 2009. The results of these and similar studies suggest that human beings may construct their norms by observing the behavior and outcomes of other people. As such, they will tend to judge their own position less harshly when they see other people with outcomes like themselves.

Figure 1 provides the first and simplest suggestive evidence for the paper's suicide paradox. It uses data on the industrialized Western nations. These are raw, unadjusted data on subjective well-being rankings (from the World Values Survey) and suicide rates (from the World Health Organization). Although there are variations around the average (e.g., the Netherlands), the striking association in the scatter plot is the positive association between happiness ranking and suicide rate. This gradient is the opposite of what might be expected, namely a negative association. In other work, Helliwell (2007) points out that it is possible to find a negative relationship in a much larger sample of countries. However, we suspect that some of this result may be due to differences in cultural norms (regarding, for example, suicide or suicide reporting), and socioeconomic and demographic differences. In this paper, we limit our comparisons to only Western countries or to only American states, so as to minimize variation in cultural norms; we also are able to control for major socioeconomic and demographic differences across countries (and states).

Turning back to Figure 1, the positive slope is not driven by the Scandinavian countries alone. Nations such as Iceland, Ireland, Switzerland, Canada, and the U.S. each display relatively high happiness and yet high suicide rates. Moreover, the finding is not an anomaly of the World Values survey or a result merely of raw correlations between happiness and suicide; it emerges when multiple regression equation methods are used—as is usual in the

epidemiology literature—to correct for confounding factors such as other differences across individuals. For example, if instead the estimated relative happiness values across countries, taken from another study (Blanchflower and Oswald 2008b), which employed regression-equation methods to adjust for nations' demographic characteristics, are used, the same positive relationship holds between subjective national well-being and national suicide rates (Figure 2).

The data in these scatter plots suggest the presence of a robust relationship and one that holds in countries with harsh and less harsh winters, with more and less religious influence, and with a range of cultural identities. Nevertheless, because of variation in cultures and suicide-reporting conventions, such cross-country scatter plots are only suggestive.

1.2 **The Paradox in U.S. Data**

The central contribution of this paper is to establish the happiness-suicide paradox across space within a single country, the United States. The scientific advantage of doing so is that cultural background, national institutions, language, and religion are then held approximately constant in a way that is not possible in the cross-national patterns depicted in Figures 1 and 2.

This argument should not be taken too far. The US states are not identical in cultural norms, so our test will not be a perfect one.1 But -- helped by the fact that we can control within regression equations for racial and other characteristics -- the different areas of the United States offer the potential for a more homogenous testing laboratory than a sample of nations.

1 We thank an anonymous referee for making this point.

Building on two channels of previous work, it has recently become possible to examine data on, respectively, happiness and suicide risk across the 50 U.S. states and the District of Columbia (Oswald and Wu 2010, Daly and Wilson 2009). Thus the current paper's data are drawn from (i) the Behavioral Response Factor Surveillance System, which uses individual reports of subjective well-being for 1.3 million Americans, (ii) published state suicide rates, and (iii) the National Longitudinal Mortality Study, which matches death certificate data to individual records from the U.S. Census Bureau's Current Population Surveys from 1978 through 2001. The paper uses these data to obtain average life satisfaction and average suicide risk for each of the 50 U.S. states, and repeats the form of analysis performed above on Western industrialized countries.

Spatial U.S. data allow us to address two questions related to the possible existence of a happiness—suicide paradox. First, is it real? Since the potential biases embedded in cross-country comparisons are minimized, any observed positive association is likely to be the result of a true positive correlation as opposed to a spurious outcome of omitted variables. Second, and importantly, it is possible with the paper's two large individual-level data sets, on life satisfaction and on US suicides, to check that the observed association between happiness and suicide in the United States is robust to the inclusion of controls for demographic and socioeconomic characteristics (such as marriage and joblessness) known to be correlated with happiness and suicide risk.

