DISSERTATION

SUICIDE MORTALITY, ECONOMICS AND SUBGROUP SEGREGATION

Submitted by

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ABSTRACT

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In the United States, suicide is typically theorized as an individual act, and as symptom of a mental disorder. However, evidence shows that those who die of suicide (e.g., by sex, race) varies depending on cultural, social and economic factors. Research on the contexts of suicide has been marked by several limitations, including a tendency to analyze social and economic factors separately, and also a disregard for the combined role of sex and ethnicity in the relationship between social and economic factors and suicide. This study compares current statistics with past research and offers a different methodology in the estimation and model construction of the socioeconomic determinants of suicide. By examining the association between social and economic indicators and suicide among African[1] descent men and women, as compared to European descent men and women in the United States, this study isolates the impact of business cycle fluctuations (as indicated by the unemployment rate) on socioeconomic flows in marital, educational and age groups.

The first chapter compares previous research on suicide mortality conducted in Ruhm, (2000) over business cycles by exploiting socioeconomic data from 2005-2012. Using detailed suicide mortality data, I observe that previous trends in state level suicide determination via the unemployment rate, hold over this time period. My research also expands upon Ruhm (2000) by accounting for race and gender specific socioeconomic means and suicide rates, I determine that

[1] The race references of "African decent" and "European decent" will be proxied throughout the paper by the terms "black" and "white" (respectively). These terms may be used interchangeably thought the paper.

the strong correlation between the unemployment rate and the suicide rate, only holds for whites, in particular white males. The association is insignificant for every other demographic at the state level. I also estimated the association at the county level. In a comparison of the regions, county level aggregates found significance for each subgroup. A significant and negative association was found for blacks and significant and positive for whites. These results suggest that the detrimental effects of unemployment (alone) only affects whites, although the mechanism that increases suicide for blacks could be through other socioeconomic variables that are themselves impacted by the unemployment rate. The findings imply that the modeling technique used in previous research is not sufficient to obtain the appropriate results for every demographic subgroup or subregion.

The second chapter studies the impact of socioeconomic status variables such as marital status, educational attainment, income level and inequality on the suicide count as well as regional controls on gun ownership and level of unemployment insurance. This section employs a zero-inflated negative binomial model, with modification for panel data. Results indicated that unemployment was significantly positive only for white males. Marriage has a significant and negative impact on every demographic subgroup with the exception of black females. The impact of inequality on black males and females was much more positive and significant by magnitude than that for white males and females. These findings suggest inequality as a significant factor on suicide during economic downturns, especially for blacks. Furthermore, these results suggest that business cycle fluctuations impact the black suicide rate through inequality thus, not through unemployment directly.

The third chapter addresses economic frustration as a reason for the notable increase in suicide rates, particularly amongst poor whites. It is argued that the externalization of economic

frustration by poor whites once led to homicide of blacks. Through changing social norms and penal consequences current economic and social frustration is internalized and leads to increased morbidity and suicide mortality in whites. I refer to the past perspective of one of the most influential black leaders, W.E.B. Dubois. I also provide a history of economic violence and analyze current phenomena using the philosophies of Dubois and add further evidence of the current state of affairs offered by Jonathan Metzl.

Together these chapters suggest an alternative reasoning for increased suicide mortality in the U.S. As demonstrated, the current etiology does not universally account for the socioeconomic determinants of suicide mortality in the United States by subgroup or subregion. Furthermore, there has been s substantial disregard for the cultural changes in America that may account for rising suicide mortality in America, such as racial/ethnic saturation and the internalization of economic frustration in economic analysis.

ACKNOWLEDGEMENTS

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Lastly, I want to thank all of the people who were and are subject to unjust treatment in this country for making this possible. They have paid the price of civil equality with their pain

and their lives. Their sacrifices (and continued struggle) force progress toward a more equal society.

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INTRODUCTORY CHAPTER

Between the years of 1999 – 2014, the national suicide rate in the United States increased by 24%. In that same period, the United states has engaged in two wars, eight military interventions[2], and been through two recessions, including the Great Recession, which was one of the deepest and slowest recovering in U.S. history. When considering socioeconomic changes for different demographic subgroups, the relation of suicide mortality to business cycles is not uniform across the United States. The efficacy of prevention efforts requires consideration of the impact of socioeconomic status on different demographic subgroups and subregions.

Short-run oscillations in the unemployment rate have been used to determine the socioeconomic impact of recessions since Ogburn and Thomas (1922). As they understood and stipulated, the connections between the business cycle and social outcomes are most likely not direct, in fact, the short run oscillatory changes that occur are best described through the variation of socioeconomic determinants over the business cycle. The flows of factors such as marital status, educational attainment and inequality capture the impact of economic correlates to suicide mortality.

Racial disparities in suicide rates subvert the purely economic argument that relates fluctuations in unemployment rates to suicide outcomes. Unemployment rates are highest in the black community, yet suicide rates are the lowest of every racial category. The opposite is true for whites. Furthermore, females have a lower suicide rate than males for every racial category in the U.S. Analysis of regional suicide rates without consideration for differences in racial and

[2] To this date, the U.S. is still in one war and five military entanglements.

gender demographics leads to result estimates that are not indicative of the individual experiences of a diverse population.

The objective of this research is to isolate the socioeconomic differences of four subgroup populations (black females, black males, white females and white males) to capture the unique demographic contributors of suicide mortality in the United States. This research exploits a classified mortality dataset from 2005-2012, at the state and county regional levels to offer an insight into rising suicide rates in the United States. I have demonstrated that statewide suicide mortality estimation results correspond to previous literature (Ruhm, 2000) when subgroup populations are not considered. Further analysis determined that unemployment directly impacts suicide mortality for only the white male subgroup, with insignificant positive associations for the other three. Inequality is a large determinant in suicide mortality for blacks, and the argument is made that relative deprivation compounds the psychological impact of economic downturns.

This paper concludes with a qualitative argument for the persistent increase in white suicide mortality as the result of the internalization of economic frustration and racial resentment. Examination of past and current literature buttress the theory diminishing white privilege is also a determinant of suicide mortality.

This paper has implications for future suicide prevention efforts and suggests the consideration of different socioeconomic groups as being higher risk, therefore justifying different allocation of resources. For instance, in areas with higher averages in the single marital status subgroup, the prevalence of support groups should increase. Also, a more concerted effort can be made to support individuals wanting to increase their level of educational attainment (at a state and federal level), especially during economic downturns.

INTRODUCTORY CHAPTER REFERENCES

Ogburn, William F., and Dorothy S. Thomas. "The Influence of the Business Cycle on Certain Social Conditions." *Journal of the American Statistical Association*, vol. 18, no. 139, 1922, pp. 324–340., doi:10.1080/01621459.1922.10502475.

Ruhm, C. J. "Are Recessions Good for Your Health?" *The Quarterly Journal of Economics*, vol. 115, no. 2, 2000, pp. 617–650., doi:10.1162/003355300554872.

CHAPTER 1: SUICIDE MORTALITY OVER THE BUSINESS CYCLE: A DEMOGRAPHIC CONSIDERATION

1.1 Introduction

In recent decades there has been a concentrated interest in the field of health economics, in determining the relationship between short-term economic fluctuations and mortality rates (Brenner 1971, 1973, 1979; Ruhm 2000, 2004, 2005). Trends in mortality rates over economic downturns have yielded mixed results that have largely been dependent upon the method and time frame of analysis. Earlier studies conducted by Brenner (1971;1973;1979), for example, have determined a procyclical cyclical relationship between unemployment and causes of death such as cardiovascular disease (1971), infant mortality (1973), and suicide (1979)[3]. Conventional economic theory predicts that individual mortality rates increase with a decrease in income (Marmot, 2002), as a result of decreased access to healthcare resources (Oliver and Mossialos, 2004). Recent studies have indicated that short-run economic downturns may temporarily decrease mortality rates. Christopher Ruhm (2000, 2004, 2005) has determined that economic downturns do negatively impact total mortality rates as well as individual health either internally (via reductions in heart disease mortality, flu/pneumonia, etc.) or externally (via reductions in car accident fatalities).

Suicide rates over business cycles[4] have demonstrated a procyclical pattern between unemployment and recessions in the U.S. (Luo et al., 2011). Figure 1.1 illustrates the

[3] In this paper it is suggested (but not explicitly stated) that the reason suicide rates are countercyclical but lagged one year with unemployment increasing, could be due to the psychological pressure (that increases with time) required to make the decision to die by suicide.

[4] In some instances, I will use the term "business cycle" which refers to fluctuations in real gross domestic product (GDP). A countercyclical movement of the suicide rate with the business cycle indicates that decreases in real GDP coincide with increases in the suicide rate. In other sections I will refer directly to the unemployment rate. A

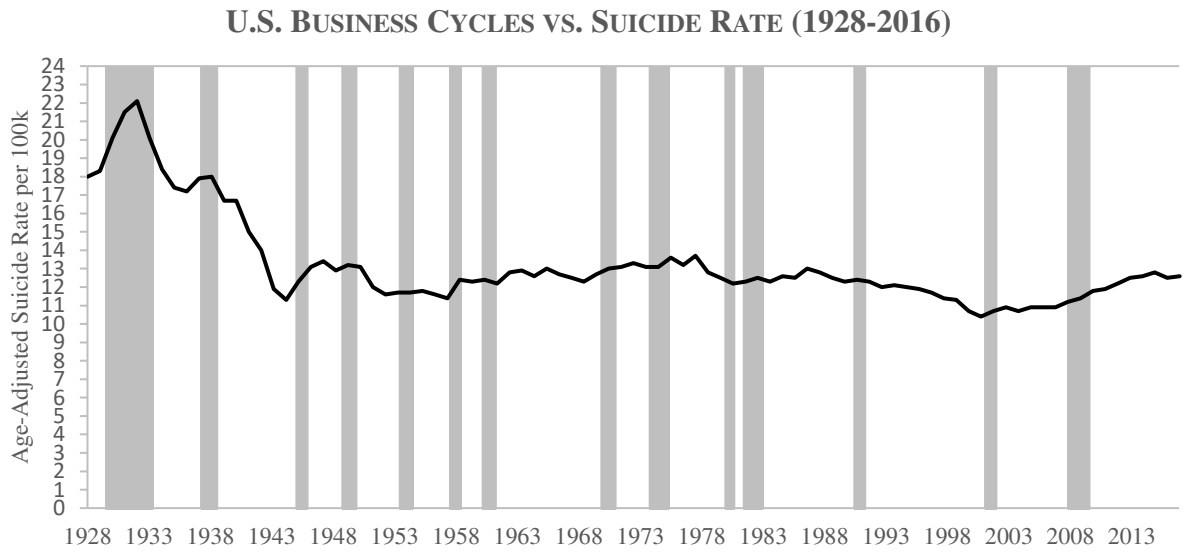

FIGURE 1.1: NATIONAL SUICIDE RATE OVER RECESSIONS IN THE U.S. (1928-2016).

trend of suicide rates from 1929-2006. As depicted, the suicide rate increases at times of economic downturns for almost every recession[5]. During the Great Depression, national annual unemployment hit a record high of 22.9% in the year 1932, across all races, ages and genders. Mortality statistics indicate that of the top six causes of death, suicide was the only one to exhibit a procyclical pattern that peaked with unemployment in the most recessionary years (Granados and Roux, 2009). Suicide also exhibits a countercyclical pattern with the business cycle in other major recessions as well. For instance, the recessions linked to the 1973 oil Crisis, the 1979 oil crisis and the disinflation recession of 1980-1982 (Pritchard, 1989) all have demonstrated the same countercyclical pattern between suicide and the business cycle. Though the magnitudes were different, suicides and unemployment demonstrated a positive relationship through each recessionary period.

procyclical relationship with the unemployment rate is analogous to a countercyclical relationship to the business cycle (since a priori, unemployment and real GDP have a negative relationship) .

[5] At some point of the recession an increase in suicide mortality occurs, albeit not every recession demonstrated an increase throughout the entire recessionary period (or at all).

The Great Recession was the longest period of economic downturn since the Great Depression (NBER, 2010). The recession lasted for a period of 18 months encompassing the period from December 2007 to June 2009. The severity of this recession is seen to be indicated by the slow recovery that ensued even after the recession had officially ended. Nationally, real GDP fell by 4.3% and unemployment rose to a high of 9.5% during the recession and 10% shortly after (October 2009).

Specifically, suicide mortality has demonstrated asymmetries over the business cycle that has warranted international interest. Granados (2005) found that from 1980-1997, suicides in Spain demonstrated a countercyclical pattern for females (weakly) and males (strongly). Neumayer (2004) discovered that most mortality rates (including suicide) showed a decrease over economic downturns from 1972-1991 in Germany. Brenner (1979) applied the countercyclical theory most predominant in the U.S., to economic activity in England and Wales from 1936-1976 and found that there was indeed a negative correlation between unemployment and suicide but lagged one year. These differences in results can be attributed to downturn severity, cultural, demographic, or even methodological differences, but the similarity between all of the studies is they fail to address differences in business cycle mortality between race and gender subgroup populations and smaller regions concurrently.

In recent years, suicide has consistently been one of the top 10 causes of mortality in the United States (CDC, 2018). Increasing suicide incidence has come to the forefront as an international health priority. With the most recent high-profile suicide cases (Robin Williams, Kate Spade and Anthony Bourdain)[6], black adolescent suicide rate increases and increases

[6] "High-Profile Celebrity Suicides Leave Media Examining Coverage." *CBS News*, CBS Interactive, 13 June 2018, www.cbsnews.com/news/kate-spade-anthony-bourdain-suicide-media-examines-reporting/.

amongst white middle-aged men, greater attention is being given to the phenomenon. National suicide rates were previously in decline from 1986-1998 and have since been in steady incline from 1999-2016 (Hedgegarrd, 2018). According to the National Institute of Mental Health, 44,965 people died by suicide in the United States in the year 2016, more than doubling the homicide incidence of 19,362 in that same year (NIMH, 2019). Also, in the year 2016, suicide rates increased in every state with the exception of Nevada[7]. These increases in suicide rates in America are sparking a larger debate on the origin of suicide mortality and possible preventive measures.

What can be considered an epidemic by magnitude, has a disproportionate effect on different demographics within society, namely race and gender. With regard to gender in particular, it has been noted that failure to control for gender differences or combining males and females in the same model could produce results that are misleading (Kposowa, 2000). Although African Americans have a lower suicide rate than other ethnic groups, gender differences within the African American race are similar to those of other ethnicities with higher completed suicide rates (Willis et al., 2002). Gender differences in suicide have been attributed to differences in causal and preventive factors, as well as misclassification of deaths. In western societies, differences in suicide rates have been attributed to socially constructed ideas of masculinity and femininity (Payne et al., 2008). For men, these include conceptions of masculinity, social isolation and poor mental health treatment (Appleby, 2000). The degradation of "hegemonic masculinity"[8] has left some men exhibiting masculine norms in other ways, such as violence

[7] According to Misty Vaughan Allen, a coordinator at the Nevada Department of Health and Human Services, the reduction in suicides is the result of a coordinated effort with the Nevada Coalition for Suicide Prevention. Perez, Maria. "Why Are Suicide Rates Rising Everywhere in the U.S. except Nevada?" *Newsweek*, Newsweek, 9 June 2018, www.newsweek.com/suicide-suicide-rate-nevada-nevada-department-health-and-human-services-967577.
[8] Hegemonic masculinity is defined as "The mythology of gender dominant within cultural representations of males, reflecting normative behavioral ideals for males in a culture in a particular period (regardless of the actual

which increases the risk for suicide ideation (Genuchi, 2018). Female causes tend to be more rooted in psychosocial disorders, and preventive factors include changes in gender roles and the presence of young children (Möller-Leimkühler, 2003; Hawton, 2000). Previous studies have shown that in most industrialized Western countries, males have a higher rate of completed suicides whereas females have a higher rate of attempted suicides (Lester, 1992; Canetto and Sakinofsky, 1998; Spicer and Miller, 2000; Möller-Leimkühler, 2002). This phenomenon is what is known as the "gender paradox in suicide" and is one of the leading topics in explaining the causal differences between male and female suicide rates. Many studies have concluded that suicide ideation in males and females differs in the method of deliberate self-harm. Males tend to choose a more violent means of self-harm, which reflects a greater suicidal intent (e.g. use of firearms, jumping, hanging, etc.). Females are most likely to convey some sort of distress or to modify the behavior of others (Hawton, 2000), and therefore choose methods that are less intrusive (e.g. poisoning, cutting, etc.).

Racial differences in suicide mortality are particularly apparent when comparing African and European Americans. Differences in how each racial group perceives suicide is based upon differences in cultural factors. For example, kinship and the prevalence of the extended family structure amongst most African American communities (especially in the south), has been cited as being one of the biggest protective barriers against adverse situations (i.e. economic, emotional and social hardship) (Gibbs, 1997; Willis et al., 2003). Social isolation has been identified as being the greatest causal factor amongst African Americans (Stack, 2000; Willis et al., 2003). Also, amongst African Americans, a strong family unit and religiosity are imperative

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prevalence of such behavior in that society)." "Hegemonic Masculinity - Oxford Reference." *Hegemonic Masculinity - Oxford Reference*, 3 Nov. 2019, www.oxfordreference.com/view/10.1093/oi/authority.20110803095928286.

to maintaining social support and mental health (Compton et al., 2005). Recurrent work on the study of ethnicity and suicide between African and European Americans finds that despite being systematically disenfranchised, African Americans have the lowest suicide rate of any ethnicity in the United States (Gibbs, 1997; Stack, 1998)).

In this study, I follow the methodology used by Ruhm (2000), but over the period of 2005-2012. Ruhm (2000) used a dataset of all individuals in a national study of mortality statistics from 1972-1991. He compared the state unemployment trend to the top 10 leading causes of mortality in the United States. Of his findings were that eight of the top ten causes were negatively and significantly related to the unemployment rate. Suicide was the exception that was positively and significantly related to the unemployment rate. His results suggest that temporary economic downturns improve national health, but not in regard to suicide mortality.

Initially, I am comparing the results of this study with the results of Ruhm (2000) using the state unemployment rate, per capita personal income, and a series of controls including percentage of population under 5, percentage of population over 65, educational attainment level and percentage of population that is black and Hispanic. My analysis continues with breaking the data into subgroups by race and gender. The four population subgroups that are analyzed: black males, black females, white males and white females, due to differences in suicide mortality between males and females (Canetto and Sakinofsky, 1998; Möller-Leimkühler, 2002; Freeman et al., 2017) and blacks and whites (Gibbs, 1997; Burr et. al, 1999; Kubrin, 2009).

