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Significant Predictors of Suicide Rates in the United States: A Multiple Regression Analysis

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Abstract

Inspired by Stack's (2021) research, this study investigated the influence of 19 variables on suicide rates across all 50 United States. The variables included political party, gun ownership, registered guns, religion, alcohol consumption, state safety, depression, marriage, divorce, domestic violence, race, mean elevation, and region. Regression analyses revealed that gun ownership significantly impacts suicide rates, with stricter firearm laws correlating with lower suicide rates. Other crucial contributors to suicide risk were alcohol consumption, domestic violence, marital status, divorce, mean elevation, and political party affiliation. The five most statistically significant predictor variables were gun ownership, divorce rates, percentage of White individuals, percentage of Black individuals, and mean elevation. While gun ownership, divorce rate, and mean elevation increased suicide rates, the percentage of Black and White individuals living in a state helped reduce suicide rates. The results emphasize the importance of considering multiple variables when formulating preventative strategies and policies to address this complex issue. By understanding the intricate interplay of these factors, policymakers and mental health professionals can develop targeted interventions to reduce suicide rates effectively.

Keywords: suicide, predictors, correlation, rate, multiple regression

The Most Significant Predictors of Suicide in the United States

This study was designed to identify as many variables as possible that are seen as factors affecting suicide rates in each state of the United States. Once a comprehensive list of variables was compiled, the objective of this investigation was to determine which variables or combinations of variables provided the best statistically significant equation for predicting suicide rates in the United States.

This study was influenced by the research of Stack (2021), who identified many variables that have contributed to or influenced suicide rates in the United States. Stack mentioned factors that are already common in the literature such as the availability of guns, depression, and gender; however, Stack also revealed additional variables possibly affecting suicide rates that are not so widespread throughout the literature. For instance, variables such as religion, domestic violence, divorce, and political affiliation are not frequently mentioned, but studies have shown that these factors can also impact suicide rates. The purpose of this study was to explore all variables affecting suicide rates in each state of the United States.

Another study, similar to this investigation, was recently performed by Grant et al. (2023). The focus of this study was to assess adolescent suicide using a list of seven predictor variables (Grant et al., 2023). Some of the seven variables were used in this investigation, while others were not. This study also differed in that it focused only on adolescents in Texas (Grant et al., 2023). Furthermore, this study examined suicide rates in all 50 states regardless of age.

A comprehensive review of the literature found many distinct factors associated with suicide rates in each state and the degree to which these factors were consistent across the entire United States. What the investigators did for this study was explore which of the variables included on the final list had data that was available for public use. Once it was determined that

data were available by state, the most recent data for each variable were used, even if the year of the data was not consistent for every variable.

In the end, the 19 variables used in this investigation for which data were available for each state were as follows: gun ownership, registered guns, religious percentage, alcohol consumption, rating of each state's level of safety, depression, marriage, divorce, domestic violence against women, domestic violence against men, percentage of population that was White, percentage of population that was Black, mean elevation, five regions of the country (Northeast, Southeast, West, Midwest, and Southwest), and political party. It was the purpose of this study to see the level to which each of these variables contributed to the suicide rate and to find which combination of factors best predicted suicide rates at a statistically significant level while using data at the state level as the basis for prediction.

Gun Ownership and Registered Guns

In the United States, it is legal to own a firearm. However, the process by which a person can purchase a firearm differs depending on the state. Some states have stricter gun laws than others and require gun owners to register their firearms. Obtaining and owning illegal firearms that are not registered is another issue that complicates this predictor. According to research, “results largely indicated that states with any of these laws in place exhibited lower overall suicide rates and suicide by firearms rates and that a smaller proportion of suicides in such states resulted from firearms” (Anestis et al., 2015, p. 2059). Since suicide by firearms is the leading method of suicide nationally, it seems logical that states with laws requiring a permit to purchase a handgun, mandating the registration of handguns, or necessitating a license to own a handgun would experience a reduction in the proportion of firearm-related suicides.

According to the Centers for Disease Control, more than half of all suicides in 2021 involve firearms. Unfortunately, not only are suicides by firearms the most common method, but 85% of suicide attempts with firearms end in death (Drexler, 2016).

According to the Second Amendment, Americans have the right to own a gun. However, legal or illegal access to guns increases the rate of suicide. Anestis and Houtsma (2018) reported sufficient evidence to support the fact that gun ownership and higher suicide rates by firearms are correlated, and Das et al. (2021) found increases in the permissiveness of firearm laws corresponding to a greater risk of suicide by firearms. Subsequently, there is more evidence of a positive correlation between the percentage of gun suicides and household gun ownership. These findings suggest that when states pass legislation with more restrictive firearm policies, they reduce the risk of suicide; however, this statistic is rarely mentioned in the political arena.

Alcohol Consumption

Alcohol consumption is something that many individuals partake in legally and illegally in the United States. Alcohol consumption can affect an individual's life in various ways. Some social drinkers use alcohol during social outings. There are binge drinkers who consume four or five drinks within two hours. Heavy alcohol drinkers consume eight or more drinks per week for women and 15 or more drinks per week for men (Recovery Centers of America, 2020). It has been reported in the literature that heavy drinkers place themselves at the highest risk for suicide (Recovery Centers of America, 2020).