The analysis first examines whether there is a correlation between reported happiness and raw suicide rates. It then calculates adjusted correlations, where the adjustments are for a large set of demographic and socioeconomic controls using multivariate regressions (some of

the detailed results from the estimated equations are not given here but are available on request from the authors). The controls in these regression equations include age, race, gender, marital status, education, income, and employment/labor-force status, as well as year fixed effects to control for any changes over time. (For a discussion of the data and methods, see the section at the end of the manuscript, and the supplementary online material supplied by Oswald and Wu (2010)).

1.3 Results

Figure 3 provides a scatter plot of raw (i.e., unadjusted) suicide rates and raw 'life satisfaction' scores for the 50 U.S. states plus the District of Columbia. These unadjusted suicide rates and raw life satisfaction scores, from columns 2 and 5 of Table 1, are positively related (Pearson's correlation=0.249, p = 0.06; rank correlation=0.255, p = 0.05; see Appendix 2 for regression statistics). This state-by-state association across the geography of America is consistent with the pattern observed above for the Western industrialized nations. The states that have people who are generally more satisfied with their lives have higher suicide rates than those that have lower average levels of life satisfaction. For example, Utah is ranked number 1 in life-satisfaction, but has the 9th highest suicide rate. Meanwhile, New York is ranked 45th in life satisfaction, yet has the lowest suicide rate in the USA.

U.S. states' citizens differ in important ways (such as in the proportion of people with college degrees). A natural question is whether the happiness-suicide paradox holds when an adjustment is made for differences in population composition across space. Figure 4 does this. It plots the results of an analysis in which the average life satisfaction and suicide risk state-by-state are adjusted for differences in age, gender, race, education, income, marital status and

employment status. The Pearson correlation coefficient remains positive (correlation = 0.127, p-value > 0.1). However, this apparently lower correlation coefficient is influenced by a tiny number of suicide outliers such as the states of Alaska and New Hampshire.

An alternative correlation measure, which is less sensitive to outliers, is the Spearman rank correlation. Assessing the correlation across states between their suicide rankings and their life satisfaction rankings allows us to get a better sense of the correlation between the two while still retaining all observations, including the states that are apparent outliers. In Figure 4, which is based on columns 3 and 6 of Table 1, the rank correlation coefficient is 0.271, which is positive and statistically significant at conventional levels (p-value < 0.05). (Regression statistics are provided in Appendix 2). Hence, the paradoxical positive relationship between state life-satisfaction and state suicides that is seen in raw, unadjusted data appears to be genuine; it is not due to confounding caused by differences in population characteristics across states.

Table 1 shows more details on the data points behind these scatter plots and allows a focus on the patterns across states. The table reveals, for example, that New Jersey ranks near the bottom in adjusted life satisfaction (47^{th}) and has one of the lowest adjusted suicide risks (coincidentally, also the 47^{th} highest rate), while at the other end of the spectrum Hawaii ranks #2 in adjusted average life satisfaction and has the 5^{th} highest suicide rate in the country.

2.1 Discussion

We have found that the happiness-suicide paradox holds in data for Western nations and across the intrinsically more homogeneous setting of the U.S. states (in both raw correlations and regression-adjusted correlations). It is this latter finding that makes the existence of a

paradox empirically persuasive. To our knowledge, the cross-state finding has not been discussed in the earlier literatures on suicide or well-being.

Future research may have to examine how frequently, and in what settings, it recurs in spatial data in other countries. Such efforts will need to be especially cognizant of one pitfall for the future that we wish to highlight here. In future work, it will typically be necessary to control for individuals' personal characteristics—especially inside nations that have some small, distinct, highly disadvantaged regions. The reason is that otherwise the socio-economic disadvantage of those regions' citizens (which our calculations, like the literature, such as Agerbo et al. 2007, find to be predictors of *individual* suicide risk) will likely swamp the cross-regional pattern and thereby lead analysts using aggregated data to conclude erroneously that there is no happiness-suicide paradox.

A detailed conceptual explanation for the paradox must await future research. However, looking beyond culture and any differences in the reporting of well-being and suicide scores, one natural possible account, as implied earlier, draws on ideas about the way that human beings rely on relative comparisons (for example, within the happiness literature, in Easterlin 2003 and Stutzer 2004, and, more broadly, in Crosby 1976).