A further contribution of this research is to reduce the regional level from state to county (although this paper focuses on the state level for comparison to Ruhm (2000)). The purpose of this research is to quantitatively determine if there are observable fluctuations in the business

cycle (proxied by unemployment) that positively or negatively relate to suicide mortality and does the impact differ across population subgroups.

Regression results indicate when using the model of Ruhm (2000), there is indeed a significant and positive relationship between unemployment and the suicide rate over the period of 2005-2012 for the all population group at the state level. Once adding the education, age and population controls, the relationship persists, but to a lower magnitude. Income is significant and positively related to the suicide rate as well. Once demographic differences are accounted for (coupled with the added controls) the relationship for blacks becomes negative and insignificant. White male suicide mortality is the only dependent variable that remains positive and significant, indicating that the result for the "all population" group is largely driven by white men. At the county level, significance increases for all demographic subgroups on the unemployment coefficient, where per capita income is negative and significant only for the black male subgroup. I compared the data in this paper's model to the model in Ruhm (2000) before and after the inclusion of subgroups and smaller regional analysis.

This paper proceeds as follows. Section 2 is the literature review of previous research and related findings. Section 3 is the data and methodology description of the proposed model(s) used in the quantitative demonstration. Section 4 is the empirical findings of the econometric estimators along with a discussion of results. Section 5 includes closing remarks and suggestions on further analysis.

1.2 Previous Research on Business Cycles and Suicide

1.2.1 Business Cycle and Mortality Rates

Previous empirical studies have shown inconsistent evidence of the relationship between business cycles and mortality. Papers such as Brenner (1971, 1973, 1975, 1979), Economou et al. (2008) and Gerdtham and Johannesson (2005) demonstrate a countercyclical relationship between certain mortality rates and the business cycle. On the other hand, a procyclical relationship between the business cycle and mortality rates was first posited by Ogburn and Thomas (1922), and several more recent studies (Ruhm, 2000; Granados, 2005, 2009; Neumayer, 2004) have demonstrated the same statistical relationship.

Brenner (1971) illustrated the correlation between heart disease mortality and the employment index in New York state in the years between 1915 and 1967. He found that there was a negative relationship between heart disease mortality rates and the employment index. Brenner attributed the relationship to increased psychosocial stress that results from the economic status of individuals, which is highly correlated with the economic standing of the region (he performed the analysis in New York State and at the national level). This result was also demonstrated by Junankar (1991) in that a countercyclical pattern was found between overall mortality and the business cycle. Using the yearly averages between 1970-1972 and 1980-1982, he estimated the impact of unemployment rates controlling for class (proxied by occupation levels: professional, skilled/manual, unskilled, etc.) of males in England and Wales. He demonstrated a positive association between unemployment and the total mortality rate, in which the impact declined as employment class increased.

Recent research (Neumayer, 2004; Lin, 2006), on the study of business cycle fluctuations and the impact on mortality rates, has been influenced by Christopher Ruhm. Ruhm (2000) was

considered counterintuitive in that the results were contrary to conventional economic theory, specifically that mortality rates decrease with increased unemployment rates[9]. His paper described the relationship between unemployment and the top 10 causes of mortality. Analyzing the period 1972–1991, he found that all-cause mortality and eight out of ten of the specific causes of death were negatively and significantly associated with the unemployment rate by state. Neumayer (2004) found similar results in Germany during the period 1980–2000 indicating that all-cause mortality and five specific causes of death (including suicide) demonstrated a procyclical relationship with the business cycle. This paper also noted that when regional fixed effects were not controlled for, the result was the same as Brenner (1979) in which a countercyclical pattern was demonstrated for all-cause mortality over the period. Ruhm (2000) found the same result when using the national unemployment rate, a negative and statistically significant predictor of suicide rates.

Indeed, it should be noted that the differences in results between the countercyclical or procyclical nature of business cycles and mortality rates can partially be attributed to the size of the region of examination. Aggregated regions lead to omitted variable bias if there is a failure to control for time-invariant fixed effects (Neumayer, 2004).

1.2.2 Business Cycle and Suicide Rates

Of the previous literature that found a countercyclical pattern between mortality rates and unemployment rates, this result did not apply to suicide mortality (with the exception of Neumayer, 2004). Ruhm (2000) found that suicide mortality was positively and significantly associated with the unemployment rate by state. The results were replicated in Gerdham and

[9] Citing Brenner and Mooney (1983), he notes that previous research focused on the psychological consequences of unemployment, such as stress resulting from the loss of resources to fulfill financial obligations, that contribute to alcohol and drug abuse. This was to the detriment of the true impact.

Ruhm (2006), which applied the same analysis as Ruhm (2000) to 23 OECD countries over the period of 1960–1997. Granados and Roux (2009) estimated a procyclical relationship between suicide mortality rates and unemployment from 1920–1940, particularly during the Great Depression. The reasoning behind this result was not explicitly addressed, but Blakely et al. (2003) indicates that the association of suicide and unemployment can be the result of: increased vulnerability due to increasing stressful life events, an increase in the predominance of risk factors that precipitate suicide, or confounding factors that simultaneously predict unemployment status and suicide risk. Preti (2003) attempts to offer the most plausible explanations for the association in reference to socioeconomic status. His study suggests that accounting for the socioeconomic impact of unemployment is the mechanism used to explain increased suicide risk during economic downturns[10]. In fact, one of the most detrimental impacts of unemployment is the impact on social ties at the individual and community levels.

Considering the reverse causality of the association between health outcomes and unemployment has also been explored in previous studies (Dooley et al., 1996; Preti, 2003; Kaspersen et al., 2015). These papers posit that poor physical and mental health can lead to unemployment via poor work performance, therefore causal inference is spurious if the unemployment rate worsens mental health just as poor mental health worsens the unemployment rate. Marcotte (1999) explores the impact of unemployment on job retention. In recessionary years, higher unemployment increases job retention, but only amongst those that are less likely to lose their jobs during a recession (i.e. higher educational attainment and higher skilled individuals). Another paper by Zimmerman et al. (2004) demonstrates that depression symptoms

[10] Under the assumption that not all suicides are related to health selection or mental illness, and when controlling for confounding factors

decline as individuals earn higher incomes. Using the National Longitudinal Survey of Youth 1979 (NLSY79), and the 1992 Center for Epidemiologic Studies Depression scale (CES-D), they found that for both men and women above and below the median income level, that on average, doubling income reduced depression symptoms by 10%[11]. Luciano and Meara (2014) examined the data of all working-age participants of the Nation Survey of Drug Use and Health (NSDUH) between the years 2009-2010. Using the responses of two mental illness assessments conducted by the Substance Abuse and Mental Health Services Administration (SAMSA), they found that the employment rate was negatively associated with increased levels of mental illness. So, in part those individuals who are most vulnerable during economic downturns (i.e. lowest occupational types and lowest income earnings) are most at risk for increased depression symptoms, which has been shown to lead to death by suicide[12]. Furthermore, those individuals who have increased levels of mental illness experience higher unemployment rates overall.

1.2.3 Stratification and Suicide Mortality

Current research on the association between suicide and business cycles fails to address the complexities of a diverse society, particularly, the exclusion of race and gender subgroups. Stratification of population subgroups considers the unique experiences of demographic differences within a society. These cultural differences contribute to the offset in suicide rates.

[11] This impact is significant only in the regressions in which other socioeconomic variables are not controlled for.
[12] This analysis does not focus on the possibility of reverse causality simply, because biological determinants of mental health are not addressed in this paper.

1.2.3.1 Race

1.2.3.1.1 Mortality Rates

The disparity between black and white mortality rates has been documented (Meghir, 2012) specifically with regard to cancer (Delancey et al 2008), cardiovascular disease (Jolly et al 2010) and infant mortality (Schempf et al., 2007). The inequality in black/white mortality rates has persisted (although in decline), despite increases in civil rights, wealth, income and educational attainment. Satcher et al. (2005) analyzed trends in the black/white standardized mortality ratios (SMRs) from 1960-2000 and found that the SMR for blacks relative to whites has largely remained unchanged. They attributed this to black men which show a significant increase, while the SMR for black women has decreased significantly over the same period. Although, amongst mortality statistics, the most evident difference is in suicide rates.

1.2.3.1.2 Suicide Rates

The disparity in mortality rates changes when we specifically analyze suicide rates. According to the CDC, in the year 2017, whites had the highest suicide rate of all ethnicities at 15.85/100,000 and blacks had the second lowest at 6.61/100,000 nationally. These trends persist over time as well. In the year 2000 the age adjusted rate of suicide per 100,000 for whites was 11.29, a 40 percent increase over the 18-year period. For blacks, the suicide rate in 2000 was 5.52. There is also an increase demonstrated of nearly 20 percent, but lower in level and magnitude than the increase in the white suicide rate. These differentials have led researchers to question not only the protective and agitating factors of suicide mortality, but also the method of data collection.

Previous studies on suicide rates were predominantly studies of white men (largely due to the abundance of suicide deaths amongst white males), the studies into suicide mortality

typically underrepresent the suicide occurrence of other gender or racial groups (Crosby and Molock, 2006). A recent and more persistent literature on minority suicide (particularly African-American) has been a focus in accentuating the "protective factors" against suicide mortality. Prior research (Gibbs, 1997; Willis et al., 2003; Stack, 2000) has attributed suicide rates in the African American community to cultural factors such as social ties rather than an economic motivation. Kinship and the prevalence of the extended family structure amongst most African American communities (especially in the south), has been cited as being one of the largest protective barriers against adverse situations (i.e. economic, emotional and social hardship) (Gibbs, 1997). Stack (1998) posits that increased educational attainment has an increasing effect on the black male suicide rate due to the increased isolation from community as the individual attains higher education levels.

There is also another explanation for the lower suicide rates amongst African Americans – misclassification. Rockett et al. (2006) posits that the black-white suicide paradox[13] could be the result of differential suicide misclassification by race. They created upper and lower bounds for the actual suicide rates by adding one or both of the following categories that have been identified as concealing suicides: injury of undetermined intent and unintentional poisonings and drownings. Once accounting for these possible misclassifications, the black white suicide gap for both genders decreased and when accounting for specific age categories, revealed crossovers in some of the black white suicide ratios. Dennis (2018) suggests that African American suicide is underrepresented in the data, partially due to misclassification but also due to societal attitudes towards black men. Noting that society tends to view African American men as hetero-

[13] The black-white suicide paradox refers to the duality of consequence as a result of oppression. Oppression creates unnecessary suffering on the part of the oppressed, at the same time promoting resilience against future oppression, which could have mitigating effects on depression and other mental disorders (Keyes 2009).

masculine, unemotional and aggressive. This is a more confined perception of masculinity, which suggests that African American men are not capable of the level of inflection that is required to conceive self-murder. These societal perceptions also have a negative impact on how the individual sees himself. She posits that black males (especially younger black males) are accustomed to masking all emotion except anger, which is expressed as outward violence. This could also be a factor for an individual who is suffering internally and decides to display it outwardly. These theories raise questions as to the efficacy of the data on black suicides, but this paper proceeds with the data available.

1.2.3.2 Gender

Suicide rates also vary by gender. According to the World Health Organization, the male to female suicide ratio in 2016 was 3.3, indicating that for every one female suicide, there are 3.3 male suicides. Most researchers have attributed this difference to intent. Freeman et al. (2017) analyzed suicide intent data from 5,212 attempted suicide cases from Germany, Portugal, Iceland and Hungary. Using a scale that categorized suicide intents into five groups (non-habitual deliberate self-harm, parasuicidal pause, parasuicidal gesture and serious suicide attempts). They found that serious suicide attempts were rated more frequently in males than in females in every country analyzed. The relative scale of intent translates to suicide completions. Previous research has found that (in western societies) males have a higher rate of completed suicide while females have a higher rate of attempted suicide (Lester, 1992; Canetto and Sakinofsky, 1998; Arensman, 2017). Differences in male and female suicide rates have been postulated to be differences in method (Tsirigotis et al., 2011) which ultimately determines intent (Arensman, 2017). In western countries, males tend to attempt suicide with more lethal means, such as firearms, hanging and

asphyxia. While females tend to use less lethal means of attempt such as intentional drug overdose, poisoning and exsanguination[14] (Tsirigotis et al., 2011).

The gender paradox in suicide describes the differences in suicide mortality, ideation, motivation, method and intent for males and females in most western countries. Canetto and Sakinofsky (1998) describe how suicide as an act is viewed by distinctive cultures in different regions and even different historical context; in particular, how communities objectively view someone who has died by suicide is dependent upon their gender. Expectations of suicidal behavior in men and women are the driving force of the method the victim chooses and even how suicides are classified by the medical authority (coroner, medical examiner)[15]. Male suicidal behavior in western cultures is seen as masculine act, a strong reaction to (perceivably) justified adversities in the individual's life. Female suicidal behavior is viewed as weak, a plea for help or a simple overreaction to personal problems (Hunt et al., 2018)

Although some of the prevailing research suggests that the difference in the suicide rate for males and females may also be augmented by misclassification. Rockett (2017) suggests that the method of suicide attempt and completion most predominant for females in the U.S. is drug intoxication and poisoning, which is where the majority of misclassifications occur, by being classified as unintentional. Mergl et al. (2015) studied the same four European countries as Freeman et al. (2017) and determined that although male suicidal acts were 3.4 times more lethal than female suicide acts, the significant differences in methods lied in the most invasive (hanging, jumping, moving objects, sharp objects and poisoning other than drugs).

[14] Exsanguination is the action or process of draining or losing blood. "Exsanguination." *Merriam-Webster*, Merriam-Webster, www.merriam-webster.com/dictionary/exsanguination.
[15] The authors also make a case for misclassification of suicide events made on the basis of cultural prejudice.

1.3 Data and Methodology

Following the method and data application as Ruhm (2000), this paper tests the significance of the state and county level unemployment rates on the suicide rate for all population (black and white, females and males) as well as the individual subgroups: black females, black males, white females and white males. This paper includes the four aforementioned demographic subgroups analyzed over the time period 2005-2012, which encompasses before during and after the Great Recession. Data differences between this analysis and Ruhm (2000) are: Ruhm (2000) uses data from census years 1970, 1980 and 1990. The non-census years are interpolated based upon a continuous rate of change between census years (Ruhm 2000). This analysis uses 5-year estimates[16] for all years analyzed. Another difference is in the total population calculation. This analysis is confined to black and white non-Hispanic individuals, whereas Ruhm (2000) uses all races and ethnicities in its aggregation. The calculation of "percent black" is used but not the "percent Hispanic", as this analysis is confined to white non-Hispanic and black non-Hispanic individuals[17].

A fixed effects model was used in effort to remove variation in suicide rates that arise due to time-invariant differences between states (this could include regional variations in suicide rates). There are also temporal trends that are accounted for using time fixed effects in the model. Time fixed effects were included to ensure that changes in economic activity due to exogenous determinants do not impede the model results (this could include times during and after war, in

[16] The 5-year estimates are a rolling average over a 60-month period. At the smallest level of aggregation (county), observations for all counties are not available for counties with populations under 65,000 on an annual basis. This method is the most viable for inclusion of all counties. US Census Bureau. "When to Use 1-Year, 3-Year, or 5-Year Estimates." *When to Use 1-Year, 3-Year, or 5-Year Estimates*, 17 Sept. 2019, www.census.gov/programs-surveys/acs/guidance/estimates.html.

[17] This type of adjustment is consistent with other research that applies the Ruhm (2000) model to different populations, such as Neumayer (2004) that uses the "percentage of foreigners" instead of "percent black" and "percent Hispanic" due to the differences in demographic makeup of Germany vs the United States.

which suicides related to post traumatic stress disorder are increased (Jukupcak et al., 2009) or from increased stress levels experienced by certain cohorts during and after increased police violence against that cohort (Aymer, 2016)). The observations were clustered at the state level in both regions of aggregation. This was done because it is assumed that the observations are independent between states, but not necessarily within states.

1.3.1 Motivation for the Usage of Different Levels of Regional Aggregates

Geographic heterogeneity warrants an investigation of social and cultural differences and their impact on suicide (Rehkopf and Bulka, 2005) at the state and county levels. Not only do unemployment rates vary at different regional levels, but the impact of unemployment on suicide mortality differ from one regional level to the next (Lester and Yang, 2003). Analyzing group level differences is imperative to isolate influences that are objective to the individual (Lawless and Lucas, 2010). The problem of the "exceptional fallacy"[18] also must be considered when individual level analysis methods are performed. Differences in demographic experiences are important to suicide mortality research. The contribution of this paper beyond Ruhm (2000) is the consideration of the impact of the business cycle indicator unemployment, for different regional levels and the time period over the Great Recession of 2005-2012 in the United States as well as the relative impacts on differing demographic groups by race and gender. This analysis is limited to suicide mortality and the quantitative comparison of different subgroups.

[18] An exceptional fallacy is committed when a group conclusion is based upon exceptional cases. "Two Research Fallacies." *Social Research Methods - Knowledge Base - Sampling*, Web Center for Social Research Methods, socialresearchmethods.net/kb/fallacy.php.

1.3.2 Data

This paper examines the demographic differences as they relate to suicide rates[19] by state in the United States. The data used for this project was retrieved from several sources. The individual mortality data was retrieved from the National Center for Health Statistics at the Center for Disease Control[20]. This data comes from the compressed mortality files on non-public use mortality for the years 2005-2012[21] and has been aggregated to the state and county levels.

The suicide rate is the total number of suicides for each race and gender group divided by the subgroup population. Race/Ethnicity categories are White (non-Hispanic) and Black (non-Hispanic). Educational attainment is broken into four categories: less than high school, high school, some college and bachelor's plus for the demographic population 25 years and above. Two age categories are included: less than 5 and 65 and older. The unemployment rate is calculated as the number of workers that are unemployed in each region, over the labor force 16-64 years old. This data was retrieved from the Current Population Survey (CPS) at the Census Bureau. Per capita income[22] in 2010 dollars was also included and retrieved from the CPS 5-year estimates.

Educational attainment, percentage of the population that is black and the two age categories act as controls in this regression analysis. Conventional theory suggests that increased education levels have a negative effect on the suicide rate (Abel and Kruger 2005). The inclusion of the percentage of the population that is black, was included to remove the downward pressure

[19] Age Adjusted Suicide Rates were Calculated. Calculation method is in the Appendix.
[20] National Center for Health Statistics Compresses Mortality File (1968-2015), as complied from data provided by the 57 vital statistics through the Vital Statistics Cooperative Program.
[21] The suicide rates were averaged over a 5-year period in the same way as the socioeconomic variables for the consistency of variable estimation. A rolling average was created for all years of analysis.
[22] Per capita income is specific to race only.

imposed on the suicide rate due to blacks having a lower suicide rate than any other race. The two age categories were held constant to remove the impact of a relatively large younger population (for which the suicide rate is low) and the impact of a relatively large older population (which the suicide rate varies by demographic).