Domestic Violence Rate

Domestic violence is committed by males and females and is defined as any form of violent or aggressive behavior within a home that typically involves the abuse of a spouse or partner. In an article by Clay (2014), the president of the American Psychological Association,

Nadine Kaslow, reiterated that more attention is often given to the act of violence than to the feelings of helplessness and hopelessness that come from it. Nevertheless, many feel that the only way to escape violence and hopelessness is to kill themselves. The connection between domestic violence and suicide is rarely discussed.

Marriage Rate

The Institute for Family Studies (IFS) is a group that supports marriage, family life, and the well-being of children through research and public education. A journalist for IFS once suggested that when it comes to the effect of marriage on suicide, marriage may be a protective factor for those at risk (Lehman, 2020). Individuals who consider themselves obligated to one another are less likely to commit suicide for several reasons, including personal, familial, and financial reasons. Research indicates that couples married or in a marital relationship are happier than those who are single or divorced (Lehman, 2020). Although there is no direct proof that this relationship reduces a person's risk of suicide, there is evidence that they are at a lower risk of suicide than those who are not in a relationship (Lehman, 2020).

Divorce Rate

Divorce is common in the 21st century; however, divorce also affects children if they are in the picture. Upshaw (2022) found that children raised in broken homes are at a greater risk of attempting suicide than those raised in families where the two parties stay together. However, divorced children are not the only ones who are at risk of suicide. Sullivan (2019) reported that, statistically, divorced couples are usually reported as being at about a 2.4% higher risk of suicide than those who are married. Kposowa (2003) reported that when it comes to a relationship between divorced men and women and suicide, divorced men are nine times more likely to die

from suicide than divorced females. This is just another piece of data that supports the impact of divorce on suicide or attempted suicide.

Mean Elevation

Each state in the United States has a different mean elevation, which is the height at which the state is above sea level. It is not a factor that is commonly associated with the risk of suicide; however, a study by the University of Utah Health (2010) reported that for every 2,000 meters, or 6,500 feet, above sea level, the risk of suicide increases by about one-third. Their research supports the theory that the lack of oxygen at higher altitudes is associated with the worsening of moods that may last for up to 90 days. In addition, the worsening of moods has been linked to the possibility of depression, another risk factor associated with suicidal thoughts and ideology. These two risk factors, individually or in combination, can increase a person's risk of suicide.

Renshaw et al. (2011) found that when higher altitudes were combined with gun ownership and population density, altitude was a significant risk factor for suicide. Even more astounding is the fact that data show a connection between altitude and the shocking effect that it can have on veteran suicides. Sabic et al. (2019) reported a statistically significant correlation between a state's mean elevation and veteran suicide rates using data from 2014. Despite the reasons and the scarce mention of elevation as a risk factor for suicide, there is evidence in the literature that altitude or elevation should be considered when compiling a list of significant predictors of suicide.

Political Party

In the United States, a two-party political organization is constructed of individuals who operate the government and influence public policy. The current primary parties in Congress are

the Democratic and Republican parties. Classen and Dunn (2010) seem to indicate that there is sufficient evidence to support the notion that political elections are negatively correlated with suicide rates. This is the exact opposite of what people would think and seems logical. The authors found in states that supported the losing candidate in the election, suicide rates declined. This is counterintuitive to what many would think. Classen and Dunn (2010) reported that “the suicide rate when a state supports the losing candidate will tend to be lower than if the state had supported the winning candidate—4.6 percent lower for males and 5.3 percent lower for females” (p. 593). They also agreed that more research is needed in the future to develop a clearer understanding of these unpredicted findings (Classen and Dunn, 2010).

In addition, Classen and Dunn (2010) showed the highest crime, divorce, and suicide rates are in states that are the most conservative. Based on the relationship between divorce and suicide, it may be that higher divorce rates in these states are prompting higher suicide rates. Regardless of the reasons, data such as this support the notion that the majority political party in the state appears to be another risk factor when it comes to identifying the factors that most affect suicide rates.

Race

Suicide affects all racial and ethnic groups. In the past, research has shown increased suicide rates for White/Caucasian individuals versus Black/African American individuals. The suicide rate has always been the highest among White males and the lowest among Black females.

Recently, the Centers for Disease Control and Prevention (CDC) (2023) has published research on the trends in suicide rates between races. Between 2018 and 2021, the CDC reported that “suicide rates significantly increased among non-Hispanic AI/AN (26%) [American Indian

and Alaska Native] and non-Hispanic Black (19.2%) people and declined by 3.9% among non-Hispanic White people” (CDC, 2023, para. 6). Graetz (2020) examined suicides in the United States in 1999 and 2017 and found that non-Hispanic Whites experienced the largest increase, but data seem to indicate that the course of these increases is changing.