Discontented people in a happy place may feel particularly harshly treated by life. Those dark contrasts may in turn increase the risk of suicide (our results are reminiscent of the interesting finding by Platt et al 1992 that suicide rates by the unemployed seem to be higher in low-unemployment regions). If humans are subject to mood swings, the lows of life may thus be most tolerable in an environment in which other humans are unhappy. Whether such relative comparisons work by producing discord due to unmet aspirations (e.g. Daly, Wilson and

Johnson 2009), or reflect a real inability to integrate into broader society and gain access to key supports, remains to be understood.

Appendix 1:

Data and Methods

To measure state-level life satisfaction, we draw upon data collected under the auspices of the Behavioral Risk Factor Surveillance System (BRFSS). The BRFSS is a state-based system of health surveys that gathers information on risky behaviors, preventive health practices, and access to health care. The BRFSS was established in 1984 by the Centers for Disease Control and Prevention (CDC); currently data are collected monthly in all 50 states, the District of Columbia, Puerto Rico, the U.S. Virgin Islands, and Guam. The data set is meant to "identify emerging health problems, establish and track health objectives, and develop and evaluate public health policies and programs." More than 350,000 adults are interviewed each year; the BRFSS is the largest telephone health survey in the world.

We study a sample of respondents between the ages of 18 and 85 with non-missing information. The data set's annual samples provide statistically representative2(1) cross-sectional snapshots of the U.S. Information on individual life-satisfaction was collected in BRFSS for the first time in 2005. Hence there has been little published research on life-satisfaction using this data set.

In addition to questions on health behaviors, access to health care, and physical health status, the survey also contains questions about mental health and subjective well-being. We rely on one particular survey question. It provides information about how satisfied people feel about the quality of their lives. The exact wording of the BRFSS life-satisfaction question is: "In general, how satisfied are you with your life?" Here people are able to answer one of the

following: Very Satisfied, Satisfied, Dissatisfied, or Very Dissatisfied (Questionnaire line code 206).

To measure state-level suicide risk, we first obtain crude suicide rates from the report "Ranking America's Mental Health: An Analysis of Depression Across the States." We then estimate adjusted average suicide risk by state using data from the National Longitudinal Mortality Study, which is constructed by and housed at the U.S. Census Bureau. The adjusted suicide risks are the hazard ratios corresponding to the estimated coefficients on state dummy variables in a suicide Cox Proportional Hazards model which includes age, race, gender, education, income, marital status, and employment/labor-force status – the same set of controls used to adjust the life satisfaction estimates. See Daly, Wilson, and Johnson (2008) and Daly and Wilson (2009) for more details about the NLMS and the Hazards model we use here.

For the cross-country comparisons, suicide rates are taken from the WHO: http://www.who.int/mental_health/prevention/suicide_rates/en/. Country happiness coefficients are taken from Table 3 of Blanchflower and Oswald (2008b). Controls in the underlying regressions include age, gender, education, marital and employment status and age left schooling.

Appendix 2: Fitted Regression Equations Depicted in Figures 1-4

Standard errors are in parentheses

Figure 1. Unadjusted Suicide Rates vs. Happiness Rankings across Western Countries

$$[\text{SUICIDE RATE}] = 17.737 + 0.250*[\text{HAPPINESS RANK}] \text{ , } R^2 = 0.126, N = 21$$
$$(4.174) \quad (0.151)$$

Figure 2. Unadjusted Suicide Rates vs. Adjusted Happiness Scores across European Countries

$$[\text{SUICIDE RATE}] = 24.912 + 8.255*[\text{HAPPINESS SCORE COEF}] \text{ , } R^2 = 0.248, N = 15$$
$$(2.311) \quad (3.992)$$

Figure 3. Unadjusted Suicide Rates vs. Unadjusted Life Satisfaction across U.S. States

$$[\text{SUICIDE RISK RANK}] = 19.347 + 0.255*[\text{HAPPINESS SCORE RANK}] \text{ , } R^2 = 0.065, N = 51^a$$
$$(4.128) \quad (0.138)$$

Figure 4. Adjusted Suicide Risk vs. Adjusted Life Satisfaction across U.S. States

$$[\text{SUICIDE RISK RANK}] = 18.953 + 0.271*[\text{HAPPINESS SCORE RANK}], R^2 = 0.073, N = 51^a$$
$$(4.108) \quad (0.138)$$

[a] Includes District of Columbia.