1.3.3 Model

The regression equation is a fixed effects panel model. Subscript *i* indicates the region (state or county), *t* indicates the year, the superscript *g* indexes the gender and the superscript *j* indexes the race. The regression equation is as follows:

$$S_{it}{}^{gj} = \alpha_t + X'_{it}{}^{gj}\beta + Unemp_{it}{}^{gj}\delta + PcInc_{it}{}^{j}\phi + R_i + \sum_{T}^{t+1} N\lambda + \epsilon_{it}$$

where *S* is the natural log of the suicide rate plus one[23], *X* is a vector of supplemental regressors, *Unemp* is the calculated unemployment rate for the noninstitutionalized civilian population 16 – 64. *PCInc* is the per capita income. *R* describes the fixed effects[24] for the time invariant properties of each region, *N* describes the time effects[25] for the region invariant properties of each year, α controls for the year differences nationally (in the reference year), and ϵ is the error term. Robust standard errors were also used to ensure testing accuracy and each region was clustered at the state level.

[23] The dependent is the natural log of the suicide rate plus one. This was done to ensure the asymptotic result of the natural log of zero was avoided (in cases where the number of suicides is zero in an observation).
[24] The fixed effects are at the state level.
[25] The time dummies start one year past the current since the model includes an intercept for the reference time period (2005).

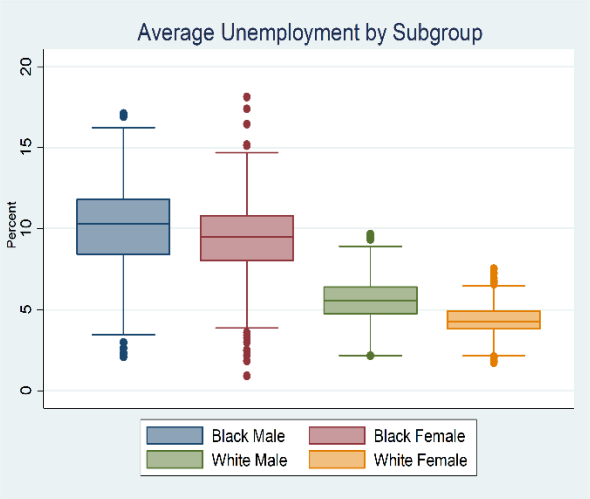

FIGURE 1.2. AVERAGE UNEMPLOYMENT RATES BY SUBGROUP (2005-2012)

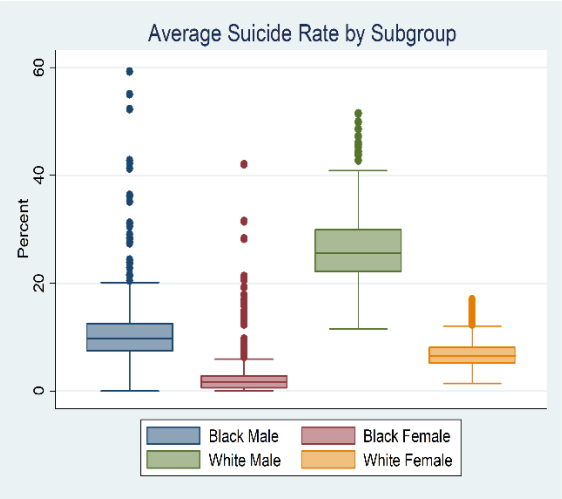

FIGURE 1.3. AVERAGE SUICIDE RATES BY SUBGROUP (2005-2012)

1.3.4 Descriptive Statistics

Descriptive statistics are provided for each regional level of analysis in effort to compare trends and patterns of each level for the period of 2005-2012. The analysis is performed on all variables (with the exception of the controls). National level unemployment rates and suicide rates comparisons are visually described in Figure 1.2. and Figure 1.3. These plots (analyzed in conjunction) indicate that subgroups with lower unemployment rates have higher suicide rates at the national level.

1.3.4.1 Nation

Figure 1.4 displays the average suicide rate vs the average unemployment rate over the period for each subgroup. Noteworthy is the average unemployment rate of black and whites. Blacks have the highest unemployment rate between the two ethnicities and black males have the highest unemployment of any cohort. Period analysis demonstrates that black males show a procyclical pattern up until the recession and then exhibit a countercyclical pattern. The averages for black females display a countercyclical pattern throughout each year of analysis. Also,

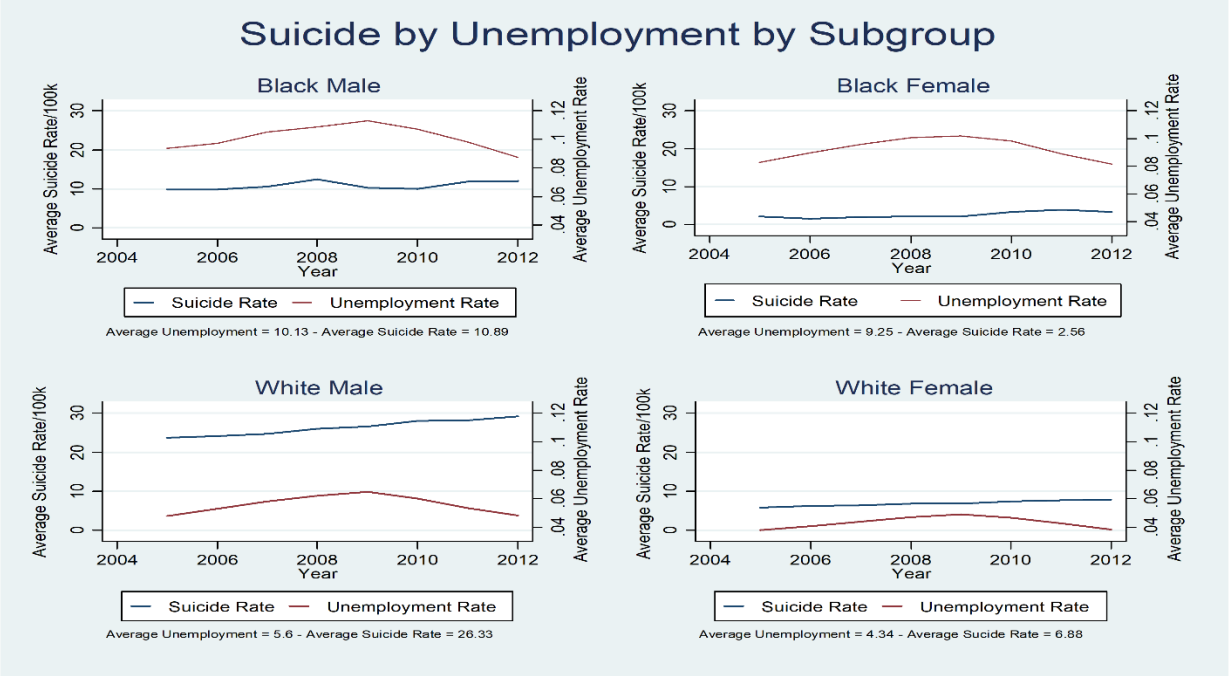

FIGURE 1.4 NATIONAL LEVEL UNEMPLOYMENT RATES AND SUICIDE RATES BY SUBGROUP

unemployment rates are higher over the period for blacks, than the suicide rates. White males demonstrate a procyclical pattern over the period and white females show a countercyclical pattern with suicide rates being higher than the unemployment rates in each year, this despite having a lower unemployment rate than blacks. These comparisons indicate that the negative effects of economic downturns (proxied by the unemployment rate), in large part, affects only white males as it relates to suicide mortality.

1.3.4.2 State

Table 1.1 (Appendix) provides means and standard deviations at the state level for the variables used in each regression. The suicide rate averages over the period 2005-2012, demonstrate the overwhelming dominance of the statistic by men of each ethnicity with white males having the highest. Per capita income for blacks is much lower than the white population average. Coupled with the unemployment rates for both black males and females that is roughly

double that of the all population average, *a priori* evidence indicates that economic conditions (at least those indicated by the included variables) does not demonstrate a positive relationship to the suicide rate for blacks. The opposite can be seen for whites. Higher than all population averages in per capita income and lower than all population averages in unemployment rates, correspond to higher suicide rates for whites in both gender categories.

1.3.4.3 County

County level comparisons reveal a much broader difference in the regional means, especially from the state to the county level. Table 1.2 (of the Appendix) reveals significant differences are noted in unemployment rates for blacks and suicide rates for whites. Females of both races have statistical differences in both suicide rates and unemployment rates. Given these notable differences, the inferences made at the state level are spurious (and even after accounting for regional differences, omitted variable bias is sure to be an issue). County level differences in lower education level means is also noteworthy. At the county level, "less than high school" and "high school" levels of educational attainment have significantly higher means for all race gender cohorts, subsequently, "some college" and "bachelors plus" have significantly lower means (except for white males in which the difference is insignificant at the "some college" level). This could lead to a misleading analysis of the impact of education on the suicide rate, even as a control[26]. One difference of education at the state level versus the county level is funding. Baker (2017) studies the impact of education funding for schools and the impact on pupil outcomes. He finds that public education funding varies by state as well as resource allocation for districts/counties in that state, and thus changing pupil outcomes.

[26] If county level differences are not considered, then an incorrect assumption about the differences in the allocation of educational funds is implied.

TABLE 1.3 STATE RESULTS COMPARISON

State (Results Comparison)[27]				
	(1)	(2)	(3)	(4)
VARIABLES	Ruhm (2000)		Briggs (2019a)	
Unemployment Rate	0.0162*	0.0260***	0.0162*	0.0260***
	(0.00910)	(0.00963)	(0.00910)	(0.00963)
Income				
Per Capita Income (1K)		-0.0048		0.0273**
		(0.007)		(0.0102)
Observations	930	930	400	400
Number of States	51	51	50	50
State FE	YES	YES	YES	YES
Time FE	YES	YES	YES	YES

1.4 Estimation

1.4.1 Results Comparison

Table 1.3 lists the regression results for Ruhm (2000) and this analysis. Columns (1) and (2) are the Ruhm (2000) results, where column (1) includes only the unemployment rate and (2) has the variables unemployment rate, per capita income and all controls included (controls and constant are suppressed). Columns (3) and (4) show the estimation results of this paper with and without controls. Both of the two variables of interest (unemployment rate and per capita income) are positive and significant in the control regression. This result demonstrates that the overall suicide rate is increasing regardless of economic conditions. The population controls of percent under the age of five and percent black are negative and marginally significant as expected. The rationale for this result is the larger the percent of persons under the age of five mitigates the suicide rate since the suicide rate for this cohort is very low as well as children

[27] I have also included estimations for the rolling average suicide rate in the appendix.

being a deterrent to suicide of adults (Qin and Mortensen, 2003). Accounting for the proportion of the population that is black is theorized to be negative due to the lower suicide rate of black individuals. Ruhm (2000) regression results indicate that an increase in the all population unemployment rate results in a 1.16% increase in the suicide rate. Notably per capita income is negative but insignificant. The results of this analysis are quite a bit different. The sign of the coefficient on unemployment is positive, indicating a consensus that unemployment for all population has a positive impact on the suicide rate. The magnitude is much larger than that of Ruhm (2000) for the regressions with and without controls but relatively larger with controls. This could be for a multitude of reasons including (but not limited to) the different time period of analysis (Ruhm (2000) spanned from 1972-1991, a 20-year period, vs 2005-2012, an 8-year period). If the premise is correct that recessions (proxied by the unemployment rate) increase the suicide rate, a smaller time period that includes the greatest economic downturn since the Great Depression, would have a larger impact on the suicide rate. Not to mention that the averages are smaller over a larger period of time. Thus, the fluctuation in the unemployment rate would have a smaller impact on the suicide rate as a result. Also, this analysis is limited to black and white individuals. Being that whites have the highest suicide rate of all races, the largest population of all races, and presumably the strongest bind between economic downturns and the suicide rate, the impact of unemployment on the suicide rate would be stronger. Income as a predictor in this analysis is positive and significant. The aforementioned time period difference also impacts this variable. Consideration of the time period inclusive of the Great Recession would indicate a

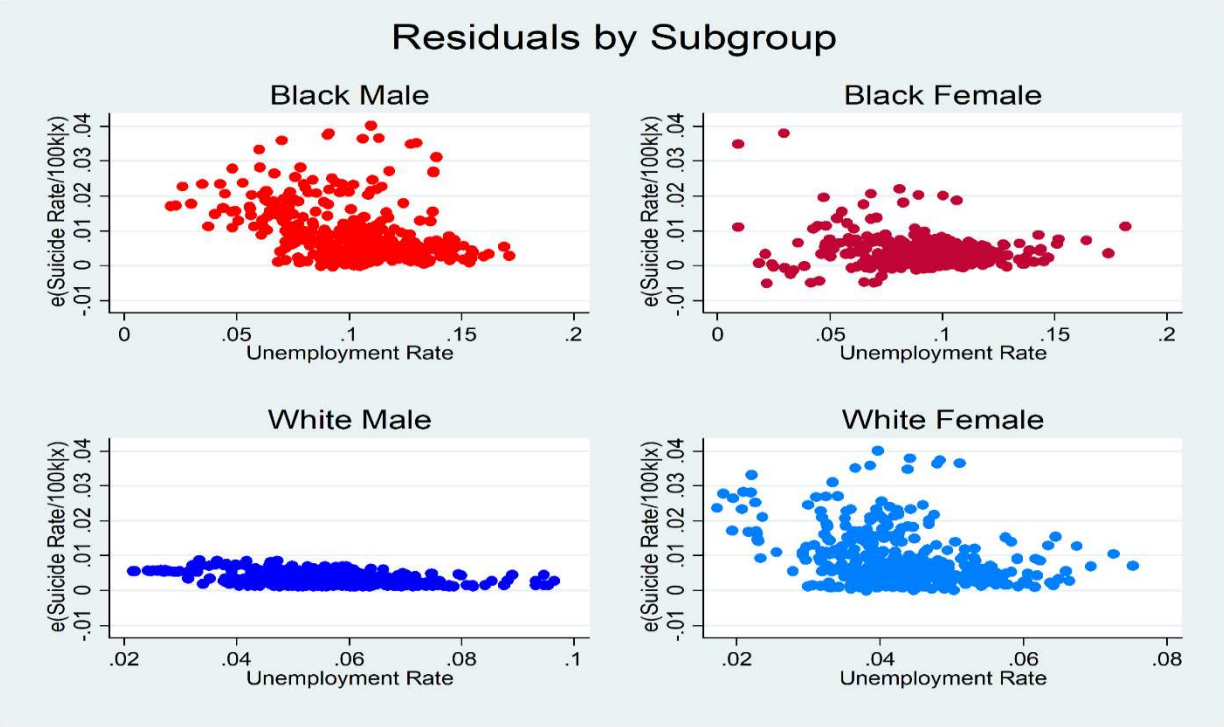

FIGURE 1.5. EVIDENCE OF OMITTED VARIABLE BIAS

greater sensitivity to income changes as a determinant of the suicide rate. Daly et al. (2010) determined that suicide rates increase with income levels as a result of relative comparisons made between income groups. This "keeping up with the Joneses" effect could have an increased impact at higher income levels, especially during economic downturns. This result could also indicate that suicides are rising irrespective of per capita income levels. This phenomenon is addressed in chapter 3 as the result of changes in racial demographic proportions.

1.4.2 Demographic Differences

1.4.2.1 Race

Regression results[28] segregated by race demonstrate a positive and insignificant association between the unemployment rate and the suicide rate for whites without controls, the

[28] Located in the Appendix.

opposite sign is present for blacks. This indicates that the overall suicide rate Accounting for the education, income and age controls, subsequently made the coefficient negative for blacks, while the positive relationship maintained for whites, none of the coefficients were statistically significant on unemployment. This result reveals the necessity of either a smaller regional level of analysis, the inclusion of other variables, or both.

Figure 1.5 illustrates the plotted residuals of the regressions (with controls) against the heteroskedasticity corrected unemployment rates. Even with robust standard errors clustered at the state level, there is heteroskedasticity demonstrated for each subgroup except white males. *Prima facie*, this is evidence of omitted variable bias for three of the four subgroups. A modified Wald statistic[29] for groupwise heteroskedasticity in the residuals was performed for the "all population" regression[30]. With a p-value = 0.00 and the tests statistic $\chi^2(50) = 29367.76$, the model was determined to have impure heteroskedasticity[31]. Although the modified Wald statistic cannot reveal which determinants are missing, this gives me a good indication of the existence of omitted variable bias. White male unemployment has the strongest relationship with the suicide rate and omitted variable bias is not such a concern. As previously stated, this analysis goes beyond Ruhm (2000) to consider cultural differences in determining the suicide rate.

[29] The modified Wald statistic is used when the model cannot assume normality of the error terms. All that is required is consistency of the estimators of β, so that we can assert consistency of the estimators of the standard errors, and asymptotic normality of the estimators so that we can assume asymptotic distribution of b with independent observations (Greene 2012, p.298-p.299).

[30] Results located in the Appendix,

[31] "Impure heteroscedasticity refers to cases where you incorrectly specify the model, and that causes the non-constant variance. When you leave an important variable out of a model, the omitted effect is absorbed into the error term. If the effect of the omitted variable varies throughout the observed range of data, it can produce the telltale signs of heteroscedasticity in the residual plots." Frost, Jim. "Heteroscedasticity in Regression Analysis." *Statistics By Jim*, 15 Mar. 2019, statisticsbyjim.com/regression/heteroscedasticity-regression/.

1.4.2.2 Gender

Gender differences in the coefficient on unemployment follow theory in that the impact of unemployment on the suicide rate is lower for females of both racial groups than their male counterparts. Per capita income is positive for all subgroups except white male and is significant only for black females. Income as a positive predictor for black females was also demonstrated in Nisbet (1996). He found that higher income black females were less likely to seek emotional/mental social support and as a result, only sought professional help when mental deterioration was at its highest.

1.4.3 Regional Differences

At the county level, significance increases for all subgroups except black male (presumably because of the increase in observations). Per capita income is negative and significant for black males at the county level. County averages have a stronger negative association with the suicide rate for black males, another indicator of heterogeneity between regions. Aside from the benefits of a larger sample size, we can assert that the mean is more representative of the cultural differences around the nation. Although modelling[32] is a concern at the county level, inferences can still be made about the direction of the coefficient while focusing less on the differences in coefficient magnitudes.

[32] In the next chapter, I address the problem with using a log-linear model for subgroups with a significant number of zeros in the regional observations. Observation variance larger than the mean warrants a variant of the Poisson model, the Zero-Inflated Negative Binomial model.