Although there is much speculation as to the reasons for these increases in the non-Hispanic, AI/AN, and non-Hispanic Black populations, the fact that the rates are changing in a direction that is quite the opposite of the historical trends is worrisome. Changes in the direction of suicide by race are current, and research is lacking in this area. Therefore, it is logical that any investigation involving the most significant reasons for fluctuations in suicide rates for states in the United States includes the variable of race.

Religion

There are many different religions worldwide, especially in the United States. According to the Constitution, individuals are given the freedom to choose their religion. Not surprisingly, Cook (2014) found that religion may function as a “saving grace” when it comes to suicide. Religion may be beneficial in helping people cope better with life stressors. As a result, it may play a key role in reducing suicide rates. In many cases, the presence of religion in a person’s life can deescalate the severity of depression and assist those who are victims of substance misuse or abuse.

Life stressors, depression, and substance misuse or abuse are common threads for those contemplating suicide. However, religious involvement has been found to promote a healthier lifestyle, thus reducing the detrimental effects of these triggers of suicide. Individuals who make religion a customary practice in their lives seem to make better choices when coping with these

stressors. Cook (2014) suggested that religion and religious practices help promote positive mental health and well-being, which function as protective barriers against suicide.

Safety of State

Each state in the United States has a safety rating. Jin et al. (2016) reported how safety can help lower suicide rates within a state. All methods used to increase safety within a state also help lower suicide attempts and suicide deaths. For example, Jin et al. (2016) suggested that adding more surveillance to prisons and jails may prevent hangings. Regulating the sale of alcohol and drugs to minors is also a safety measure that can positively influence suicide rates (Jin et al., 2016). As mentioned earlier, stricter gun laws can make communities safer and less susceptible to violence, crime, and suicide.

The sense of community is a critical component of maintaining safety in states. Empirical data have suggested that adding any means of safety within a community can be extremely effective in reducing not only crime but also suicide. However, Jin et al. (2016) emphasized that for safety to be effective, community assistance is extremely necessary. When everyone in the community is on board with increasing means of safety, it can help in reducing the number of suicide attempts and deaths by suicide.

Regions

The United States is commonly divided into five different regions: Northeast, Southeast, Midwest, Southwest, and West. Research has shown that certain regions within the United States have higher suicide rates than others (Choi et al., 2017). According to Choi et al. (2017), firearm suicides are more common in regions other than the Northeast region. Data show that firearm suicides occur more often in the Western, Midwestern, and Southern regions of the United

States, which can be attributed to higher rates of firearm ownership (Choi et al, 2017). Despite these reasons, the regions of the country must be included as a risk factor for higher suicide rates.

When compared to the Northeastern United States, suicides by firearms, hanging and suffocation, and poisoning were significantly higher in the South, Midwest, and West (Choi et al, 2017). Women in the South where gun ownership is high, were 2.5 times more likely than women in the Northeast to die by firearm suicide (Choi et al., 2017). Statistics like these support theories suggesting a risk that comes with living in a certain region of the country. Despite these reasons, data confirms that suicide rates are, in fact, higher in some areas of the United States than in others.

Depression

Whenever the topic of suicide is mentioned as the cause of death, depression is often considered the number one reason a person chooses to end his/her life. Psychologically, depression is defined as a feeling of hopelessness, helplessness, and the misconception that things will never improve. Research is abundant on the topic of depression and its association with suicide, and it is not surprising that most studies conclude that higher rates of depression can account for more suicidal ideation and suicidal behavior. Schlagbaum et al. (2020) found that in the 17 states for which data was available, there was a significant association between a person's depressed mood and suicidal behavior. Gill (2018) found that among Caucasians who have been screened for depression, there is a strong relationship with suicide-related thoughts and beliefs.

The research does indicate that other factors may contribute to the level of depression experienced by a person. For example, people who are depressed have also been known to engage in more alcohol consumption, which magnifies their depression. Tobacco and drug use

are also known to accompany those who feel hopeless. Portnoff (2016) reported that those who are constantly bullied exhibit more depressive symptoms that can often lead to suicide.

Unfortunately, this trend continues even on college campuses today, where students seek primary care services. Mackenzie (2011) studied 1,622 college students who screened positive for depression and found that they engaged in suicidal ideation. Tragic experiences such as the loss of a loved one, a breakup with a longtime romantic partner, moving to environments where cultures are different, failing a licensure examination, or financial disasters such as job loss can all have a significant effect on a person's level of depression (Schlagbaum et al., 2020; Gill, 2018)). Unexpectedly, higher levels of depression led to a higher risk of suicide. These are only a few of the reasons why trying to identify the highest risk factors or predictors of suicide must include depression in the list.

In conclusion, the purpose of this study was to investigate, from a statistical standpoint, whether these variables or a combination of variables have a significant effect on suicide rates in the United States. It was an attempt to identify the factors associated with a person's decision to end his/her own life, and any information from this study that may contribute to saving just one life and making people more aware of its warning signs would make this investigation invaluable.