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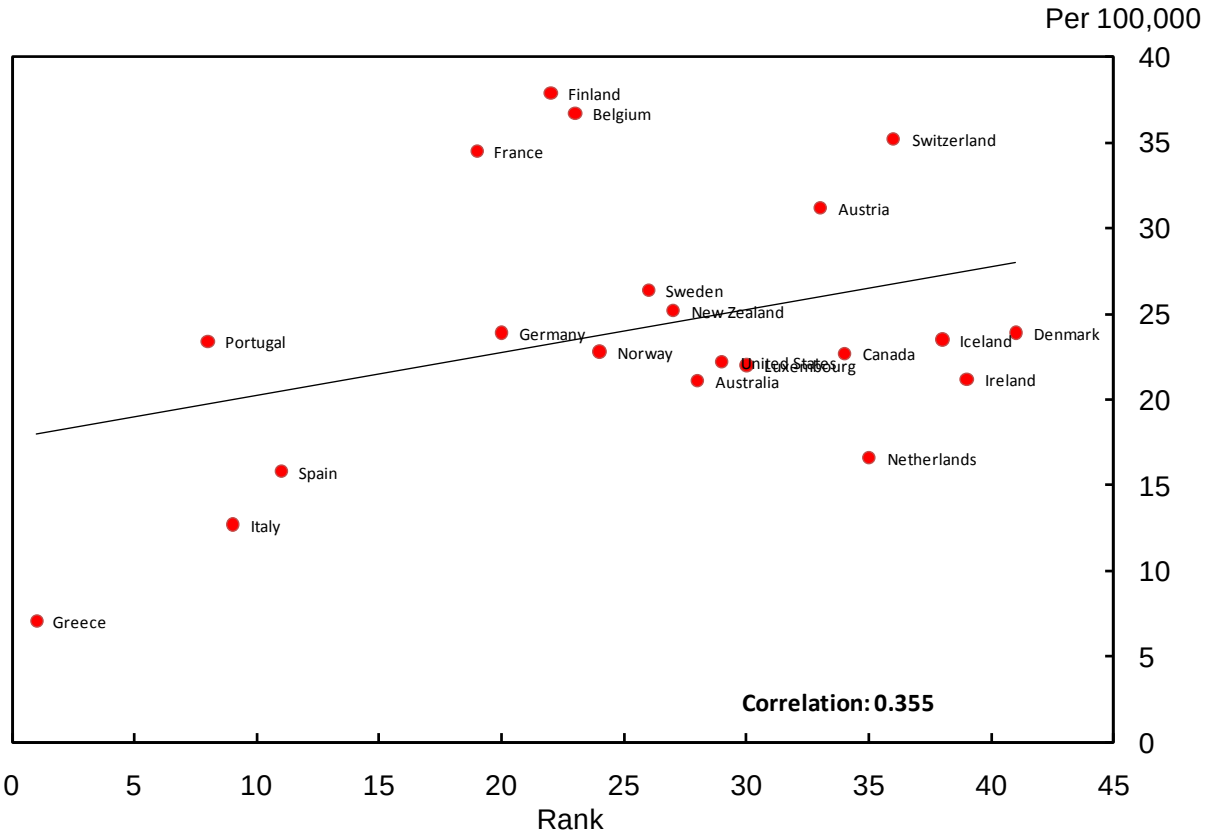
Figure 1. Unadjusted Suicide Rates vs. Happiness Rankings across Western Countries

Unadjusted Suicide Rates per 100,000 (y-axis); 2002 WVS Happiness Rankings (x-axis)



Note: The 2002 WVS Rankings were reordered from a descending level of happiness rank to an ascending ranking (higher rank = higher level of happiness).