1.5 Conclusion

Suicide mortality is a growing international health concern. As social scientists and medical health professionals seek to appropriately address this phenomenon, it is imperative to address the techniques used in data analysis in effort to properly form combative measures. The business cycle indicator of the unemployment rate has been demonstrated to be a useful indicator as an input to the production of suicides in America, albeit not for every racial demographic, subregion and time period of analysis as demonstrated by the conflicting results established in this paper.

Using Ruhm (2000) as a foundation, this paper set out to determine the efficacy of the static model for the time period 2005-2012, before, during and after the Great Recession. Model comparison at the state level indicated that the coefficient sign on unemployment was the same as predicted by Ruhm (2000) with larger magnitudes for all regressions considered. Income also had a positive and significant impact on the "all population" suicide rate, a different result from the reference paper. This paper's analysis is remanded to suicide mortality and albeit Ruhm (2000) used the static model in determination of all-cause mortality as well the top 10 mortality causes, its usefulness could be greater with a different mortality cause. As demonstrated, stratification of demographic subgroups yields different results for suicide mortality and I suppose that analysis of other forms of mortality (and morbidity) would benefit from the extension techniques used in this paper. This paper argues that further analysis is needed by including smaller regions as well as including other variables to determine the true relationship between unemployment rates and suicide rates for each demographic subgroup (i.e. variables that capture socioeconomic differences).

In the next analysis, I include stratification of the demographic subgroups as well as intersections for the different socioeconomic measures of: educational attainment, age, income levels and marital status. Controls include regional gun ownership and unemployment insurance maximums by state. This variables are important to include due to the suggestions that increased gun ownership has a positive effect on the suicide rate (Kposowa, 2013) and increased unemployment protections have a mitigating effect on the suicide rate (Cylus et al., 2013)

CHAPTER 1 REFERENCES

Abel, Ernest L., and Michael L Kruger. "Educational Attainment and Suicide Rates in The United States." *Psychological Reports*, vol. 97, no. 5, 2005, p. 25., doi:10.2466/pr0.97.5.25-28.

Appleby, Louis. "Suicide in Women." The Lancet, vol. 355, no. 9211, 2000, pp. 1203–1204.

Arensman, Ella. "Suicide Prevention in an International Context." Crisis, vol. 38, no. 1, 2017, pp. 1–6., doi:10.1027/0227-5910/a000461.

Aymer, Samuel R. "'I Can't Breathe': A Case Study—Helping Black Men Cope with Race-Related Trauma Stemming from Police Killing and Brutality." Journal of Human Behavior in the Social Environment, vol. 26, no. 3-4, 2016, pp. 367–376., doi:10.1080/10911359.2015.1132828.

Baker, Bruce. "How Money Matters for Schools." *Learning Policy Institute*, 17 July 2017, learningpolicyinstitute.org/product/how-money-matters-brief.

Blakely, T A, et al. "Unemployment and Suicide. Evidence for a Causal Association?" *Journal of Epidemiology & Community Health*, vol. 57, no. 8, 2003, pp. 594–600., doi:10.1136/jech.57.8.594.

Brenner, M H. "Economic Changes and Heart Disease Mortality." *American Journal of Public Health*, vol. 61, no. 3, 1971, pp. 606–611., doi:10.2105/ajph.61.3.606.

Brenner, M. H. "Fetal, Infant, and Maternal Mortality during Periods of Economic Instability." *International Journal of Health Services*, vol. 3, no. 2, 1973, pp. 145–159., doi:10.2190/um5l-tvn7-vdfr-uu0b.

Brenner, M. Harvey. “Mortality and The National Economy.” *The Lancet*, vol. 314, no. 8142, 1979, pp. 568–573., doi:10.1016/s0140-6736(79)91626-x.

Burr, Jefferey A., et al. “Black Suicide in U.S. Metropolitan Areas: An Examination of the Racial Inequality and Social Integration-Regulation Hypotheses.” *Social Forces*, vol. 77, no. 3, Mar. 1999, pp. 1049–1080., doi:10.2307/3005971.

Canetto, Silvia Sara, and Issac Sakinofsky. “The Gender Paradox in Suicide.” Suicide and Life-Threatening Behavior, vol. 28, no. 1, 1998, pp. 1–23.

Compton, Michael T., et al. “Social Environment Factors Associated with Suicide Attempt among Low-Income African Americans: The Protective Role of Family Relationships and Social Support.” Social Psychiatry and Psychiatric Epidemiology, vol. 40, no. 3, 2005, pp. 175–185., doi:10.1007/s00127-005-0865-6.

Cylus, Jonathan, et al. “Do Generous Unemployment Benefit Programs Reduce Suicide Rates? A State Fixed-Effect Analysis Covering 1968–2008.” *American Journal of Epidemiology*, vol. 180, no. 1, 2014, pp. 45–52., doi:10.1093/aje/kwu106.

Daly, Mary C., et al. “Relative Status and Well-Being: Evidence from U.S. Suicide Deaths.” *Federal Reserve Bank of San Francisco, Working Paper Series*, 1 July 2010, doi:10.24148/wp2007-12.

Delancey, J. O. L., et al. “Recent Trends in Black-White Disparities in Cancer Mortality.” *Cancer Epidemiology Biomarkers & Prevention*, vol. 17, no. 11, 2008, pp. 2908–2912., doi: 10.1158/1055-9965.epi-08-0131.

Dennis, Kimya N. “Suicide Isn't Just a 'White People Thing'.” *The Conversation*, 11 Oct. 2019, theconversation.com/suicide-isnt-just-a-white-people-thing-77367.

Dooley, David, et al. *Annual Review Public Health*, vol. 17, 1996, pp. 449–465.

Economou, Athina, et al. “Are Recessions Harmful to Health after All?” *Journal of Economic Studies*, vol. 35, no. 5, 2008, pp. 368–384., doi:10.1108/01443580810903536.

Freeman, Aislinné, et al. “A Cross-National Study on Gender Differences in Suicide Intent.” *BMC Psychiatry*, vol. 17, no. 1, 2017, doi:10.1186/s12888-017-1398-8.

Genuchi, Matthew C. “The Role of Masculinity and Depressive Symptoms in Predicting Suicidal Ideation in Homeless Men.” Archives of Suicide Research, 2018, pp. 1–23., doi:10.1080/13811118.2018.1428705.

Gerdtham, Ulf-G., and Christopher J. Ruhm. “Deaths Rise in Good Economic Times: Evidence from the OECD.” *Economics & Human Biology*, vol. 4, no. 3, 2006, pp. 298–316., doi: 10.1016/j.ehb.2006.04.001.

Gerdtham, Ulf-G., and Magnus Johannesson. “Business Cycles and Mortality: Results from Swedish Microdata.” *Social Science & Medicine*, vol. 60, no. 1, 2005, pp. 205–218., doi: 10.1016/j.socscimed.2004.05.004.

Gibbs, Jewelle Taylor. “African-American Suicide: A Cultural Paradox.” Suicide and Life-Threatening Behavior, vol. 27, no. 1, 1997, doi:10.1111/(issn)1943-278x.

Granados, J. A. Tapia, and A. V. Diez Roux. “Life and Death during the Great Depression.” *Proceedings of the National Academy of Sciences*, vol. 106, no. 41, 2009, pp. 17290–17295., doi:10.1073/pnas.0904491106.

Granados, José A. Tapia. “Recessions and Mortality in Spain, 1980–1997.” *European Journal of Population / Revue Européenne De Démographie*, vol. 21, no. 4, 2005, pp. 393–422., doi:10.1007/s10680-005-4767-9.

Hawton, Keith. “Sex and Suicide: Gender Differences in Suicidal Behaviour.” British Journal of Psychiatry, vol. 177, no. 06, 2000, pp. 484–485., doi:10.1192/bjp.177.6.484.

Hedgegaard, Holly, et al. “NCHS Data Brief.” National Center for Health Statistics, June 2018, www.cdc.gov/nchs/data/databriefs/db309.pdf.

Hunt, Tara, et al. “Intervention among Suicidal Men: Future Directions for Telephone Crisis Support Research.” *Frontiers in Public Health*, vol. 6, 2018, doi:10.3389/fpubh.2018.00001.

Jakupcak, Matthew, et al. “Posttraumatic Stress Disorder as a Risk Factor for Suicidal Ideation in Iraq and Afghanistan War Veterans.” Journal of Traumatic Stress, vol. 22, no. 4, 2009, pp. 303–306., doi:10.1002/jts.20423.

Junankar, P. N. “Unemployment and Mortality in England and Wales: A Preliminary Analysis.” *Economics of the Labour Market*, 1991, pp. 459–473., doi:10.1057/9781137555199_25.

Kaspersen, Silje L., et al. “Health and Unemployment: 14 Years of Follow-up on Job Loss in the Norwegian HUNT Study.” *The European Journal of Public Health*, vol. 26, no. 2, 2015, pp. 312–317., doi:10.1093/eurpub/ckv224.

Kposowa, Augustine J. “Unemployment and Suicide: A Cohort Analysis of Social Factors Predicting Suicide in the US National Longitudinal Mortality Study.” Psychological Medicine, vol. 31, no. 1, 2001, pp. 127–138., doi:10.1017/s0033291799002925.

Kposowa, Augustine J. “Association of Suicide Rates, Gun Ownership, Conservatism and Individual Suicide Risk.” *Social Psychiatry and Psychiatric Epidemiology*, vol. 48, no. 9, 2013, pp. 1467–1479., doi:10.1007/s00127-013-0664-4.

Kubrin, Charis E., and Tim Wadsworth. “Explaining Suicide Among Blacks and Whites: How Socioeconomic Factors and Gun Availability Affect Race-Specific Suicide Rates.” *Social Science Quarterly*, vol. 90, no. 5, 2009, pp. 1203–1227., doi:10.1111/j.1540-6237.2009.00654.x.

Lawless, Nicole M., and Richard E. Lucas. “Predictors of Regional Well-Being: A County Level Analysis.” Social Indicators Research, vol. 101, no. 3, 2010, pp. 341–357., doi:10.1007/s11205-010-9667-7.

Lester, D., and B. Yang. “Unemployment and Suicidal Behaviour.” *Journal of Epidemiology & Community Health*, BMJ Publishing Group Ltd, 1 Aug. 2003, jech.bmj.com/content/57/8/558.short.

Lester, David. “Sex Differences in Suicide Notes.” Perceptual and Motor Skills, vol. 75, no. 5, 1992, p. 582., doi:10.2466/pms.75.5.582-582.

Lin, Shin-Jong. “Unemployment and Suicide: Panel Data Analyses.” *The Social Science Journal*, vol. 43, no. 4, 2006, pp. 727–732., doi:10.1016/j.soscij.2006.08.013.

Luo, Feijun, et al. “Impact of Business Cycles on US Suicide Rates, 1928–2007.” *American Journal of Public Health*, vol. 101, no. 6, 2011, pp. 1139–1146., doi:10.2105/ajph.2010.300010.

Meghir, Costas, et al. “Education, Health and Mortality: Evidence from a Social Experiment.” *SSRN*, IZA Discussion Paper No. 6462, 2012, papers.ssrn.com/sol3/papers.cfm?abstract_id=2039648.

Mergl, Roland, et al. “What Are Reasons for the Large Gender Differences in the Lethality of Suicidal Acts? An Epidemiological Analysis in Four European Countries.” *Plos One*, vol. 10, no. 7, 2015, doi:10.1371/journal.pone.0129062.

Moller-Leimkuhler, Anne Maria. “The Gender Gap in Suicide and Premature Death or: Why Are Men So Vulnerable?” European Archives of Psychiatry and Clinical Neuroscience, vol. 253, no. 1, 2003, pp. 1–8., doi:10.1007/s00406-003-0397-6.

Möller-Leimkühler, Anne Maria. “Barriers to Help-Seeking by Men: a Review of Sociocultural and Clinical Literature with Particular Reference to Depression.” Journal of Affective Disorders, vol. 71, no. 1-3, 2002, pp. 1–9., doi:10.1016/s0165-0327(01)00379-2.

Neumayer, E. “‘Recessions Lower (Some) Mortality Rates: Evidence from Germany.’” *Social Science & Medicine*, vol. 59, no. 9, 2004, p. 1993., doi:10.1016/j.socscimed.2004.02.018.

Nisbet, Paul A. “Protective Factors for Suicidal Black Females.” Suicide and Life-Threatening Behavior, vol. 26, no. 4, 1996, doi:10.1521/suli.2006.36.issue-4.

Ogburn, William F., and Dorothy S. Thomas. “The Influence of the Business Cycle on Certain Social Conditions.” *Journal of the American Statistical Association*, vol. 18, no. 139, 1922, pp. 324–340., doi:10.1080/01621459.1922.10502475.

Payne, Sarah, et al. “The Social Construction of Gender and Its Influence on Suicide: a Review of the Literature.” Journal of Men's Health, vol. 5, no. 1, 2008, pp. 23–35., doi:10.1016/j.jomh.2007.11.002.

Preti, A. “Unemployment and Suicide.” *Journal of Epidemiology & Community Health*, vol. 57, no. 8, 2003, pp. 557–558., doi:10.1136/jech.57.8.557.

“Preventing Suicide |Violence Prevention|Injury Center|CDC.” *Centers for Disease Control and Prevention*, Centers for Disease Control and Prevention, 2018, www.cdc.gov/violenceprevention/suicide/fastfact.html.

Pritchard, C. “Suicide, Unemployment and Gender Variations in the Western World 1964–1986.” *SpringerLink*, Springer-Verlag, 1990, link.springer.com/article/10.1007/BF00794985#citeas.

Qin, Ping, and Preben Bo Mortensen. “The Impact of Parental Status on the Risk of Completed Suicide.” *Archives of General Psychiatry*, vol. 60, no. 8, 2003, p. 797., doi:10.1001/archpsyc.60.8.797.

Rehkopf, David H., and Stephen L. Buka. “The Association between Suicide and the Socio-Economic Characteristics of Geographical Areas: a Systematic Review.” Psychological Medicine, vol. 36, no. 02, 2005, p. 145., doi:10.1017/s003329170500588x.

Rockett, Ian R.H. “The Gender Suicide Gap and Differential Misclassification: A Research Autobiography.” *International Review of Modern Sociology*, vol. 43, no. 1, 2017.

Rockett, Ian R.H.., et al. “The Black–White Suicide Paradox: Possible Effects of Misclassification.” *Social Science & Medicine*, vol. 63, no. 8, 2006, pp. 2165–2175., doi:10.1016/j.socscimed.2006.05.017.

Ruhm, C. J. “Are Recessions Good for Your Health?” *The Quarterly Journal of Economics*, vol. 115, no. 2, 2000, pp. 617–650., doi:10.1162/003355300554872.

Ruhm, Christopher J. “Healthy Living in Hard Times.” *Journal of Health Economics*, vol. 24, no. 2, 2005, pp. 341–363., doi:10.1016/j.jhealeco.2004.09.007.

Ruhm, Christopher J. “Macroeconomic Conditions, Health and Mortality.” *The Elgar Companion to Health Economics*, Dec. 2004, doi:10.4337/9781845428914.00009.

Satcher, David, et al. “What If We Were Equal? A Comparison Of The Black-White Mortality Gap In 1960 And 2000.” *Health Affairs*, vol. 24, no. 2, 2005, pp. 459–464., doi:10.1377/hlthaff.24.2.459.

Schempf, Ashley H., et al. “The Contribution of Preterm Birth to the Black–White Infant Mortality Gap, 1990 and 2000.” *American Journal of Public Health*, vol. 97, no. 7, 2007, pp. 1255–1260., doi:10.2105/ajph.2006.093708.

Spicer, R S, and T R Miller. “Suicide Acts in 8 States: Incidence and Case Fatality Rates by Demographics and Method.” American Journal of Public Health, vol. 90, no. 12, 2000, pp. 1885–1891., doi:10.2105/ajph.90.12.1885.

Stack, S. “Suicide: a 15-Year Review of the Sociological Literature. Part I: Cultural and Economic Factors.” *Suicide & Life-Threatening Behavior*, U.S. National Library of Medicine, 2000, www.ncbi.nlm.nih.gov/pubmed/10888055.

Stack, Steven. “Education and Risk of Suicide: An Analysis of African Americans.” *Sociological Focus*, vol. 31, no. 3, 1998, pp. 295–302., doi:10.1080/00380237.1998.10571108.

“Suicide.” *National Institute of Mental Health*, U.S. Department of Health and Human Services, 2019, www.nimh.nih.gov/health/statistics/suicide.shtml.

Tsirigotis, Konstantinos, et al. “Gender Differentiation in Methods of Suicide Attempts.” Medical Science Monitor, vol. 17, no. 8, 2011, doi:10.12659/msm.881887.

“US Business Cycle Expansions and Contractions.” *The National Bureau of Economic Research*, Public Information Office, 20 Sept. 2010, www.nber.org/cycles.html.

Willis, Leigh A, et al. “Ready to Die: a Postmodern Interpretation of the Increase of African-American Adolescent Male Suicide.” Social Science & Medicine, vol. 55, no. 6, 2002, pp. 907–920., doi:10.1016/s0277-9536(01)0

Willis, Leigh A., et al. “Uncovering the Mystery: Factors of African American Suicide.” Suicide and Life-Threatening Behavior, vol. 33, no. 4, 2003, pp. 412–429., doi:10.1521/suli.33.4.412.25230.

CHAPTER 2: SOCIOECONOMIC DETERMINANTS OF SUICIDE MORTALITY: A COUNTY LEVEL ANALYSIS OF DEMOGRAPHIC DIFFERENCES

2.1 Introduction

Research studies have determined that health outcomes are influenced by economic fluctuations (Ruhm, 2000; Belles-Obrero and Castello, 2018), but the mechanisms have largely remained unclear or imprecise. Oscillations in an economic system have direct and indirect consequences on mortality rates; for instance, direct impacts through appropriations to federal health care expenditures that affect the number of lower income individuals that have access to healthcare (Cleereen, 2016). Indirect impacts occur through individual income changes that affect engaging in activities that have adverse effects on health. Christopher Ruhm (2000) suggested that economic downturns (as a result of external income factors), can actually be "good" for your health. Due to the disparate results of recent studies (with regard to certain causes of death, such as suicide and homicide), a strong focus has been placed on the interdisciplinary study of the impact of business cycles on human mortality. An overwhelming majority of research has demonstrated that mortality has a procyclical relationship to the business cycle in some of the leading causes of death such as: cardiovascular disease (Brenner, 1971; van den Berg et al., 2008), liver disease (Ruhm, 2000; Gonzalez and Quast, 2010) and respiratory disease (Tapia Granados et al., 2013; Huetel and Ruhm, 2013). The relationship between socioeconomic indicators and the business cycle are of interest, particularly the vulnerability of specific groups of different socioeconomic statuses to suicide mortality risk. Analysis in this framework can ensure that properly targeted prevention efforts will make a difference in mitigating deaths by suicide.