Method

Procedure

Two processes were used in this investigation. The first was a comprehensive literature search to accumulate a list of variables associated with suicide and suicide rates. There were no limitations on the years examined and no requirements regarding the amount of research on a specific variable. The focus area was the United States; however, any study, regardless of where

the research was performed, claimed that a strong relationship between certain variables and suicide was the decision of the researchers to either include them or exclude them from the list. All data used for these variables were from the United States. All data used in this study were obtained from public sources; therefore, the use of human subjects was not relevant to this study. There has been a large amount of research on certain variables that were selected, and it would have been impossible to include every study for every variable that made the list. The authors decided to use a condensed number of studies that demonstrated a strong relationship between each variable and suicide, to keep the purpose of the study manageable.

Once this list of variables was assembled, the second process explored the Internet for raw data. The data had to be available for every variable on the list for every state in the United States. Although not all the data found for each variable were for the same calendar year, the most recent data available for that variable by state were used for the statistical analyses. Once the search for raw data was completed, the researchers produced a dataset that contained data for 14 separate variables plus the region variable recorded as five dummy variables. Thus, resulting in a list of 19 different predictor variables associated with the suicide rate for each state in the United States. Some of the data were scale data and some categorical or nominal data, and the region was divided into five dichotomous dummy variables.

The final list of independent variables for each state was as follows:

- percentage of gun owners,
- number of registered guns,
- alcohol consumption per capita in gallons,
- rate of domestic violence against men,
- rate of domestic violence against women,

- marriage rate per 1,000 women,
- rate of divorce per 1,000 women,
- mean elevation of the state,
- majority political party in the state,
- percentage of the population that is White,
- percentage of the population that is Black,
- percentage of the population identified as highly religious,
- a safety rating for each state,
- the prevalence of depression, and
- the five regions of the country: Northeast, Southeast, Midwest, Southwest, and West.

Limitations

This study has some limitations. The diversity and reliability of the data were two factors that were difficult to control. The fact that this study used 19 different variables from 50 different states can be troublesome. It is certainly possible that not every state collects the same data in the same manner. In addition, not all years of data were consistent. Most of the data were from 2022, but the Political Party majority was as of 2020, and the percentage of the population that was depressed was from 2021. In addition, the variables used in this investigation were subject to change each year, thus affecting the reliability and generalizability of the results. Some variables are subject to change, thus introducing the possibility of various factors influencing the data over time. However, the fact that the two variables for which the data were from an earlier year was not considered a statistical aberration by researchers.

Another limitation is the use of linear multiple regression. Regression analysis considers each value for each state collectively. However, the final equation may not be practical for each state. The final five variables may not provide a perfect answer for each state because there is always a percentage error in the calculations and the predicted outcome measures using the regression equation do not always equal the actual measures. The possibility that a regression equation can predict the suicide rate in each state with a high degree of accuracy is highly unlikely, if not impossible. However, the awareness of this topic and these variables is indisputable.

The final limitation of this study stems from the fact that none of these variables can be manipulated, altered, or changed easily. What procedure is in place to lower the divorce rate in a state or to limit the number of individuals who own guns? The mean elevation of a state cannot be changed, and the ability to control the percentage of each race within a state is unconscionable.

Results

The exploratory nature of this investigation allowed researchers to perform several statistical analyses of the data. All analyses were performed using IBM SPSS Statistics, Version 29. The first analysis was a correlational analysis of all 19 variables and suicide rates. Of the 19 variables, only 10 were found to be statistically significant. Table 1 lists the variables and statistically significant correlation coefficients.

Table 1.

Coefficient of Each Variable Significantly Correlated with Suicide Rate

Variable	Correlation Coefficient ¹
Political Party	.421**

Gun Ownership	.808**
Depression	.324*
Marriage Rate	.404**
Divorce Rate	.564**
Percent White	.374**
Percent Black	-.436**
Mean Elevation	.594**
Northeast Region	-.380**
West Region	.331*

¹ Statistically significant correlations only

*p < .05 ** p < .01

Once the list of variables that were significantly correlated with the suicide rate was identified, several regression analyses were performed. In the first regression analysis, all 19 predictor variables were entered into the multiple regression, regardless of whether they were significantly correlated with the suicide rate. As shown in Table 2, the results of the regression indicated that 18 predictors (Southeast was excluded from the equation because Tolerance = .000) explained 92.4% of the variance ($R^2 = .924$, $F(18,31) = 20.819$, $p < .001$)

Table 2.

Regression Model Summary for All Variables.

Model Summary ^b					Change Statistics		
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	Sig. F Change
1	.961 ^a	.924	.879	1.9563	.924	20.819	<.001

a. Dependent Variable: SUICIDERATE2022

b. Predictors: (Constant), region=West, DivorceRate2022, RegisteredGuns2022, Alcoholconsumption2022, PoliticalParty2020, WhitePercent2022, region=Southwest, region=Midwest, DVAgainstWomen2022, DVAgainstMen2022, SafestStates2022, region=Northeast, DepressionPercent2021, MarriageRate2022, GunOwnership2022, MeanElevationFT, BlackPercent2022, ReligiousPercent2022

In Table 3, the coefficients for all predictor variables (Southeast excluded) are shown, in addition to the probability values and 95% confidence intervals. Descriptive statistics for the 19 independent variables (Southeast included) are presented in Table 4.