Figure 2. Unadjusted Suicide Rates vs. Adjusted Happiness Scores across European Countries
Unadjusted Suicide Rates per 100,000 (y-axis); Happiness Score Regression Coefficients (x-axis)

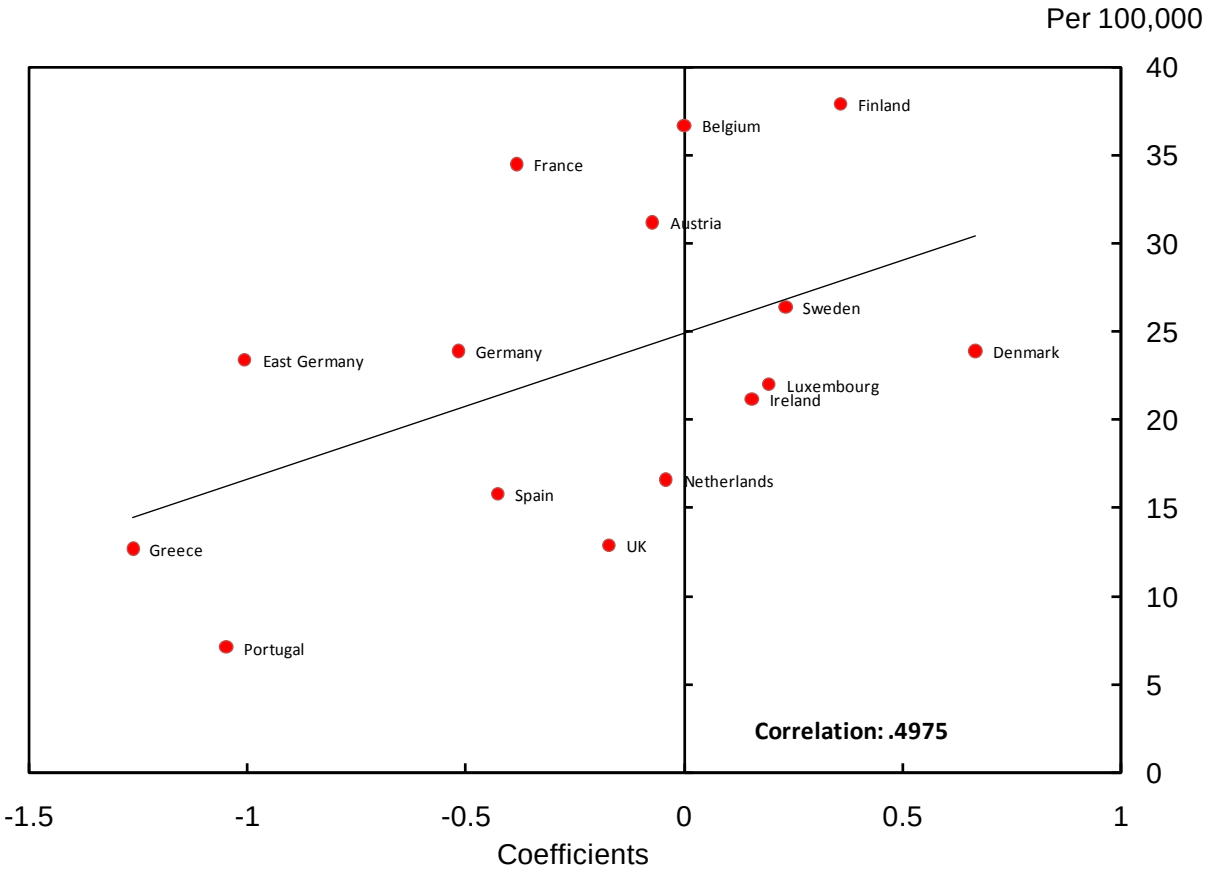


Figure 3. Unadjusted Suicide Rates vs. Unadjusted Life Satisfaction across U.S. States

Unadjusted Suicide Rates per 100,000 (y-axis); Unadjusted Life Satisfaction (x-axis)