It has been demonstrated that a direct link between suicide mortality and fluctuations in business cycle indicators is non-causal (Beautrais et al., 1998). The association is better described by the factors that contribute to employment status and their correlation to suicide mortality. This research acknowledges that there is a medical as well as a social perspective as to the motivation in taking one's life. Relegating suicide ideation or mortality to a medical assessment (i.e. mental illness), is to misunderstand the societal factors that can impact suicide rates (Gunnell et al.,1995), particularly in aggregate versus individual levels of analysis. In consideration of the impact of socioeconomic measurements on suicide mortality, it must be noted that a causal argument is difficult to obtain. In the analysis of suicides over the business cycle, it is imperative to state that the motivations of an individual to die by suicide are not solely attributable to movements in socioeconomic characteristics[33] (Taylor et al., 2004).

Socioeconomic variables used in this study are composite variables that affect health outcomes and mortality in multiple ways. For instance, educational attainment affects an individual's earnings, access to healthcare and mental support services, and dietary resources, but also influences an individual's ability to rationally and logically think of the health consequences of their decisions. Marital status as a measure of socioeconomic status, also has an impact on mortality. Research suggests that there are several mechanisms by which this outcome occurs. First, resources between married individuals is presumably greater than non-attached individuals, which has positive effects on health outcomes (Hahn, 1993). Second, social relationships as a regulation on physical behaviors can affect individual mortality. Belonging, support and companionship are just a few of the supposed benefits marriage offers to one's overall well-being. At an aggregate level, Thoits (2011) suggests that the influence of social

[33] With regard to the initial psychological state of an individual.

norms (such as marriage) can affect: diet, exercise, usage of drugs, alcohol and tobacco and the usage of preventive care and mental counseling. Lastly, there is considered to be a selection effect into marriage. This idea suggests that healthier people are more likely to find a partner than individuals who are mentally or physically disabled (Drefahl, 2012). These points are mitigated by the fact that there are an increasing number of individuals who engage in cohabitation, effectively obtaining the benefits of marriage without being married, but the association between marriage and health remains (Schaller, 2013).

Previous research has suggested a countercyclical relationship between educational attainment and suicide rates (overall), simply through the mechanisms of higher incomes and thus, access to greater resources. Social influences also impact an individual's mental well-being. A larger proportion of similarly educated individuals, can impact the mental reasoning of an individual and/or treatment decisions[34]. The impact of marriage on suicide rates is consistent with its attenuating impact on overall mortality statistics. It has been shown that the regulating effects of marriage decreases the suicide rate, more so for men and less so for women (Kposowa, 2000). Moreover, there are demographic subgroup differences that are addressed in this paper, but this result holds for an overall analysis of the U.S. population.

This study's primary objective is to describe the association between socioeconomic variables (marital status, educational attainment, per capita income, income inequality (via the Gini coefficient)) and the unemployment rate, as determinants in the suicide counts of different demographic subgroups (race, gender and age) between 2005-2012. In effect, this paper attempts

[34] It is not this paper's intent to suggest that intelligence is directly or indirectly related to suicide. Abel and Kruger (2005) noted that their study did indeed find a negative association between education and suicide, but not by intelligence (or its measure, the IQ score). This is because the mechanism in which IQ could affect the suicide rate (i.e. income) would be through its conversion by education and training.

offers a deeper intuition to the more central idea that economic fluctuations affect the flows of socioeconomic determinants, which in turn affect the subgroup suicide count in aggregate areas. Using aggregated individual mortality data provided by the National Center for Health Statistics at the Center for Disease Control[35], I have evaluated socioeconomic predictors of county-specific suicide mortality rates[36]. Using temporal and state fixed-effect controls in zero-inflated negative binomial regression models, I identify between county differences of business cycle fluctuations over the Great Recession. This paper analyzes specific subgroup populations stratified by race (black non-Hispanic and white non-Hispanic) and gender (female and male).

This research contributes to the growing literature regarding the business cycle impacts on suicide mortality. The inclusion of socioeconomic variables stratified by demographic subgroup at the county level is a means of considering the local impact of business cycle oscillations beyond a state or national level which can obscure concentrated trends. Most research has been relegated to the national or state level due to data availability or the rigor of the analysis. Chapter 1 addressed the consequences to the estimation results, at higher levels of aggregation. Also included in this research is the impact to which the prevalence of gun ownership impacts the statewide suicide count. Prevalence and availability of firearms is directly correlated to increased levels of lethal violence (Kposowa, 2015), and therefore relevant to suicide research.

Regression findings indicate that unemployment is positively related to each subgroup, but only significantly so for white males. This result is further developed as it provides evidence that not all demographic subgroup suicides are significantly correlated to unemployment.

[35] National Center for Health Statistics Compresses Mortality File (1968-2015), as complied from data provided by the 57 vital statistics through the Vital Statistics Cooperative Program.
[36] It is a count but the ZINB model accounts for the rate by inflating the pop variable

Marriage as a socioeconomic determinant is significant and negatively associated with the suicide count for each subgroup, with the exception of black females for which it is negative with no significance. *A priori*, marriage acts as a regulation on destructive personal behavior, particularly for males. Increased educational attainment estimates counter theory in that a positive association is demonstrated for each subgroup, this result is also found in the per capita income variable. Of relative interest is the impact of inequality, expressed by the Gini coefficient. Results indicate a positive and strongly significant relation to inequality and suicide but by a much larger magnitude for both black males and females, much more so than their white counterparts. The coefficients on the Gini variable for black males and females are 8.06 and 11.52 respectively. For white males and females, the estimated coefficients on the Gini variable are 1.358 and .94 respectively. The impact of inequality on the suicide rate for black males is more than 6.5 times higher than white males. For black females, the impact is more than 12.25 times higher than their white female counterparts.

The paper proceeds as follows. Part 2 is the literature review of previous research on the business cycle impact on suicide mortality for different subgroups. Part 3 is the outline of the theory behind the chosen variables. Part 4 describes the data and methodology used in the quantitative analysis. Part 5 presents the empirical findings and interpretation of specific results. Part 6 concludes the paper with future research suggestions and methodological estimation enhancements.

2.2 Previous Research on Suicide

The epidemiology of suicide has been the subject of study for a multitude of disciplines within scholastic social science, as well as government agencies at various levels of aggregation.

The interdisciplinary nature of health economics has prohibited a vast amount of research within the economics discipline.

2.2.1 Differences in Suicide Mortality Between Black and White Americans

Suicide rates across the United States are considerably different when controlling for race. In the year 2017, the suicide rate for whites (15.85/100,000) more than doubled that of the suicide rate for blacks (6.61/100,000) (CDC Newsroom, 2018). Differences in the motivation to die by suicide based on structural conditions are evident within race but less so between them. Socioeconomic disadvantage increases suicide rates amongst whites overall, but not (significantly) for blacks. And despite having higher rates of unemployment and poverty coupled with lower rates of educational attainment and marriage, suicide rates among blacks remain significantly lower than whites.[37] Kubrin et al. (2006) demonstrates that industrial composition in urban areas has a concentrated effect on inner cities and in fact does increase suicide rates amongst blacks (in the lower income strata) due to decreased employment opportunities and increased poverty levels. As it relates to unemployment, the same result persists for whites. Case and Deaton (2015; 2017) outline an argument for increasing morbidity and mortality rates amongst whites as being a consequence of declining economic advantage. Suicide amongst whites has been increasing since the year 2000, and although suicide rates are exacerbated by oscillating unemployment rates, there is a persistent increase in suicide mortality amongst whites regardless of economic pressures. These results indicate that suicide rates for blacks and whites

[37] This is not necessarily the case when controlling for age, which is addressed further in the paper.

are beset by other variables that mitigate suicide rates for blacks (resilience) and exacerbate them for whites (cumulative deprivation[38]).

Utsey et al. (2007) reviewed recent literature on the lower (but increasing) rates of suicide amongst African Americans and determined that the protective factors have largely been attributed to the cultural resilience amongst African Americans; a coping mechanism born of systematic oppression. The pillars of cultural resilience are close family relationships, supportive social networks and spiritual based coping. Wingate et al. (2005) suggests that blacks have lower suicide rates in southern states as a result of low racial integration. Figure 2.1 illustrates the difference in mean suicide rates (as a percent) between black and white males across the continental United States. Differences in mean suicide rates are largest in the southern states (though not exclusively), giving credence to kinship and community segregation as protective factors[39]. Figure 2.2 shows the mean differences between black and white females. This cartograph illustrates the similar patterns as males, with higher differences in the South and West. Identification of the regions where differences are most prevalent, supports the idea that those areas that are traditionally less segregated and therefore stronger familial and community ties, positively impact the black suicide rate.

2.2.2 Differences in Suicide Mortality between Females and Males

In the United States, gender differences in suicide mortality rates are persistent across race. In 2017, male suicide rates were 3.54 times higher than female suicide rates across the United States (CDC Newsroom, 2018). While suicide decedent rates are greater for males than

[38] Case and Deaton (2017) define "cumulative deprivation" as the result of changing labor force outcomes for lower educated individuals, along with lower rates of marriage and religiosity. This cumulative deprivation manifests itself in increased predisposed dysfunctional behaviors such as alcohol and drug abuse.
[39] This paper does not specifically address protective factors as independent variables in the quantitative estimation but is recognized and reserved for future research.

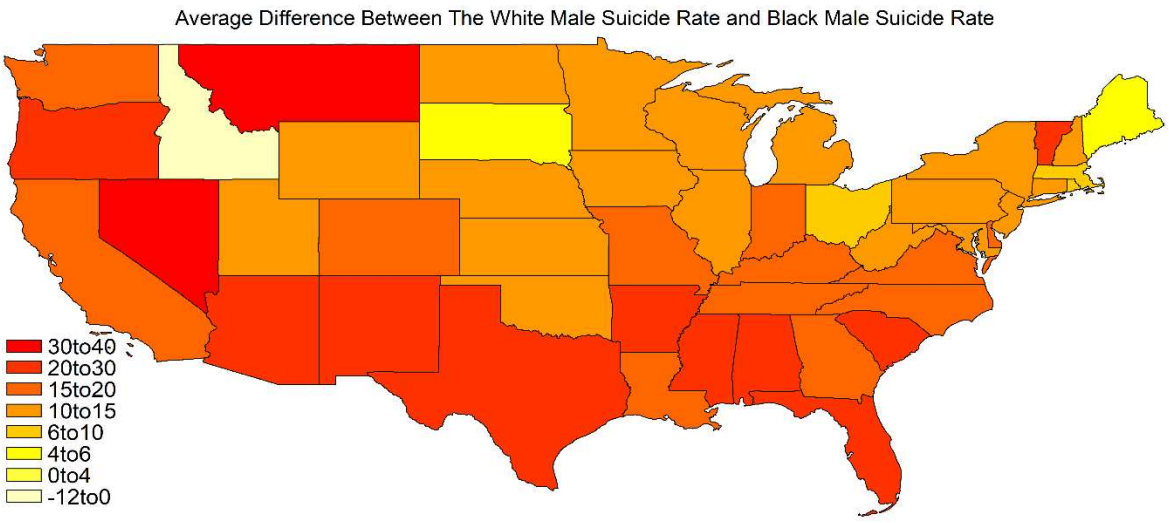

FIGURE 2.1 AVERAGE DIFFERENCE BETWEEN BLACK AND WHITE MALE SUICIDE RATE

females, suicide attempt rates are greater for females than for males (Mościcki, 2001). Differences in male and female suicide rates have been postulated to be differences in method (Tsirigotis et al., 2011) which ultimately determines intent (Arensman, 2017). In western countries, males tend to attempt suicide by more lethal means, such as firearms, hanging and asphyxia. While females tend to use less lethal means of attempt such as intentional drugoverdose and poisoning and exsanguination[40]. Arguably these are less lethal means of death by suicide and are more subject to misclassification.

2.2.3 Gun Prevalence and Suicide Mortality

Previous studies have shown that lethal violence directly correlates with the availability of firearms, particularly, in those states where gun controls are the weakest. Hamilton and Kposowa (2015) examined the trends of lethal violence by state based on the correlation between suicide rates and gun prevalence. They determined that the incidence of suicide increased in those states that were more rural and the populations had larger percentages of non-Hispanic

[40] Exsanguination is the action or process of draining or losing blood. "Exsanguination." *Merriam-Webster*, Merriam-Webster, www.merriam-webster.com/dictionary/exsanguination.

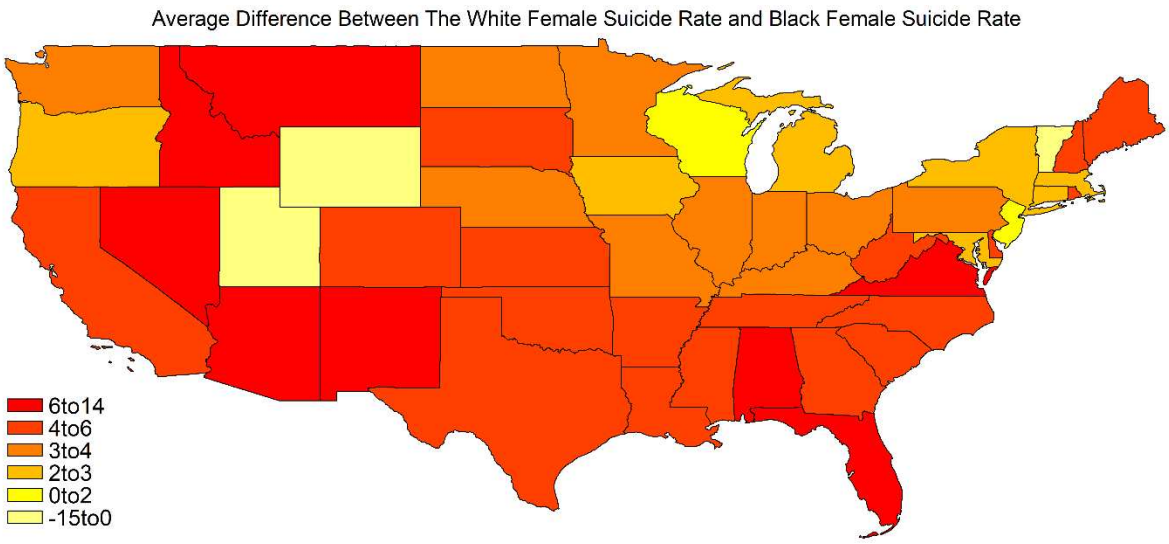

FIGURE 2.2 AVERAGE DIFFERENCE BETWEEN BLACK AND WHITE FEMALE SUICIDE RATE

white males. Anestis and Houtsma (2016) conducted a similar study that stratified on a broader set of covariates relating to psychopathology (previous suicide ideation and/or attempts), substance abuse, criminal history, etc. They found that gun ownership predicted overall statewide suicide rates beyond the influence of other covariates relating to mental disposition.

Gun suicides are the most predominant method of suicide across the United States. Almost every state has a gun suicide percentage of over 80% with the exception of California, Connecticut, Delaware, D.C., Illinois, Iowa, Ohio, Maryland, New Jersey, New York and Rhode Island which include all of the states with smaller proportions of gun ownership (California, Connecticut, D.C., Illinois, New Jersey, New York and Rhode Island).

2.3 Theory

2.3.1 Socioeconomic Indicators and the Business Cycle

The link between business cycle fluctuations and movements in socioeconomic indicators has found a renewed interest after the recent “Great Recession” of 2008-2009. The Great

Recession gave researchers the unique opportunity to study specific changes over the business cycle, due to the severity of the recession and longevity of the recovery. Researchers have found mixed results in their efforts to determine either procyclical or countercyclical trends in indicators such as marital status, educational attainment, health and income distribution inequality. Thus, it would be misguided to point to a single risk factor or variable (economic or social) that can solely describe trends and patterns in changing suicide rates. Considering the interactions of many variables is the only way to understand the changing trends holistically (Rehkopf and Buka, 2005).

2.3.2 Marital Status as a Socioeconomic Consequent of the Business Cycle

Both marriage and divorce rates have been predicted to be negatively impacted during a recession (Hoynes et al., 2012; Cohen, 2014). Marriage rates have been posited by some to be negatively impacted during recessions due to the monetary outlay the endeavor entails (Schneider and Hastings, 2015). Watson and McLanahan (2009) hypothesize that marital status is a reflection of income status, being that lower income individuals are less likely to get married, which persists regardless of race (black and white), but by different magnitudes. It is suggested that a certain standard of living is (relatively) associated with marriage, which can mitigate the marriage rate, especially during economic downturns for lower income groups. Becker (1973) suggested that a theoretical model of utility supports this fact. He stated that individuals engage in marriage only when the utility of marriage is greater than the utility of independence, and to that end, it is specialization of tasks that increases that utility. In a traditional sense, if the male brings income and the female supports the household duties, a negative shock to the male's income will decrease the utility of the marriage. If it is the female's income that falls, the opposite impact occurs, as the opportunity cost of household support decreases, and can increase

the utility of marriage with increased specialization[41]. Divorce rates have also shown a procyclical relationship to the business cycle. If marriage is an insurance against negative income shocks, then divorce rates would necessarily decline in an economic downturn (González-Val and Marcén, 2017). The procyclical nature of the two marital statuses indicates that marriage can be a protection against negative income shocks but also agitated by them. It is this duality that demonstrates the importance of time period and regional specific analysis with regard to marital status.

2.3.3 Educational Attainment as a Socioeconomic Consequent of the Business Cycle

The relationship between educational attainment and the business cycle is relevant as to the impact of changing unemployment rates amongst the strata of educational attainment levels. Higher education levels generally have higher employment rates and lower risk of unemployment. Being that skilled labor has not only a smaller chance of becoming unemployed during a recession; but also, a shorter duration of unemployment if unemployed (Mincer, 1991), higher levels of educational attainment should be a protection against economic downturns. Schmidt (2018) found that postsecondary enrollment increased from 2006-2011, with a subsequent decline in 2011-2015. With most of the change in enrollment occurring at the undergraduate level and the majority of new enrollments over the prior year, indicating education as a protective factor against recessions. State appropriations to higher education are procyclical, which suggests that funding falls during economic downturns, despite increases in individual enrollment during recessions (Humphreys, 2000). Increased individual demand for human capital

[41] This argument is antiquated as it describes a theory of marriage based upon traditional household norms that do not necessarily apply to this era as more and more females participate in the labor force (either solely or in conjunction with male income earners). This theory also does not account for the increasing rates of cohabitation amongst couples without engaging in marriage, where the benefits of marriage can be realized without engaging in the institution (with the exception of marital tax credits).

during the Great Recession warranted increased funding by the Obama administration to support expanded enrollments (Douglass, 2010). A priori, education acts as a protective factor against the negative impact of recessions, despite increasing costs (as a result of increased demand).