Table 3.

Regression Coefficients for All Predictor Variables.

Coefficients ^a							
Model	Unstandardized		Standardize		Sig.	95.0% Confidence Interval for B	
	Coefficients		d			Lower Bound	Upper Bound
	B	Std. Error	Beta	t			
1 (Constant)	18.921	13.186		1.435	.161	-7.972	45.814
PoliticalParty2020	1.428	1.054	.128	1.354	.185	-.722	3.578
GunOwnership2022	.355	.050	.831	7.052	<.001	.252	.457
RegisteredGuns2022	-4.666E-6	.000	-.137	-2.004	.054	.000	.000
ReligiousPercent2022	-.116	.076	-.220	-1.527	.137	-.270	.039
Alcoholconsumption2022	-.031	.060	-.038	-.519	.608	-.154	.092
SafestStates2022	-.073	.071	-.114	-1.029	.312	-.217	.072
DepressionPercent2021	-.096	.159	-.062	-.601	.552	-.420	.229
MarriageRate2022	-.038	.216	-.018	-.174	.863	-.479	.404
DivorceRate2022	.728	.440	.178	1.656	.108	-.169	1.625
DVAgainstWomen2022	.086	.118	.054	.733	.469	-.154	.327
DVAgainstMen2022	-.199	.104	-.145	-1.913	.065	-.411	.013
WhitePercent2022	-.120	.058	-.276	-2.054	.049	-.239	-.001
BlackPercent2022	-.189	.076	-.319	-2.482	.019	-.345	-.034
MeanElevationFT	.001	.000	.316	2.617	.014	.000	.002
region=Northeast	1.778	1.583	.123	1.124	.270	-1.450	5.006
region=Midwest	-.448	1.324	-.034	-.338	.737	-3.148	2.252
region=Southwest	-.114	1.945	-.006	-.059	.954	-4.082	3.854
region=West	-2.025	2.040	-.145	-.993	.329	-6.185	2.135

a. Dependent Variable: SUICIDERATE2022

Table 4.*Descriptive Statistics for All Independent Variables.*

Descriptive Statistics			
	Mean	Std. Deviation	N
PoliticalParty2020	1.5000	.50508	50
GunOwnership2022	44.102	13.1854	50
RegisteredGuns2022	148739.76	165087.068	50
ReligiousPercent2022	54.70	10.742	50
Alcoholconsumption2022	33.782	6.8512	50
SafestStates2022	49.8390	8.79591	50
DepressionPercent2021	21.220	3.6568	50
MarriageRate2022	49.090	2.6761	50
DivorceRate2022	11.312	1.3788	50
DVAgainstWomen2022	37.356	3.5217	50
DVAgainstMen2022	30.992	4.0885	50
WhitePercent2022	74.9572	12.94469	50
BlackPercent2022	10.5512	9.48085	50
MeanElevationFT	1779.80	1824.941	50
region=Northeast	.1800	.38809	50
region=Southeast	.3000	.46291	50
region=Midwest	.2400	.43142	50
region=Southwest	.0800	.27405	50
region=West	.2000	.40406	50

The second regression only included statistically significant independent variables from the first regression analysis. A multiple regression analysis was conducted to predict the suicide rate for each state using only five significant variables. These were the number of registered guns, the percentage of gun ownership, the percentage of the population that was White, the percentage of the population that was Black, and the mean elevation of the state. This resulted in a significant model: $F(5,44) = 61.301, p < .001, R^2 = .874$.

A final multiple regression was run using the backward processing method to predict the suicide rate from the ten variables shown in Table 1, which were significantly correlated with the suicide rate. After six iterations, only five significant independent variables remained in the

equation. The variables were the divorce rate in each state, the Black percentage of the population in the state, the mean elevation of the state, the percentage of gun ownership in the state, and the White percentage of the population in each state. This resulted in a significant model: $F(5,44) = 58.072$, $p < .001$, $R^2 = .868$. The model summary for the backward regression is shown in Table 5. Table 6 lists the coefficients and 95% confidence intervals for the five variables that were identified as the most significant predictors of suicide.

Table 5.

Model Summary of Backward Regression.