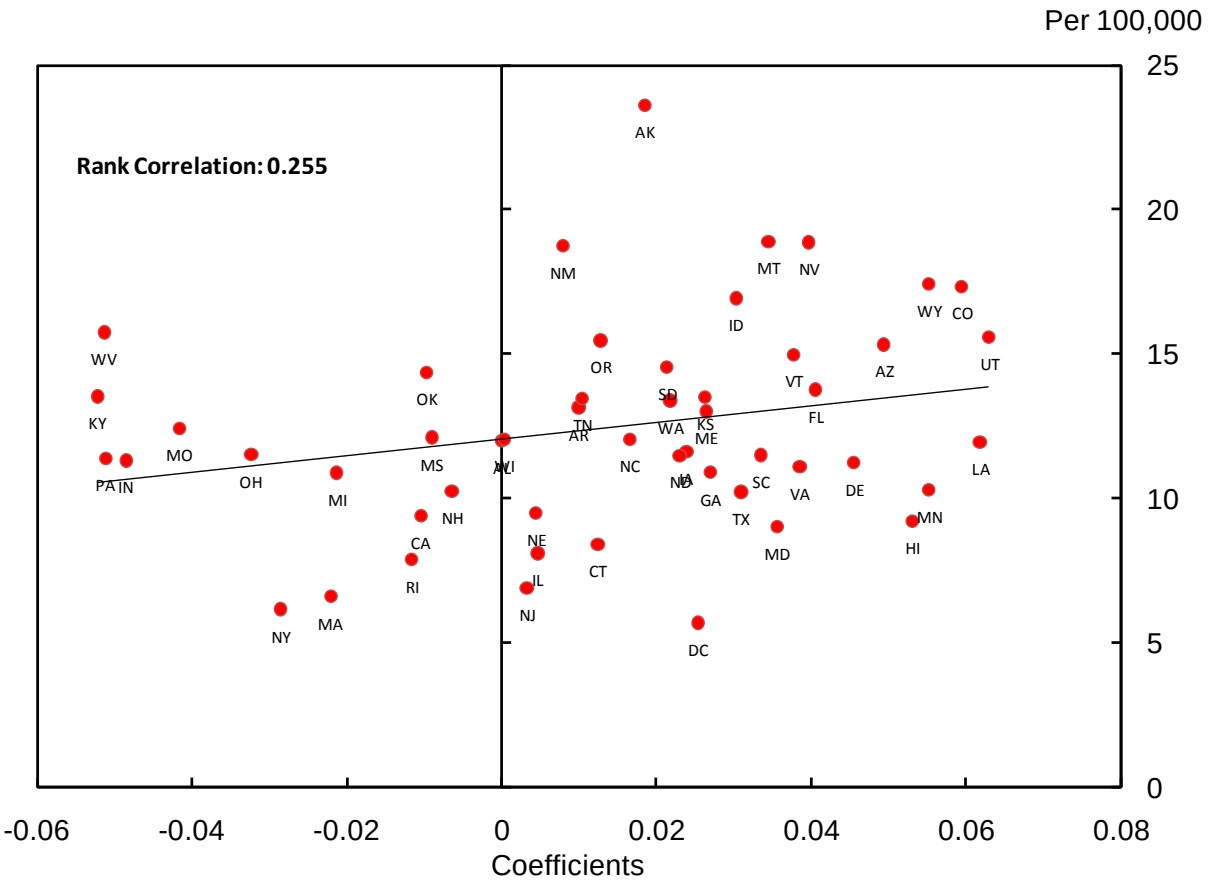


Figure 4. Adjusted Suicide Risk vs. Adjusted Life Satisfaction across U.S. States

Adjusted Suicide Hazard Ratios (y-axis); Adjusted Life Satisfaction (x-axis)