2.3.4 Inequality as a Socioeconomic Consequent of the Business Cycle

The supposition of procyclical income fluctuations during the business cycle are derivative, but the distributional effects of economic downturns is not. Analogous to the effect of business cycle fluctuations on different levels of educational attainment, the impact of a recession on income, affects income groups disproportionately. This is the result of differences of the likelihood and longevity of unemployment along the income strata. Low-income workers are likely to be hit hardest during economic downturns because of the stronger relationship between unemployment and the business cycle. Procyclicality and volatility of unemployment for that group is stronger relative to higher income earners (Casteñeda et al., 1998).

Another less noted impact of increased unemployment on low-income earners is the coupling effect of cyclical unemployment to structural unemployment. Since low-income earners are most likely to become unemployed during an economic downturn, their initial unemployment is cyclical, and due to increased demand for education and skills training during economic downturns, their unemployment can become structural, worsening the negative psychological and physical effects in an individual sense, but also worsening income inequality in an aggregate sense. (Mocan, 1999). This paper does not separate different types of unemployment in any period, but as previously stated, I do capture the impact of income inequality on the suicide count through the Gini coefficient. This method is best to capture the overall impact of not only worsening labor outcomes during and after a recession, but also the deterioration of economic standing for those whose remain employed, yet incomes worsen.

Analysis at an aggregated level, requires consideration of the spatial effects of economic downturns on lower income areas and minorities. It follows that lower income areas are hit harder by recessions due to the aforementioned impacts of unemployment on low income earners. Kuruvilla and Jacob (2007) show that higher rates of mental illness are more prevalent in areas of higher poverty, homeless and unemployment rates. Citing poverty leads to mental disorders through accumulated stress, which causes depression and anxiety. Runciman (1966) supposed that relative deprivation led to a cycle of cumulative causation that increased social deprivation associated with income inequality. The negative effects of income inequality such as social and health outcomes (Wilkinson, 2006) are compounded by racial injustices which leads to increased crime and violence (Harer and Steffenmesiter, 1992). Burr et al. (1999) determined that the risk of suicide was increased in urban areas where occupational and income inequalities were greatest, particularly for young black males.

2.3.5 Consequences of the Business Cycle by Age

Conventional economic theory on the impact of the business cycle on age specific cohorts, suggests that unemployment amongst younger, less experienced, lower income workers would be more sensitive to economic shocks than those of higher age cohorts (Blanchard and Diamond, 1990). Recent research has suggested that during and after the Great Recession, younger workers are more likely to transition from unemployment to employment, implying that the Great Recession altered the way we should examine flows in and out of the workforce (Xu and Couch, 2017). Although current research finds that younger workers transition from unemployment to employment at a higher rate during an expansion, there is no evidence that the movement occurs in the opposite direction in the event of a recession. Thus, the impact of

unemployment would deepest amongst middle and older aged cohorts with respect to the longevity of unemployment, and its detrimental impacts.

2.4 Data and Methodology

2.4.1 Data

This paper examines the demographic and socioeconomic differences as they relate to suicide counts within counties in the United States. The data used for this project was retrieved from several sources. The individual mortality data was retrieved from the National Center for Health Statistics at the Center for Disease Control[42]. The longitudinal data comes from the compressed mortality files on non-public use mortality for the years 2005-2012. All mortality data is aggregated to the county level. There are 3,142 counties in the United States, analyzed for eight years, yielding 25,056 observations for each subgroup regression.

The suicide count is the suicide count for each race and gender group. Race categories are White (non-Hispanic) and Black (non-Hispanic). Age groups are broken into seven intervals: 0-14, 15-24, 25-34, 35-44, 45-54, 55-64 and 65 plus. Per capita income (in 2010 dollars) was also included and retrieved from the CPS 5-year estimates; each observation is race specific for each county. Marital status is broken into four categories: never married, married, divorced/separated and widowed. Each of the categories is a share of the demographic population 25 years and above. Educational attainment is also broken into four categories: less than high school, high school, some college and bachelor's plus. Each of the categories is a share of the demographic population 25 years and above. The unemployment rate is the subgroup specific unemployment

[42] National Center for Health Statistics Compresses Mortality File (1968-2015), as complied from data provided by the 57 vital statistics through the Vital Statistics Cooperative Program.

rate. Each of the explanatory variables was retrieved from the Current Population Survey (CPS) at the Census Bureau. These explanatory variables were constructed as ratios of those in the category over the demographic population and reflect 5-year estimates[43].

State controls are also included. Unemployment insurance is the maximum amount of insurance allowed to be collected in each state, expressed in 2010 dollars[44]. This variable was retrieved from the U.S. Department of Labor[45]. The Gini coefficient is specific to county and time, but not to demographic subgroup. This variable was also retrieved from the CPS 5-year estimates. Gun ownership is the percentage of households in the state that have a gun in the household. This data was retrieved from the Behavioral Risk Factor Surveillance System, conducted by the CDC for the year 2004. I constructed categories for three levels of household gun ownership as a percentage at the state level: 0-20, greater than 20 and less than or equal to 40 ($20<x\leq40$) and 40 plus[46].

2.4.2 Motivation for County Level Analysis

Analyzing group level differences is imperative to isolate influences that are objective to the individual (Lawless and Lucas, 2010). Differences in individual experiences are important to suicide mortality research, but the intent of this paper is to substantively identify characteristics of general subgroup populations in effort to determine if there are larger causes to the individual problem. According to Rehkopf and Buka (2005), area of aggregation by socioeconomic status, was a determinant in 221 independent analyses. They concluded that as the area of aggregation

[43] Data table information is available in the appendix.
[44] In the years during and after recession, the maximum allotted time to collect payment was accounted for.
[45] Significant Provisions of State Unemployment Insurance Laws, January 2005
[46] The rational inclusion of the index for all of the years is based on the assumption that the number of households that own firearms may change but the percentage will not vary much by state over the course of the specified time period.

was reduced (from nation to county or smaller), there was a stronger inverse association demonstrated between socioeconomic position and suicide rates.

2.4.3 Concerns of Misclassification

Empirical analysis in this paper investigates the quantitative relationship between socioeconomic variables and the suicide rate for the period of 2005-2012. One of the difficulties in the empirical estimation of health economics is suicide classification. Determination of a death by suicide is subject to the coroner's or medical examiner's certification of the event. This presents the opportunity for bias in the determination of a suicide or an accidental death. Rockett et al (2010) suggests that the lower register of suicide rates for non-Hispanic Blacks and Hispanics may be the result of misclassification. If socioeconomic factors are indicators of potential suicide risk, the disproportion of minorities in adverse socioeconomic categories (higher poverty rates, lower marriage rates, lower educational attainment and rising regional income inequality) should reflect this reality, but it does not. Similarly, Canetto and Sakinofsky (1998) argue that the "gender paradox" may also be a consequence of misclassification and/or cultural differences in the classification and ideation of fatal and non-fatal suicide behavior.

Differences in determination are also recognized by the education credentials of the adjudicator (medical examiner or the coroner). Medical examiners are almost always medically trained as pathologists or forensic pathologists that have the ability to perform autopsies and are appointed by local government officials. Coroners are either appointed or elected and most are not trained as pathologists, but according to the CDC, both attend a death investigation training school prior to the tenure of their office. Shapiro-Mendoza et al (2017) reported that 97% of medical examiners had post-secondary levels of educational attainment, while 32% of coroners had attained the same level. Rockett (2018) stated that those cases of death which are possible

suicides (no note was found, cases of accidental or intentional poisonings) required more stringent investigative standards that come with increased training. The researcher also suggests that there is a reluctance of coroners to probe pertinent personal issues required for determination of death by suicide, leading to misclassification.

This paper does not quantitatively account for misclassification in the analysis of suicide data as provided by the CDC for three reasons. First, quantitative methods for determination of misclassification bias vary and the true extent and direction of misclassification is unknown. Second, to the extent that misclassification occurs, accounting for individual title and/or education, does not fully consider the potential bias, which is born out of not only the training of the individual but the cultural beliefs of the adjudicator. Finally, in the determination of the usage of a medical examiner or a coroner is not uniform for every state. Some states use either a medical examiner or coroner throughout the state, and some states use a combination of the two (where some counties use a coroner and some use a medical examiner), a process that is determined by the county itself, not the state. Therefore, usage by county could only be determined through a rigorous survey of each county.

2.4.4 Model

Suicide count data is non–negative integer–valued data and therefore requires a count model process (Greene, 2000; Cameron and Trivedi, 1986). The Poisson process is not a feasible model for this dataset due to the abundance of (excess) zero occurrences. Figure 2.3 illustrates the frequency of suicide counts for all counties in the United States by subgroup. The frequency

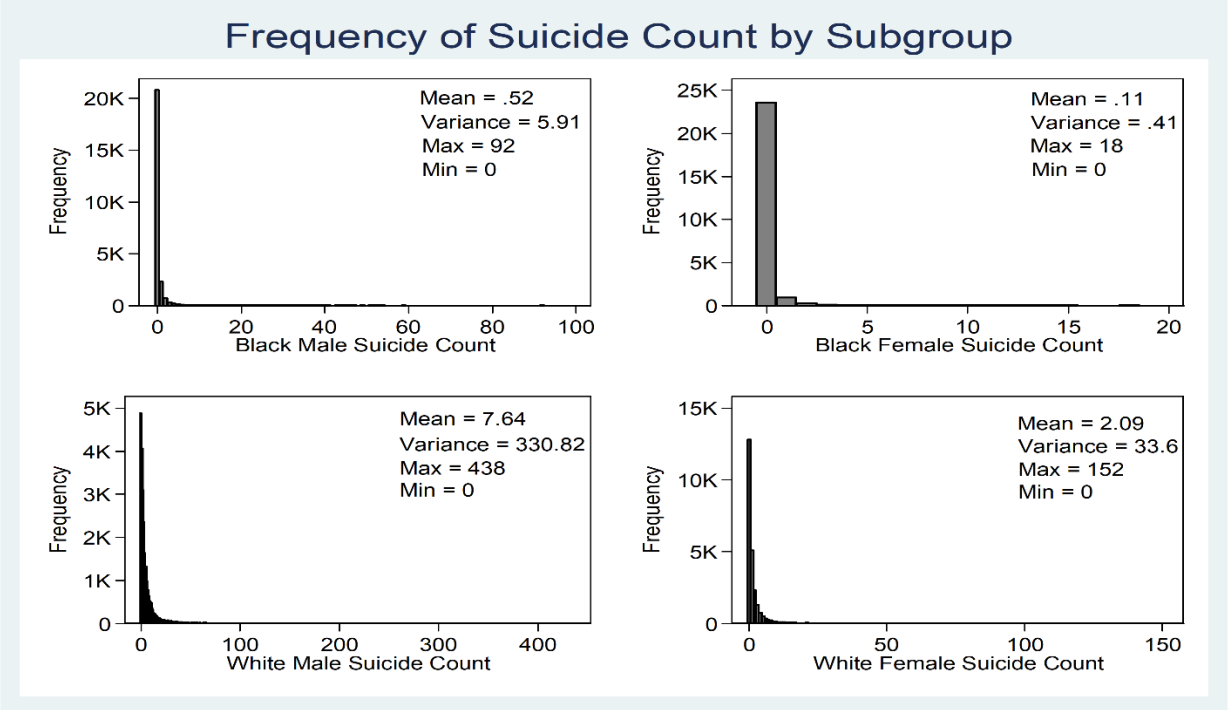

FIGURE 2.3 FREQUENCY OF SUICIDE COUNT BY SUBGROUP

of a zero-suicide count is largest for blacks, but the variance is larger than the mean for each subgroup. Due to the over dispersion of zeros in the model, the variance is larger than the mean making the zero inflated procedure most appropriate. The nature of the zeros in a particular observation (county) could be the result of two separate count processes[47]. The first type of zeros in the dependent could result from zero occurrences in the county/time period (true zeros). The second could be the result of a zero population (excess zeros) of the subgroup. Each of these zeros can be determined independently. If there were an overabundance of true zeros, the negative binomial process would suffice, but the nature of this data set and the abundance of excess zeros, makes the zero inflated negative binomial model the most employable.

[47] Using a Poisson or Negative Binomial regressions can lead to under prediction when zeros can be determined by an independent count processes.

The zero-inflated negative binomial model (zinb)[48] is a special case of the negative binomial model, which in itself is the Poisson model with an unobserved heterogeneity term. This unobserved term is the increased deviation of the variance from the mean. We can describe the conditional mean as:

$$E[suicide\ count_{it}|x_{it}, \delta_{it}] = \mu_{it}\delta_{it} = e^{x_{it}^{T}\beta+\varepsilon_{it}} \tag{2.1}$$

$\mu_{it}\delta_{it}$ is the mean incidence rate of suicides per unit of exposure. μ_{it} is the expectation of the vector of k regressors for observation *i* in time period *t*. δ_{it} is independent of the vector of regressors x_{it}. Heterogeneity differences are due to the random component, $\delta_{it} = \varepsilon_{it}$. The negative binomial expression is:

$$\mu_{it} = \exp\left(\ln(\delta_{it}) + \beta_1 x_{1it} + \beta_2 x_{2it} + \cdots + \beta_k x_{kit}\right) \tag{2.2}$$

where, β is the estimation coefficient and x_{kit} is the kth explanatory variable for the *i*th county in time period *t*.

The Poisson regression model is:

$$\Pr(Y = suicide\ count_{it}|x_{it}, \delta_{it}) = \frac{e^{-\mu_{it}\delta_{it}}\mu_{it}\delta_{it}^{\ suicide\ count_{it}}}{suicide\ count_{it}!} \tag{2.3}$$

Let $g(\delta_{it})$ be the probability density function of the random component. So, the distribution of $E[suicide\ count_{it}|x_{it}]$, is independent of δ_{it}. The density function is obtained by integrating with respect to δ_{it}.

[48] Some of the derivations made were referenced from the NCSS documentation of the NCSS Statistical Software package. "NCSS Documentation." *NCSS*, www.ncss.com/software/ncss/ncss-documentation/#OperationsResearch. Chapter 325: Poisson Regression and Chapter 326: Negative Binomial Regression

$$\Pr(suicide\ count_{it}|x_{it}) = \int_0^{\infty} \Pr(Y = suicide\ count_{it}|x_{it}, \delta_{it})\, g(\delta_{it}) d\delta_{it} \tag{2.4}$$

A solution exists when (δ_{it}) follows a gamma distribution[49] ($\delta \sim Gamma(1/\theta, \theta)$). Given, this is the negative binomial distribution:

$$\Pr(Y = suicide\ count_{it}|\mu_{it},) = \frac{\Gamma(suicide\ count_{it}+\alpha^{-1})}{suicide\ count_{it}\Gamma(\alpha^{-1})}\left(\frac{\alpha^{-1}}{\alpha^{-1}+\mu_{it}}\right)^{\alpha^{-1}}\left(\frac{\mu_{it}}{\alpha^{-1}+\mu_{it}}\right)^{suicide\ count_{it}} \tag{2.5}$$

This demonstrates that the negative binomial distribution is a mixture of the Poisson and gamma distributions. Let:

$$\alpha = \frac{1}{\theta} \tag{2.6}$$

The conditional variance of the negative binomial distribution is:

$$Var[suicide\ count_{it}|x_{it}] = \mu_{it}(1 + \frac{\mu_{it}}{\theta}), \tag{2.7}$$

which is greater than the conditional mean.

The zero-inflated negative binomial model uses a negative binomial distribution and a logit distribution, since there are two possible outcomes for each observation. In the first outcome, the observation is zero. In the second outcome, the outcome is non-zero positive and is generated using a negative binomial model. The probability distribution for the dependent variable is as follows:

$$\Pr(y_i = j) = \begin{cases} \pi_i + (1-\pi_i)g((y_i = 0) & if\ j = 0 \\ (1-\pi_i)g((y_i) & if\ j > 0 \end{cases} \tag{2.8}$$

where π_i is the logistic link function given by:

[49] A gamma distribution arises naturally in processes in which the waiting times between Poisson distributed events are relevant. "Gamma Distribution." *From Wolfram MathWorld*, mathworld.wolfram.com/GammaDistribution.html.

$$\pi_i = \frac{\lambda_i}{1+\lambda_{it}} \tag{2.9}$$

The expectation of the logistic component:

$$\lambda_i = \exp\left(\ln(\delta_{it}) + \gamma_1 z_{1it} + \gamma_2 z_{2it} + \cdots + \gamma_k z_{kit}\right) \tag{2.10}$$

where, γ is the estimation coefficient and z_{kit} is the kth explanatory variable for the *i*th county in time period *t*.

The zinb model was adapted to account for the longitudinal dataset. In this form, the negative binomial component (2.2) and the logistic component (2.10) are transformed so that the exposure term includes all explanatory variables and indices for fixed effects and temporal effects are added as explanatory variables (not included in the exposure term). The resulting equations are:

$$\mu_{it} = \exp\left(\ln(\beta_1 x_{1it} + \beta_2 x_{2it} + \cdots + \beta_k x_{kit}) + \beta_1 x_{1it} + \beta_2 x_{2it} + \cdots + \beta_k x_{kit} + State^S + Year^T\right) \tag{2.11}$$

$$\lambda_i = \exp\left(\ln(\gamma_1 z_{1it} + \gamma_2 z_{2it} + \cdots + \gamma_k z_{kit}) + \gamma_1 z_{1it} + \gamma_2 z_{2it} + \cdots + \gamma_k z_{kit} + State^S + Year^T\right) \tag{2.10}$$

Adaptation in this way allows for unconditional state and year fixed effects, and the regression is clustered at the state level. State level fixed effects are used because there are time-invariant properties of each state that are unique. Accounting for these fixed effects allows the over-time average of each state to be removed. State level fixed effects are used instead of county because it is assumed that there would not be time invariant unique properties at the county level within

each state jurisdiction[50]. The model then reflects the estimates based on time variation within each state. Each state has its own intercept, allowing for consideration of the time-invariant regional differences (Hilbe, 2011).