		ANOVA ^a				
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1378.336	10	137.834	30.815	<.001 ^b
	Residual	174.445	39	4.473		
	Total	1552.781	49			
2	Regression	1377.584	9	153.065	34.947	<.001 ^c
	Residual	175.197	40	4.380		
	Total	1552.781	49			
3	Regression	1374.295	8	171.787	39.461	<.001 ^d
	Residual	178.486	41	4.353		
	Total	1552.781	49			
4	Regression	1369.375	7	195.625	44.798	<.001 ^e
	Residual	183.405	42	4.367		
	Total	1552.781	49			
5	Regression	1359.094	6	226.516	50.288	<.001 ^f
	Residual	193.687	43	4.504		
	Total	1552.781	49			
6	Regression	1348.444	5	269.689	58.072	<.001 ^g
	Residual	204.337	44	4.644		
	Total	1552.781	49			

a. Dependent Variable: SUICIDERATE2022

b. Predictors: (Constant), region=West, DivorceRate2022, PoliticalParty2020, BlackPercent2022, region=Northeast, DepressionPercent2021, MarriageRate2022, MeanElevationFT, GunOwnership2022, WhitePercent2022

c. Predictors: (Constant), region=West, DivorceRate2022, PoliticalParty2020, BlackPercent2022, region=Northeast, DepressionPercent2021, MeanElevationFT, GunOwnership2022, WhitePercent2022

d. Predictors: (Constant), DivorceRate2022, PoliticalParty2020, BlackPercent2022, region=Northeast, DepressionPercent2021, MeanElevationFT, GunOwnership2022, WhitePercent2022

e. Predictors: (Constant), DivorceRate2022, BlackPercent2022, region=Northeast, DepressionPercent2021, MeanElevationFT, GunOwnership2022, WhitePercent2022

f. Predictors: (Constant), DivorceRate2022, BlackPercent2022, region=Northeast, MeanElevationFT, GunOwnership2022, WhitePercent2022

g. Predictors: (Constant), DivorceRate2022, BlackPercent2022, MeanElevationFT, GunOwnership2022, WhitePercent2022

Table 6.

Regression Coefficients for Five Most Statistically Significant Predictor Variables.

		Coefficients^a				95.0% Confidence	
		Unstandardized		Standardized		Interval for B	
		Coefficients		Coefficients			
Model		B	Std. Error	Beta	t	Sig.	Lower Bound Upper Bound
6	(Constant)	4.370	3.432		1.273	.210	-2.547 11.287
	GunOwnership2022	.310	.033	.726	9.331	<.001	.243 .377
	DivorceRate2022	.588	.279	.144	2.108	.041	.026 1.149
	WhitePercent2022	-.086	.034	-.198	-2.529	.015	-.155 -.017
	BlackPercent2022	-.219	.050	-.369	-4.375	<.001	-.320 -.118
	MeanElevationFT	.001	.000	.190	2.558	.014	.000 .001

a. Dependent Variable: SUICIDERATE2022

Discussion

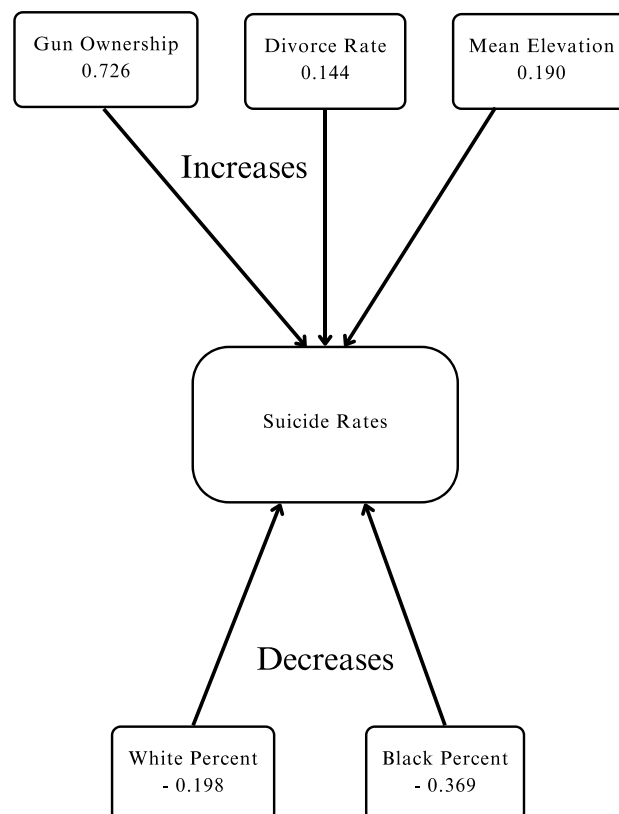
The purpose of this research was to expand on the association between 19 of the most identified variables in the psychological literature and the suicide rate in each state of the United States. Undoubtedly, all research that addresses this topic is extremely important and this investigation is in no way intended to reduce the magnitude of any element associated with

suicide. The sole purpose was to add to the existing research and heighten awareness of what may be some of the key components surrounding this unfortunate and untimely event.

This study attempted to illustrate, from a purely statistical approach, what the most significant predictors of suicide are based on recent data. It was unique in that it included data from every state in the United States and tried to prioritize or condense the variables identified in the current research that had the greatest impact on the suicide rate in each state. It strived to pinpoint the degree to which each of these elements increased or, in some cases, decreased the suicide rate in a state, and to see what variables or combinations of variables best predicted the suicide rate in each state.

Figure 1.