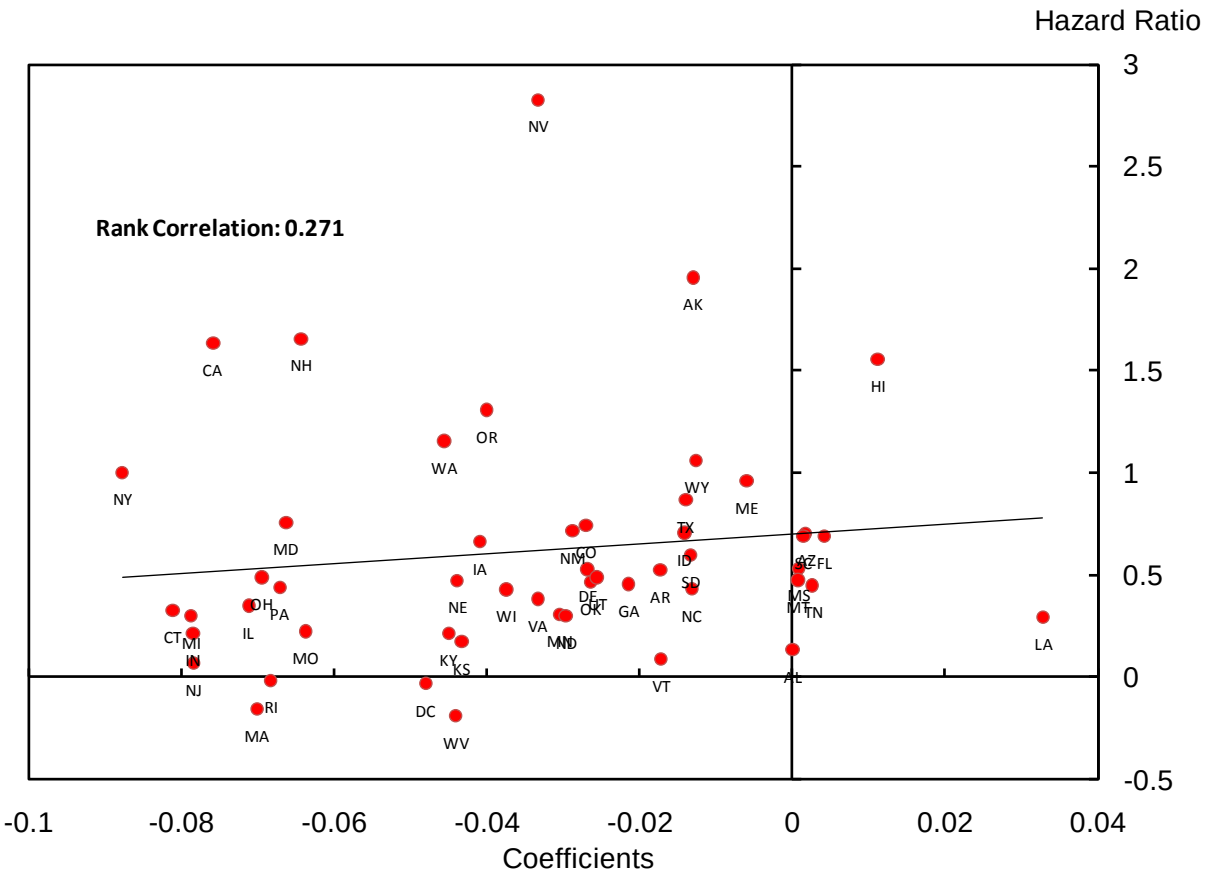


Table 1: Suicide Rates and Happiness Across U.S. States

State	Suicide Rate (Unadjusted)	Adjusted Suicide Hazard Ratio	Adjusted Suicide Rank	Raw Coefficients on Life Satisfaction	Adjusted Coefficients on Life Satisfaction	Adjusted Life Satisfaction Rank
Alabama	11.98	0.134	45	0	0	9
Alaska	23.6	1.955	2	0.0185221	-0.0130092	12
Arizona	15.32	0.702	16	0.0493716	0.0017149	5
Arkansas	13.14	0.522	23	0.0099526	-0.0173219	18
California	9.4	1.634	4	-0.010424	-0.0758851	46
Colorado	17.33	0.742	13	0.0594714	-0.0270579	23
Connecticut	8.41	0.326	36	0.0124054	-0.0811446	50
Delaware	11.22	0.527	22	0.0454979	-0.0268907	22
District of Columbia	5.69	-0.033	49	0.0253698	-0.0480357	37
Florida	13.76	0.688	18	0.0405791	0.0041158	3
Georgia	10.89	0.455	29	0.0269513	-0.0214549	19
Hawaii	9.21	1.554	5	0.0530756	0.0111783	2
Idaho	16.92	0.705	15	0.0302691	-0.0141471	16
Illinois	8.09	0.348	35	0.0046879	-0.0712013	45
Indiana	11.31	0.215	42	-0.0485675	-0.0785005	48
Iowa	11.61	0.661	19	0.0238617	-0.0408878	31
Kansas	13.51	0.172	44	0.0262973	-0.0433084	32
Kentucky	13.53	0.215	43	-0.0522251	-0.0450508	35
Louisiana	11.94	0.291	40	0.0618289	0.0328016	1
Maine	13.01	0.960	10	0.0264101	-0.0060124	10
Maryland	9	0.756	12	0.0355865	-0.0663173	40
Massachusetts	6.6	-0.155	50	-0.0220967	-0.0700712	44
Michigan	10.88	0.298	39	-0.0213069	-0.078772	49
Minnesota	10.29	0.307	37	0.0552504	-0.0304928	26
Mississippi	12.1	0.532	21	-0.0090073	0.0008344	7
Missouri	12.43	0.224	41	-0.0416866	-0.0637721	38
Montana	18.89	0.474	26	0.0344648	0.0007023	8
Nebraska	9.5	0.472	27	0.0044156	-0.0439223	33
New Hampshire	10.25	1.656	3	-0.0064468	-0.06437	39
Nevada	18.86	2.824	1	0.039696	-0.033304	28
New Jersey	6.88	0.067	47	0.0032406	-0.0784707	47
New Mexico	18.73	0.713	14	0.0079173	-0.0287865	24
New York	6.15	1.000	9	-0.0285934	-0.0877726	51
North Carolina	12.04	0.432	32	0.0165689	-0.0132164	13