2.4.5 Descriptive Statistics

Table 2.1 describes the county variable averages during the period 2005-2012 for each demographic subgroup and table 2.2 exhibits the state level variable averages. Mean data examination coincides with previous research analysis. Suicide rates[51] for white males (29.18) was the highest of all subgroups with black males (15.38) having the second highest, more than doubling white females (6.5) and black females (3.79) with the lowest, accounting for one seventh of the white male suicide rate. The average unemployment rate for black males (14.02) was nearly twice as high as that for white males (7.27) across all counties in the United States. Female unemployment was lower for both races; as black females (10.99) had an average unemployment rate that was lower than black males but higher than white males and females (6.43). Couch and Fairlie, (2010) stated that trends in increased unemployment impacts different subgroups at different points in the downturn. Blacks are the first fired in an economic recession and therefore should suffer the greatest impact on suicide mortality from an economic downturn. In the consideration of concentrated disadvantage, mean comparisons indicate that this reasoning does not hold between races (although some previous studies posit that inequality within race does hold as a consistent predictor for whites (Kubrin and Wadsworth, 2009)). Socioeconomic variable means demonstrate the same pattern of inverse relation. Educational attainment for

[50] Rey and Janikas (2005) found that spatial clustering of incomes occurred at the state level, but not at the county level. Although inequality within states increased overtime, spatial clustering of incomes did not. This can reasonably be applied to the other included socioeconomic determinants in the model.
[51] Suicide rates are expressed in units per 100,000.

TABLE 2.1 COUNTY LEVEL MEANS AND STANDARD DEVIATIONS

	COUNTY			
VARIABLES	Black Males	Black Females	White Males	White Females
Suicide: per 100,000				
Suicide Rate	15.38	3.79	29.18	6.5
	(299.3)	(219.6)	(81.18)	(29.72)
Unemployment:				
Unemployment Rate	14.02	10.99	7.27	6.43
	(18.66)	(17.11)	(3.71)	(3.38)
Educational Attainment:				
Less than High School Rate	21.58	17.50	13.37	11.57
	(20.21)	(20.12)	(6.71)	(5.77)
High School Rate	33.47	26.44	36.07	34.13
	(23.51)	(23.72)	(8.69)	(7.64)
Some College Rate	24.88	27.34	28.74	31.97
	(21.54)	(24.37)	(6.3)	(5.95)
Bachelor's Plus Rate	10.91	13.74	21.5	22.02
	(16.50)	(18.99)	(10.82)	(9.78)
Age:				
0 – 14	17.95	20.22	17.37	16.24
	(16.58)	(19.66)	(3.3)	(3.11)
15 – 24	19.44	16.9	12.55	11.45
	(18.37)	(19.3)	(3.99)	(3.85)
25 – 34	14.62	10.51	11.08	10.49
	(15.05)	(13.35)	(2.62)	(2.51)
35 – 44	13.36	10.36	12.18	11.76
	(14.08)	(12.94)	(2.21)	(2.08)
45 – 54	12.71	11.33	15.19	14.93
	(13.09)	(13.84)	(2.24)	(2.23)
55 – 64	8.82	9.4	14.49	14.48
	(11.54)	(13.12)	(2.79)	(2.82)
65 Plus	6.832	11.39	16.85	20.37
	(10.43)	(16.08)	(4.99)	(5.18)
Marital Status:				
Never Married	48.62	39.81	26.1	19.14
	(25.41)	(27.06)	(6.21)	(5.96)
Married	28.60	25.05	57.54	54.94
	(21.33)	(22.29)	(6.92)	(6.78)
Divorced/Separated	13.42	14.02	12.79	13.65
	(15.02)	(16.07)	(3.48)	(3.53)
Widowed	2.9	9.21	3.29	11.98
	(5.81)	(14.03)	(1.34)	(3.13)
Per Capita Income:				
2010 Dollars	12,840	12,840	24,750	24,750
	(10,500)	(10,500)	(6,552)	(6,552)
	N = 25056	N = 25056	N = 25056	N = 25056

Note: each variable is described as a percent (except suicide rate)[52]

[52] County level means and standard deviations are slightly different than what is reported in Table 1.2 in Appendix A because all observations are used in this analysis (for usage in the ZINB model). In Table 1.2, only those counties with a positive population of the demographic subgroup were used.

TABLE 2.2 REGIONAL CONTROL MEANS AND STANDARD DEVIATIONS

STATE AND COUNTY	
State:	
Unemployment. Insurance: (2010 Dollars)	10,311
	(2391)
Household Gun Ownership:	
Low *(0-20%)*	13.5
	(0.34)
Mid *(>20%,<40%)*	45.3
	(0.5)
High *(>40%)*	0.41
	(0.49)
County:	
Gini Coefficient:	0.44
	(0.043)
	N = 25056

Note: Household gun ownership is described as a percent. Gini is between 0 and 1. Zero indicates perfect equality and one indicates perfect inequality.

black males and females was significantly lower than their white counterparts, with higher averages of lower level educational attainment achieved. Both black and white females had higher educational attainment averages than males. Never married category of marital status was highest for black males (48.62), with almost 50% of black males on average in this category. Although it is significant to mention that males of both races had higher marriage rates than females. Age analysis indicates that blacks held a larger percentage of their population under the age of 44. On average, black males had 65.37% of the population under the age of 44, compared to 57.99% for white males. Black females showed the same result with 53.18% of the under 34 population and white females with just 49.94%. Previous literature has demonstrated that younger black suicides are on the rise, and if fatal and non-fatal suicide behavior persists, older generations of blacks could also be more susceptible to suicide. Joe et al. (2006) posits that this

TABLE 2.3 REGRESSION RESULTS (TRUNCATED)

VARIABLES	(1) Black Male	(2) Black Female	(3) White Male	(4) White Female
Unemployment:				
Unemployment Rate	0.00380	0.00683	0.0524***	0.00706
	(0.00510)	(0.0123)	(0.00245)	(0.00461)
Marital Status:				
Ref: NeverMarried				
Married	-0.0188***	-0.0292	-0.0164***	-0.0407***
	(0.00661)	(0.0234)	(0.00246)	(0.00459)
Divorce/Separated	0.0358***	0.0110	0.0199***	0.0611***
	(0.00642)	(0.0264)	(0.00359)	(0.00620)
Widow	0.0171	-0.00720	-0.00594	-0.0718***
	(0.0287)	(0.0711)	(0.00771)	(0.00905)
Educational Attainment:				
Ref: High School				
Less Than High School	-0.0137	-0.0277	5.49e-05	-0.00949**
	(0.00871)	(0.0478)	(0.00218)	(0.00437)
Some College	0.0303***	0.0298*	0.0542***	0.0433***
	(0.00825)	(0.0162)	(0.00177)	(0.00317)
Bachelors Plus	0.00890	0.00869	0.0315***	0.0177***
	(0.0109)	(0.0133)	(0.00136)	(0.00253)
Gini Coefficient	8.056***	11.52***	1.358***	0.940**
	(1.178)	(1.680)	(0.232)	(0.384)
Observations	25,056	25,056	25,056	25,056
Non-Zero Observations	4281	1506	20169	12220
State Fixed Effects	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes

Robust Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

increasing trend could become a birth-cohort effect, where manifestations of social norms act on human behavior later in the life cycle, eventually affecting the older cohort suicide rate as well.

2.5 Estimation

The empirical estimation conducted in this paper intends to demonstrate the correlation of specific socioeconomic variables to the suicide count. Table 2.2[53], represents the estimated coefficients for each subgroup.

2.5.1 Unemployment

Changes in the unemployment rate is the most widely recognized indicator for economic health. Previous literature has associated a positive relationship with unemployment and suicide mortality (Pritchard, 1990; Ruhm, 2000; Ionides et al., 2011). This paper segregates demographic subgroups in an effort to uniformly state or refute that conclusion. The unemployment rate estimation was positive for all subgroups. White males had the largest coefficient by magnitude and the only subgroup with coefficient significance. A 1% increase in the unemployment rate yields a 5.2% increase in the suicide count for white males. This result indicates that while unemployment is a positive agitator of suicide, the narrative has been based on the outcome of the white male majority. Yang (1992) demonstrated the same results in a national time series study, noting that unemployment is not a significant indicator of suicide for demographic subgroups other than white males.

White female suicide mortality was demonstrated to be disconnected from the unemployment rate. Kalleberg and Wachter (2017) posit that increases in the unemployment rate for males is larger than for females (especially during recessions) and can therefore have stronger psychological impacts on males. Also, mental health services have been found to have a mitigating effect on suicide risk (NIMH, 2019) and females are most likely to use these services

[53] Complete table in the appendix.

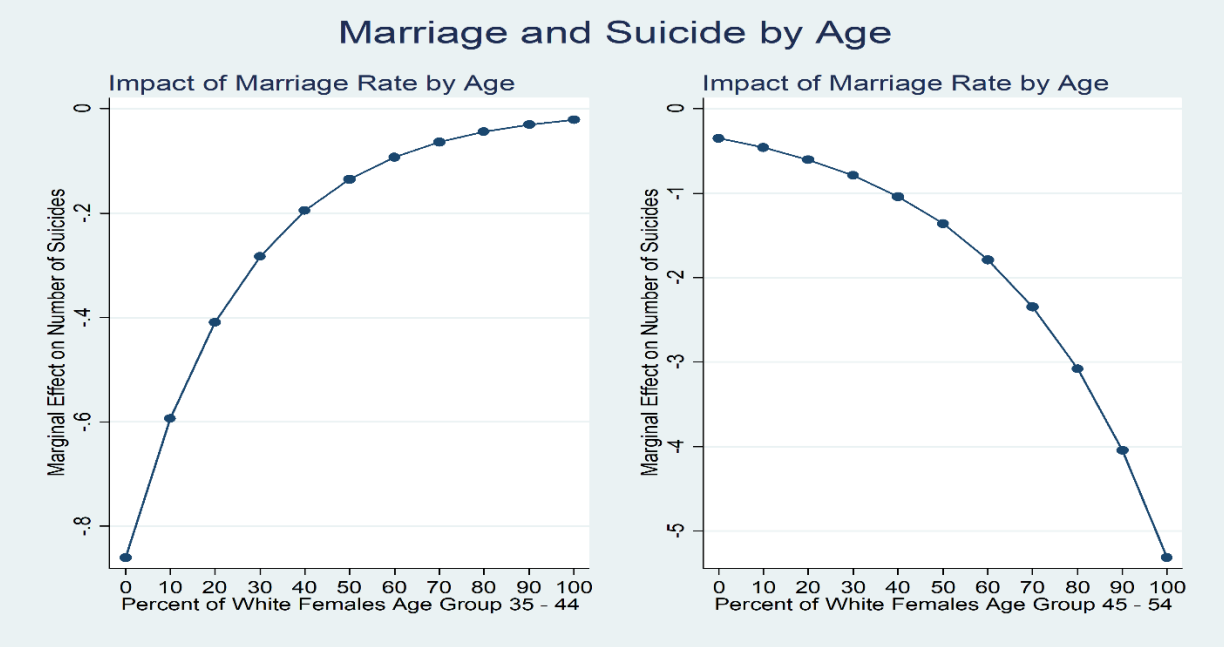

FIGURE 2.3 MARGINAL EFFECT OF MARRIAGE ON WHITE FEMALE SUICIDE BY AGE

in times of mental distress (Kung et al., 2003). The black female and male results were the *a priori* expectation, as demonstrated in the mean analysis comparison but the underlying mechanism for the mitigation of the impact of unemployment (resilience), remains unclear.

2.5.2 Marital Status

As first posited by Emile Durkheim (2013), marriage is generally a behavior regulator (for males) which offers a protection from the behaviors that contribute to suicide ideation. Estimation results indicate a strong negative association between suicide and marriage for each demographic subgroup with the exception of black females. Marriage as a regulator demonstrated roughly the same impact on the black (-.02) and white male (-.016) suicide count. The coefficient on black female (-.029) marriage was negative and insignificant. Previous studies have shown (Indu et al., 2017; Vijayakumar, 2015) that marriage is not a proper mitigant of suicide for females because of the regulation that marriage places on female autonomy and specifically, in situations of domestic violence against women. The coefficient on white females

(-.041) was also negative and significant by double the magnitude of that for males. I believe this result is due to the size of the age groups within the white female demographic. Figure 2.3 illustrates the impact of the marginal change in the suicide count for white females in the age cohort of 35-44 and 45-54. The 35-44 age group demonstrates a positive marginal suicide curve, indicating that increases in the married population of that age cohort reduce the suicide count by a smaller amount. Descriptive statistics showed that there was a larger proportion of white females above the age of 45. The opposite is displayed for females 45-54. It is evident that the larger proportion of older white females is driving this result, as older white females have a downward sloping relationship, indicating a fall in the suicide count as a larger proportion of this cohort inhabits a county.

2.5.3 Educational Attainment

Higher levels of education have been associated with lower suicide risk. These results indicate that higher levels of education correspond to higher suicide counts for every demographic, with significance at the "some college" level for every subgroup. The positive and significant association for white females and males on the bachelors plus category does not support to the a priori assumption that increased education negatively affects the suicide count. Albeit, this analysis contends that socioeconomic factors as they relate to the Great Recession do not necessarily follow epidemiologic norms. Agerbo (2017) suggests that given higher education, higher income and marriage, an individual may be more likely to die by suicide. Daly et al. (2007) also found an increased propensity to die by suicide as median household income increased as a result of "external habit" or subjective well-being. As incomes rise, happiness is derived not by the level of income, but the comparison of that income to others within the same earnings range.

FIGURE 2.4. MARGINAL IMPACT OF UNEMPLOYMENT BY GINI COEFFICIENT

2.5.4 Inequality

Income inequality is measured by the Gini and coefficient has a range from zero to one, with an increase signifying higher income inequality and thus higher relative deprivation. Previous studies demonstrate that as income inequality increases, so does mental illness, violence, drug abuse and teenage pregnancy (Wilkinson and Pickett, 2009). Income inequality contributes to social dysfunction, and by extension, suicide (as a consequent of greater social dysfunction). The estimated coefficients on inequality for black females (11.52) and males (8.91) are positive and significant. White females (.94) and males (1.36) also have a positive and significant relationship with suicide, but by a much smaller magnitude. This result indicates that

inequality has a much larger impact on blacks than for whites. Figure 2.4 shows the marginal impact of increased unemployment as the Gini coefficient increases. As unemployment and the Gini increase, the slope of the curve increases. This means that as the unemployment rate rises, increases in the Gini have greater impacts on suicide counts. A 10 % increase in the Gini coefficient, increases the suicide count by 1.15 for black females, compared to a white female increase of .094 suicides. It is my contention that the impact of income inequality on blacks, compounds the racial systematic oppression that exists beyond earnings levels. Hanks et al. (2018) suggest that essentially, blacks can never have a Gini coefficient of zero, due to structural racism and the creation of the black-white wealth gap. Income inequality only exacerbates the racial inequality that blacks experience, therefore a relative increase in the Gini coefficient has a much larger impact on black suicide.

2.6 Conclusion

The relationship between business cycle fluctuations and suicide mortality remains a highly debated subject as to the method of estimation and interpretation of underlying results. Proper variable identification is imperative in determining the true impact of business cycle fluctuations on suicide mortality in America. It was this paper's intent to demonstrate that business cycle oscillations do not impact the suicide rate for all demographic subgroups through the unemployment rate, but through the flows of socioeconomic status determinants that are correlated with suicide. Differences in socioeconomic status by race and gender indicate that there are external factors that either mitigate or propagate the suicide rate for different subgroups. Despite being the most structurally disadvantaged group with respect to marriage rate, income levels and educational attainment, blacks have the lowest suicide rates of the two

races. This paper's attempt to address some of those factors was just the beginning of a needed body of research into those influences that have traditionally not been regarded as having an impact on mortality rates, specifically, suicide mortality rates (i.e. kinship, community structure, religiosity, etc.).

In this paper I used non-public individual mortality data aggregated to the county level for the years 2005-2012, to demonstrate that unemployment is only a significant determinant in white male suicide, a fact that has largely driven the narrative on suicide prevention during economic downturns. Marital status and inequality measurement were much more significant to other demographic groups than the unemployment rate. Using a zero-inflated negative binomial model (zinb), I was able to isolate the temporal and state level fixed effects, in effort to control for regional differences in suicide. The zinb model allowed for the control of overdispersion, especially amongst those subgroups that had a relatively smaller number of deaths by suicide over the period. A very limited number of empirical papers have addressed this topic from a county level analysis that takes into consideration regional effects. This analysis reveals that estimation outcomes are sensitive to the level of geographic aggregation.

This paper successfully demonstrated that socioeconomic determinants of suicide have a larger influence than unemployment for all demographic subgroups except white males. In an effort to extend the paper from which this one was originally drawn, I have demonstrated that the conclusions formulated in Ruhm (2000) only applied to one subgroup of individuals, and complete analysis of the business cycle impact on suicide mortality requires a cumulative correlation of socioeconomic variables. Regional differences were also displayed through the usage of a smaller aggregation, I was able to account for county level socioeconomic differences that impact suicide mortality.

CHAPTER 2 REFERENCES

Agerbo, E. "Risk of Suicide in Relation to Income Level in People Admitted to Hospital with Mental Illness: Nested Case-Control Study Commentary: Suicide and Income---Is the Risk Greater in Rich People Who Develop Serious Mental Illness?" *Bmj*, vol. 322, no. 7282, 2001, pp. 334–335., doi:10.1136/bmj.322.7282.334.

Anestis, Michael D., et al. "Firearm Legislation and Statewide Suicide Rates: The Moderating Role of Household Firearm Ownership Levels." *Behavioral Sciences & the Law*, vol. 37, no. 3, 2019, pp. 270–280., doi:10.1002/bsl.2408.

Arensman, Ella. "Suicide Prevention in an International Context." Crisis, vol. 38, no. 1, 2017, pp. 1–6., doi:10.1027/0227-5910/a000461.

Beautrais, A. L., et al. "Unemployment and Serious Suicide Attempts." *Psychological Medicine*, vol. 28, no. 1, 1998, pp. 209–218., doi:10.1017/s0033291797005990.

Becker, Gary S. "A Theory of Marriage." *Economics of the Family: Marriage, Children, and Human Capital*, by T. W. Schultz, University of Chicago Press, 1996, pp. 299–351.

Bellés-Obrero Cristina, and Judit Vall Castello. "The Business Cycle and Health." *Oxford Research Encyclopedia of Economics and Finance*, 2018, doi:10.1093/acrefore/9780190625979.013.282.

Berg, Gerard J. Van Den, et al. "Mortality and the Business Cycle: Evidence from Individual and Aggregated Data." *Journal of Health Economics*, vol. 56, 2017, pp. 61–70., doi:10.1016/j.jhealeco.2017.09.005.

Blanchard, Olivier Jean, et al. “The Cyclical Behavior of the Gross Flows of U.S. Workers.” *Brookings Papers on Economic Activity*, vol. 1990, no. 2, 1990, p. 85., doi:10.2307/2534505.

Brenner, M H. “Economic Changes and Heart Disease Mortality.” American Journal of Public Health, vol. 61, no. 3, 1971, pp. 606–611., doi:10.2105/ajph.61.3.606.