Standardized Beta Coefficients for Five Most Significant Predictors of Suicide



For example, a closer look at Figure 1 shows the five variables that had the greatest impact on the suicide rate for all states combined in the United States. Figure 1 shows the positive standardized beta coefficients for the percentage of the population in each state for three of the five predictors that would increase suicide rates:

- Gun Ownership: States with higher rates of gun ownership tend to have higher suicide rates. This is likely because firearms are a highly lethal means of suicide, with few surviving an attempt. Stricter gun laws within states could be the most impactful recommendation to reduce suicide rates. Future research should examine the effects of different types of gun legislation on suicide rates over time.
- Divorce Rate: The trauma and life changes associated with divorce, including feelings of loneliness, financial insecurity, and perceptions of failure, can increase suicide risk. Factors like age at marriage, cohabitation, religious differences, and access to counseling could potentially reduce divorce rates and thus suicide rates. Studies should explore the efficacy of different pre-marriage and post-divorce interventions on mental health outcomes.
- Mean Elevation: The lack of oxygen at high altitudes may impair decision-making and clear thinking. More research is needed on the physiological and psychological effects of altitude to understand this relationship. Possible mitigations for high-altitude regions could be examined.

On the other hand, percentages of Black and White residents in a state were associated with lower suicide rates, though recent data shows concerning trends in certain groups like American Indian and Alaska Native populations. Future work should investigate cultural,

socioeconomic, and systemic factors contributing to shifting racial disparities in suicide.

Targeted prevention and intervention strategies for high-risk populations are needed.

Conclusion

This study investigated the impact of 19 variables on suicide rates across all 50 U.S. states using multiple regression analyses. The five most statistically significant predictors of suicide were gun ownership, divorce rates, mean elevation, and the percentages of White and Black residents in a state. Higher gun ownership, divorce rates, and mean elevation were associated with increased suicide rates, while higher percentages of White and Black residents correlated with lower suicide rates.

The findings highlight the complex interplay of factors influencing suicide and underscore the need for a multifaceted approach to prevention. Key recommendations based on this research include:

1. Implementing comprehensive gun safety legislation, such as background checks, waiting periods, and safe storage laws, while partnering with gun owners to promote education and distribute safety devices.
2. Providing accessible, affordable mental health services and support for individuals and families going through divorce, with a focus on reducing known suicide risk factors like isolation, addiction, and financial strain.
3. Developing targeted prevention and intervention strategies for high-risk populations, such as American Indian and Alaska Native communities, that address unique cultural, socioeconomic, and historical factors.

4. Conducting further research on the physiological and psychological effects of altitude on suicide risk and implementing public health campaigns and healthcare strategies tailored to high-altitude regions.
5. Adopting a comprehensive public health approach that includes increased funding for research, universal mental health screening, training for healthcare providers and community members, public awareness campaigns, improved crisis intervention services, means restriction efforts, and postvention support.
6. Utilizing advanced statistical modeling techniques to develop predictive models for suicide risk based on multiple variables, guiding resource allocation and targeted interventions in high-risk areas.

By understanding the complex relationships between these critical factors and suicide rates, policymakers, healthcare providers, researchers, and community stakeholders can collaborate to develop evidence-based, culturally relevant prevention strategies. Ongoing evaluation and refinement of these strategies based on the latest data and research will be essential for effectively reducing suicide rates and saving lives.

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References

- Anestis, M. D., & Houtsma, C. (2018). The association between gun ownership and statewide overall suicide rates. *Suicide and Life-Threatening Behavior*, 48, 204-217.
<https://ezproxy.stevenson.edu:2082/10.1111/sltb.12346>
- Anestis, M. D., Khazem, L. R., Law, K. C., Houtsma, C., LeTard, R., Moberg, F., & Martin, R. (2015). The association between state laws regulating handgun ownership and statewide suicide rates. *American Journal of Public Health*, 105(10), 2059–2067.
<https://www.cdc.gov/suicide/facts/disparities-in-suicide.html>
- Centers for Disease Control and Prevention (CDC). (2023, May 9). *Disparities in suicide*.
<https://www.cdc.gov/suicide/facts/disparities-in-suicide.html>
- Choi, N.G., DiNitto, D.M., & Marti, C.N. (2017). Youth firearm suicide: Precipitating/risk factors and gun access. *Children & Youth Services Review*, 83, 9-16.
<https://doi:10.1016/j.childyouth.2017.10.022>
- Classen, T. J., & Dunn, R. A. (2010). The politics of hope and despair: The effect of presidential election outcomes on suicide rates. *Social Science Quarterly*, 91(3), 593–612.
<https://doi.org/10.1111/j.1540-6237.2010.00709.x>
- Clay, R. (2014). Suicide and intimate partner violence. *Monitor on Psychology*, 45(10), 30.
<https://www.apa.org/monitor/2014/11/suicide-violence>
- Cook, C. (2014). Suicide and religion. *The British Journal of Psychiatry*, 204(4), 254-255.
<https://doi:10.1192/bjp.bp.113.136069>
- Das, A., Singh, P., & Bruckner, T. (2021). Permissiveness of firearm laws, pro-gun culture, and suicides by firearm in the U.S., 2000–2016. *Public Health in Practice*, 2, 1-6.
<https://doi.org/10.1016/j.puhip.2021.100218>

Drexler, M. (2016). *Guns and suicide: The hidden toll*. Harvard Public Health Magazine.

https://www.hsph.harvard.edu/magazine/magazine_article/guns-suicide/

Gill, S. K., Muñoz, R. F., & Leykin, Y. (2018). The influence of perceived stress and depression.