North Dakota	11.48	0.300	38	0.0230207	-0.0296804	25
Ohio	11.51	0.486	25	-0.0323678	-0.0694797	43
Oklahoma	14.36	0.465	28	-0.009718	-0.026477	21
Oregon	15.46	1.307	6	0.012761	-0.0400734	30
Pennsylvania	11.39	0.438	31	-0.0511653	-0.0670964	41
Rhode Island	7.88	-0.018	48	-0.01163	-0.0683337	42
South Carolina	11.49	0.691	17	0.0335299	0.0014269	6
South Dakota	14.54	0.597	20	0.0213743	-0.0133957	14
Tennessee	13.46	0.448	30	0.010376	0.0026267	4
Texas	10.21	0.867	11	0.0309428	-0.0139671	15
Utah	15.57	0.488	24	0.0629503	-0.0256149	20
Vermont	14.98	0.086	46	0.0377624	-0.0171947	17
Virginia	11.08	0.381	34	0.038553	-0.0332978	27
Washington	13.38	1.155	7	0.0217956	-0.0456155	36
West Virginia	15.74	-0.189	51	-0.0514003	-0.0440579	34
Wisconsin	12.04	0.428	33	0.0003551	-0.0374646	29
Wyoming	17.41	1.061	8	0.0551404	-0.0126597	11
Pearson Correlation between Unadjusted Suicide Rate and Unadjusted Life Sat Coefficients						0.249
Spearman Rank Correlation between Unadjusted Suicide Risk and Unadjusted Life Sat Coefficients						0.255
Pearson Correlation between Adjusted Suicide Risk and Adjusted Life Sat Coefficients						0.127
Spearman Rank Correlation between Adjusted Suicide Risk and Adjusted Life Sat Coefficients						0.271

Notes: Crude suicide rates are taken from the report "Ranking America's Mental Health: An Analysis of Depression Across the States." Adjusted suicide risks are the hazard ratios corresponding to the estimated coefficients on state fixed effects from a Cox Proportional Hazards regression using the National Longitudinal Mortality Study data. Coefficients for dissatisfaction with life are taken from regressions using data from the Behavioral Risk Factor Surveillance System (survey years between 2005-2008). Controls for income, education, age, race, gender, and marital and employment status are included in both the NLMS and BRFSS regressions.