Research in Political Sociology, 39(2), 137-177. [https://doi.org/10.1027/0227-](https://doi.org/10.1027/0227-5910/a000492)

[5910/a000492](https://doi.org/10.1027/0227-5910/a000492)

Graetz, N., Preston, S.H., Peele, M., Irma, T. E. (2020). Ecological factors associated with suicide mortality among non-Hispanic whites. *BMC Public Health*, 20(1339).

<https://doi.org/10.1186/s12889-020-09379-w>

Grant, M. J., Gilreath, T. D., Smith-Douglas, A., Bowring, A. & Pacheco, N. (2023). Predictors of suicide and associated factors in Texas high school adolescents, *Cogent Psychology*,

10(1), 1-11. <https://doi:10.1080/23311908.2022.2149291>

Jin, H.M., Khazem, L.R. & Anestis, M.D. (2016). Recent advances in means safety as a suicide prevention strategy. *Current Psychiatry Reports*, 18(10), 1-7.

<https://doi.org/10.1007/s11920-016-0731-0>

Kposowa, A. J. (2003). Divorce and suicide risk. *Journal of Epidemiology & Community Health*, 57(12), 993. <https://doi.org/10.1136/jech.57.12.993>

Lehman, C. F. (2020). *The role of marriage in the suicide crisis*. Institute for Family Studies.

<https://ifstudies.org/blog/the-role-of-marriage-in-the-suicide-crisis>

Mackenzie, S., Wiegel, J. R., Mundt, M., Brown, D., Saewyc, E., Heiligenstein, E., Harahan, B., & Fleming, M. (2011). Depression and suicide ideation among students accessing campus health care. *American Journal of Orthopsychiatry*, 81(1), 101–107.

<https://doi.org/10.1111/j.1939-0025.2010.01077.x>

Portnoff, L., McClintock, C., Lau, E., Choi, S., & Miller, L. (2017). Spirituality cuts in half the relative risk for depression: Findings from the United States, China, and

India. *Spirituality in Clinical Practice*, 4(1), 22-31. <https://doi:10.1037/scp0000127>

Recovery Centers of America. (2020, December 8). *Social drinking vs a drinking problem:*

What's the difference? <https://recoverycentersofamerica.com/blogs/social-drinking-vs-a-drinking-problem-whats-the-difference/>

Renshaw, P. F., Mickelson, J. B., Yurgelun-Todd, D. A., Kim, N., Haws, C. A., & Brenner, B. E.

(2011). Altitude, gun ownership, rural areas, and suicide. *American Journal of*

Psychiatry, 168(1), 49-54. <https://doi.org/10.1176/appi.ajp.2010.10020289>

Sabic, H., Kious, B., Boxer, D., Fitzgerald, C., Riley, C., Scholl, L., McGlade, E., Yurgelun-

Todd, D., Renshaw, P. F., & Kondo, D. G. (2019). Effect of altitude on veteran suicide rates. *High Altitude Medicine And Biology*, 20(2), 171-177.

<https://doi.org/10.1089%2Fham.2018.0130>

Schlagbaum, P., Ruch, D., Tissue, J., Sheftall, A. H., & Bridge, J. A. (2020). Depressed mood

prior to death: Implications for precipitating factors of youth suicide. *The Journal of*

Crisis Intervention and Suicide Prevention, 41(6), 445-452. <https://doi.org/10.1027/0227-5910/a000660>

Stack, S. (2021). Contributing factors to suicide: Political, social, cultural, and economic,

Preventive Medicine, 152(1). <https://doi.org/10.1016/j.ypmed.2021.106498>

Sullivan, G. (2019). *Divorce is a risk factor for suicide, especially for men*. Psychology Today.

<https://www.psychologytoday.com/us/blog/acquainted-the-night/201906/divorce-is-risk-factor-suicide-especially-men>

University of Utah Health. (2010). *Higher altitudes hide deadly problem: Increased risk for*

suicide. <https://healthcare.utah.edu/press-releases/2010/09/higher-altitudes-hide-deadly-problem-increased-risk-suicide>

Upshaw, L. (2022). *Children of divorce at higher risk for suicide: 7 vital tips for parents*.

Connatser Family Law. <https://www.connatserfamilylaw.com/blog/2022/july/children-of-divorce-at-higher-risk-for-suicide-7/>

Violence Policy Center. (2021). *States with lower gun ownership and strong gun laws have*

lowest suicide rates. <https://vpc.org/press/states-with-lower-gun-ownership-and-stronger-gun-laws-have-lowest-suicide-rates-3/>