Cameron, A. Colin, and Pravin K. Trivedi. “Econometric Models Based on Count Data. Comparisons and Applications of Some Estimators and Tests.” *Journal of Applied Econometrics*, vol. 1, no. 1, 1986, pp. 29–53., doi:10.1002/jae.3950010104.

Canetto, Silvia Sara, and Issac Sakinofsky. “The Gender Paradox in Suicide.” Suicide and Life-Threatening Behavior, vol. 28, no. 1, 1998, pp. 1–23.

Case, Anne, and Angus Deaton. “Mortality and Morbidity in the 21st Century.” Brookings Papers on Economic Activity, vol. 2017, no. 1, 2017, pp. 397–476., doi:10.1353/eca.2017.0005.

Case, Anne, and Angus Deaton. “Rising Morbidity and Mortality in Midlife among White Non-Hispanic Americans in the 21st Century.” Proceedings of the National Academy of Sciences, vol. 112, no. 49, 2015, pp. 15078–15083., doi:10.1073/pnas.1518393112.

Castañeda, Ana, et al. “Exploring the Income Distribution Business Cycle Dynamics.” *Journal of Monetary Economics*, vol. 42, no. 1, 1998, pp. 93–130., doi:10.1016/s0304-3932(98)00015-4.

CDC Newsroom.” Centers for Disease Control and Prevention, Centers for Disease Control and Prevention, 7 June 2018, www.cdc.gov/media/releases/2018/p0607-suicide-prevention.html.

Cleeren, K., Lamey, L., Meyer, J-H. and de Ruyter, K. (2016). How Business Cycles Affect the Healthcare Sector: A Cross-country Investigation. Health Economics, 25(7), pp. 787-800. doi: 10.1002/hec.3187

Cohen, Philip N. "Recession and Divorce in the United States, 2008–2011." Population Research and Policy Review, vol. 33, no. 5, 2014, pp. 615–628., doi:10.1007/s11113-014-9323-z.

Daly, Mary C., et al. "Relative Status and Well-Being: Evidence from U.S. Suicide Deaths." *SSRN Electronic Journal*, 2007, doi:10.2139/ssrn.1026351.

Douglass, John Aubrey. "Higher Education Budgets and the Global Recession: Tracking Varied National Responses and Their Consequences. Research & Occasional Paper Series: CSHE.4.10." *Center for Studies in Higher Education*, Center for Studies in Higher Education. University of California, Berkeley, 771 Evans Hall #4650, Berkeley, CA 94720-4650. Tel: 510-642-5040; Fax: 510-643-6845; e-Mail: Cshe@Berkeley.edu; Web Site: Http://Cshe.berkeley.edu/, 31 Jan. 2010, eric.ed.gov/?id=ED511965.

Drefahl, Sven. "Do the Married Really Live Longer? The Role of Cohabitation and Socioeconomic Status." *Journal of Marriage and Family*, vol. 74, no. 3, 2012, pp. 462–475., doi:10.1111/j.1741-3737.2012.00968.x.

Durkheim Émile, et al. *Suicide: A Study in Sociology*. Snowball Publishing, 2013.

Gonzalez, Fidel, and Tony Quast. "Mortality and Business Cycles by Level of Development: Evidence from Mexico." *Social Science & Medicine*, vol. 71, no. 12, 2010, pp. 2066–2073.

González-Val, Rafael, and Miriam Marcén. "Divorce and the Business Cycle: a Cross-Country Analysis." *SpringerLink*, Springer US, 3 Mar. 2016, link.springer.com/article/10.1007/s11150-016-9329-x.

Greene, William. (1994). Accounting for Excess Zeros and Sample Selection in Poisson and Negative Binomial Regression Models.

Gunnell, D. J, et al. "Relation between Parasuicide, Suicide, Psychiatric Admissions, and Socioeconomic Deprivation." *Bmj*, vol. 311, no. 6999, 1995, pp. 226–230., doi:10.1136/bmj.311.6999.226.

Hahn, Beth A. "Marital Status and Women's Health: The Effect of Economic Marital Acquisitions." *Journal of Marriage and the Family*, vol. 55, no. 2, 1993, p. 495., doi:10.2307/352818.

Hanks, Angela, et al. "Systematic Inequality." *Center for American Progress*, 2018, www.americanprogress.org/issues/race/reports/2018/02/21/447051/systematic-inequality/.

Harer, M. D., and D. Steffensmeier. "The Differing Effects of Economic Inequality on Black and White Rates of Violence." *Social Forces*, vol. 70, no. 4, 1992, pp. 1035–1054., doi:10.1093/sf/70.4.1035.

Heutel, Garth, and Christopher J. Ruhm. "Air Pollution and Procyclical Mortality." *SSRN*, 13 Apr. 2013, papers.ssrn.com/sol3/papers.cfm?abstract_id=2250268.

Hilbe, Joseph. *Negative Binomial Regression*. Cambridge University Press, 2016.

Hoynes, Hilary, et al. "Who Suffers During Recessions?" *Journal of Economic Perspectives*, vol. 26, no. 3, 2012, pp. 27–48., doi:10.3386/w17951.

Humphreys, Brad R. "Do Business Cycles Affect State Appropriations to Higher Education?" *Southern Economic Journal*, 1 Oct. 2000, www.jstor.org/stable/1061477?seq=1#page_scan_tab_contents.

Indu, Pankajakshan Vijayanthi, et al. “Domestic Violence as a Risk Factor for Attempted Suicide in Married Women.” *Journal of Interpersonal Violence*, 2017, p. 088626051772189., doi:10.1177/0886260517721896.

Ionides, Edward L., et al. “Macroeconomic Effects on Mortality Revealed by Panel Analysis with Nonlinear Trends.” *The Annals of Applied Statistics*, vol. 7, no. 3, 2013, pp. 1362–1385., doi:10.1214/12-aoas624.

Joe, Sean. “Explaining Changes in the Patterns of Black Suicide in the United States From 1981 to 2002: An Age, Cohort, and Period Analysis.” *Journal of Black Psychology*, vol. 32, no. 3, 2006, pp. 262–284., doi:10.1177/0095798406290465.

Kalleberg, Arne L., and Till M. Von Wachter. “The U.S. Labor Market During and After the Great Recession: Continuities and Transformations.” *RSF: The Russell Sage Foundation Journal of the Social Sciences*, vol. 3, no. 3, 2017, p. 1., doi:10.7758/rsf.2017.3.3.01.

Kposowa, A. J. “Marital Status and Suicide in the National Longitudinal Mortality Study.” Journal of Epidemiology & Community Health, vol. 54, no. 4, 2000, pp. 254–261., doi:10.1136/jech.54.4.254.

Kposowa, Augustine, et al. “Impact of Firearm Availability and Gun Regulation on State Suicide Rates.” *Suicide and Life-Threatening Behavior*, vol. 46, no. 6, 2016, pp. 678–696., doi:10.1111/sltb.12243.

Kubrin, Charis E., and Tim Wadsworth. “Explaining Suicide Among Blacks and Whites: How Socioeconomic Factors and Gun Availability Affect Race-Specific Suicide Rates.” Social Science Quarterly, vol. 90, no. 5, 2009, pp. 1203–1227., doi:10.1111/j.1540-6237.2009.00654.x.

Kubrin, Charis E., et al. “Deindustrialization, Disadvantage and Suicide among Young Black Males.” *Social Forces*, vol. 84, no. 3, 2006, pp. 1559–1579.

Kung, Hsiang-Ching, et al. “Risk Factors for Male and Female Suicide Decedents Ages 15?64 in the United States.” *Social Psychiatry and Psychiatric Epidemiology*, vol. 38, no. 8, 2003, pp. 419–426., doi:10.1007/s00127-003-0656-x.

Kuruvilla, A, and K.S. Jacob. “Poverty, Social Stress & Mental Health.” *Indian J Med Res*, 2007, pp. 273–278.

Lawless, Nicole M., and Richard E. Lucas. “Predictors of Regional Well-Being: A County Level Analysis.” *Social Indicators Research*, vol. 101, no. 3, 2010, pp. 341–357., doi:10.1007/s11205-010-9667-7.

Mincer, Jacob. “Education and Unemployment.” *NBER*, 1 Sept. 1991, www.nber.org/papers/w3838.

Mocan, H. Naci. “Structural Unemployment, Cyclical Unemployment, and Income Inequality.” *Review of Economics and Statistics*, vol. 81, no. 1, 1999, pp. 122–134., doi:10.1162/003465399767923872.

Montgomery, Scott, et al. “Mortality Following Unemployment during an Economic Downturn: Swedish Register-Based Cohort Study.” *BMJ Open*, vol. 3, no. 7, 2013, doi:10.1136/bmjopen-2013-003031.

Mościcki, Eve K. “Epidemiology of Completed and Attempted Suicide: toward a Framework for Prevention.” *Clinical Neuroscience Research*, vol. 1, no. 5, 2001, pp. 310–323., doi:10.1016/s1566-2772(01)00032-9.

Pritchard, C. “Suicide, Unemployment and Gender Variations in the Western World 1964–1986.” SpringerLink, Springer-Verlag, 1990, link.springer.com/article/10.1007/BF00794985#citeas.

Rehkopf, David H., and Stephen L. Buka. “The Association between Suicide and the Socio-Economic Characteristics of Geographical Areas: a Systematic Review.” *Psychological Medicine*, vol. 36, no. 2, 2005, pp. 145–157., doi:10.1017/s003329170500588x.

Rey, S. J., and M. V. Janikas. “Regional Convergence, Inequality, and Space.” *Journal of Economic Geography*, vol. 5, no. 2, 2005, pp. 155–176., doi:10.1093/jnlecg/lbh044.

Rockett, Ian R. H., et al. “Discerning Suicide in Drug Intoxication Deaths: Paucity and Primacy of Suicide Notes and Psychiatric History.” *Plos One*, vol. 13, no. 1, 2018, doi: 10.1371/journal.pone.0190200.

Rockett, Ian Rh, et al. “Race/Ethnicity and Potential Suicide Misclassification: Window on a Minority Suicide Paradox?” *BMC Psychiatry*, vol. 10, no. 1, 2010, doi:10.1186/1471-244x-10-35.

Ruhm, C. J. “Are Recessions Good for Your Health?” *The Quarterly Journal of Economics*, vol. 115, no. 2, 2000, pp. 617–650., doi:10.1162/003355300554872.

Runciman, Walter Garrison. *Relative Deprivation and Social Justice. A Study of Attitudes to Social Inequality in Twentieth-Century England*. Routledge & Kegan Paul, 1966.

Schaller, Jessamyn. “For Richer, If Not for Poorer? Marriage and Divorce over the Business Cycle.” Journal of Population Economics, vol. 26, no. 3, 2012, pp. 1007–1033., doi:10.1007/s00148-012-0413-0.

Schmidt, Erik P. “Postsecondary Enrollment before, during, and since the Great Recession. Population Characteristics. Current Population Reports. P20-580.” *US Census Bureau*,

US Census Bureau. 4600 Silver Hill Road, Washington, DC 20233. Tel: 800-923-8282; Tel: 301-763-4636; e-Mail: Census.in.Schools@Census.gov; Web Site: Http://Www.census.gov/, 31 Mar. 2018, eric.ed.gov/?id=ED591095.

Schneider, Daniel, and Orestes P. Hastings. "Socioeconomic Variation in the Effect of Economic Conditions on Marriage and Nonmarital Fertility in the United States: Evidence From the Great Recession." *Demography*, vol. 52, no. 6, 2015, pp. 1893–1915., doi:10.1007/s13524-015-0437-7.

Shapiro-Mendoza, Carrie K., et al. "Variations in Cause-of-Death Determination for Sudden Unexpected Infant Deaths." *Pediatrics*, vol. 140, no. 1, 2017, doi:10.1542/peds.2017-0087.

Shawn O. Utsey , Joshua N. Hook & Pia Stanard (2007) A Re-Examination of Cultural Factors that Mitigate Risk and Promote Resilience in Relation to African American Suicide: A Review of the Literature and Recommendations for Future Research, Death Studies, 31:5, 399-416, DOI: 10.1080/07481180701244553

"Suicide." National Institute of Mental Health, U.S. Department of Health and Human Services, 2019, www.nimh.nih.gov/health/statistics/suicide.shtml.

Tapia Granados, Jose A., et al. "Individual Joblessness, Contextual Unemployment, and Mortality Risk." *OUP Academic*, Oxford University Press, 3 July 2014, academic.oup.com/aje/article/180/3/280/2739163.

Taylor, Richard, et al. "Socio-Economic Differentials in Mental Disorders and Suicide Attempts in Australia." *British Journal of Psychiatry*, vol. 185, no. 6, 2004, pp. 486–493., doi:10.1192/bjp.185.6.486.

Thoits, Peggy A. “Mechanisms Linking Social Ties and Support to Physical and Mental Health.” *Journal of Health and Social Behavior*, vol. 52, no. 2, 2011, pp. 145–161., doi:10.1177/0022146510395592.

Tsirigotis, Konstantinos, et al. “Gender Differentiation in Methods of Suicide Attempts.” Medical Science Monitor, vol. 17, no. 8, 2011, doi:10.12659/msm.881887.

Vijayakumar, Lakshmi. “Suicide in Women.” *Indian Journal of Psychiatry*, Medknow Publications & Media Pvt Ltd, July 2015, www.ncbi.nlm.nih.gov/pmc/articles/PMC4539867/.

Watson, Tara, and Sara McLanahan. 2009. “Marriage Meets the Joneses: Relative Income, Identity, and Marital Status,” National Bureau of Economic Research Working Paper 14773, March.

Wilkinson, Richard G, and Kate E. Pickett. “Income Inequality and Population Health: A Review and Explanation of the Evidence.” *Social Science & Medicine*, vol. 62, no. 7, 2006, pp. 1768–1784., doi:10.1016/j.socscimed.2005.08.036.

Wilkinson, Richard. “The Impact of Inequality:” *Social Inequality and Public Health*, 2006, pp. 159–168., doi:10.2307/j.ctt9qgz3s.16.

Wingate, Laricka R., et al. “Suicidality in African American Men: The Roles of Southern Residence, Religiosity, and Social Support.” *Suicide and Life-Threatening Behavior*, vol. 35, no. 6, 2005, pp. 615–629., doi:10.1521/suli.2005.35.6.615.

Xu, Huanan, and Kenneth A. Couch. “The Business Cycle, Labor Market Transitions by Age, and the Great Recession.” *Applied Economics*, vol. 49, no. 52, 2017, pp. 5370–5396., doi:10.1080/00036846.2017.1307932.

Yang, Bijou. “The Economy and Suicide: A Time Series Study of the USA.” *American Journal of Economics and Sociology*, vol. 51, no. 1, 1992, pp. 87–99., doi:10.1111/j.1536-7150.1992.tb02512.x.

CHAPTER 3: A HISTORY OF VIOLENCE: THE MORTALITY CONSEQUENCES OF RACIAL RESENTMENT AND ECONOMIC CIRCUMSTANCE

3.1 Introduction

In the political and economic landscape of society today, frustration is felt by many Americans. Frustration over immigration, the opioid crisis, war fatigue and racial and economic inequality (to name a few), are at the forefront of the dissatisfaction Americans feel in their everyday lives. Despite the start of the longest economic expansion in U.S. history[54], the rise of groups such as the "Tea Party" and "Occupy Wallstreet" were indications that American citizens were frustrated economically on both sides of the isle. Particularly and according to some authors, lower educated whites displayed their cultural and racial resentment in the last presidential election. Tyson and Manium (2016a) of the Pew Research Center, for example, cite a frustrated response of uneducated whites as one of the main reasons for the electoral support of the 45th president, Donald J. Trump, in 2016. Lower educated[55] whites favored Donald Trump by 12 percentage points over his rival, Hillary Clinton, noting the largest spread in 36 years. His success was based upon a populist platform in which leaders promote a sense of injustice and victimhood by representing average citizens as victims of an alliance between established elites and minorities (Mols and Jetten, 2015). Another reason for the support of the populist GOP candidate was exhibited in Jones and Kiley (2016b) of the Pew Research Center. The authors found that of the individuals polled, 59% who felt that increased immigration and diversity "threatened American traditional customs and values", had warm feelings towards Donald

[54] 126 months as of January, 2020

[55] The authors define two levels of education: college degree and above and some college or less. Lower education in this article is referred to as those individuals without a college degree.

Trump. Sentiment towards (brown) immigrants and ethnic minorities is reasoned as economic concern for increased job competition or added strain on state and federal resources via welfare. Monnat (2016) tracked those counties that voted for Trump and ranked them by "deaths of despair". She noted that Trump over performed the last Republican presidential candidate Mitt Romney in those counties with the highest drug, alcohol and suicide mortality rates.

This sense of victimhood is not a new sentiment amongst poor whites who accepted their economic position as long as their social standing was higher than ethnic minorities. A prominent black leader of the early 20th century, W.E.B. Dubois, wrote about the plot of wealthy capitalists to segregate labor by race. In his book Black Reconstruction of America (1935), Dubois outlines the effort of the elite class to add division within the poor labor class, because united labor has more leverage in the determination of wages and working conditions (p.700); unity is expensive. He spoke of the wage compensation or a "psychological wage" given to poor whites by the way of their whiteness; a deferential treatment offered for their continued electoral support.

In the early 20th century, America endured major wars abroad (World War I and World War II), but there was a war within the country that claimed the lives of countless citizens, resulting primarily from violence perpetrated on black citizens. These racial tensions were fueled (in part) by economic hardships experienced by white laborers who had been sold the idea that their whiteness offered them a "psychological wage premium"[56]. Whiteness was compensation for laborers who had been exploited by capitalism for several years (Metzl, 2019), including during slavery. Racial animus in America not only served the purpose of continued subservience

[56] Although most authors refer to the term originated by W.E.B. Dubois, there are different names for the same idea. For instance, Nayer (2017) refers to "The Wages of Whiteness", or some just use the umbrella moniker "White Privilege"

of racial minorities, but the intended effect was the separation of the labor class and the weakening of a larger group, all of which experience the same economic strife.

A psychologically supposed consequence of frustration is aggression. Social science research has defined what is known as the frustration-aggression hypothesis as "...the interreference with an expected attainment of a desired goal on hostile (emotional) aggression." (Berkowitz, 1989). This theory relates aggression to frustration as sufficient but not necessary, as consequence can be an inhibitor of aggression (Miller and Sears, 1941). Nonetheless, in the history of the United States, there have been numerous instances over the past two centuries in which economic frustration has led to violent death. Lynchings and race riots were prominent occurrences in America, tractably with the perceived economic hardship of (southern) whites (Beck and Tolnay, 1990).

Violence is an act of physical force that causes or is intended to cause harm[57], even to oneself. Henry and Short (1954) proposed that suicide and homicide are the two classifications of violent death that result from the level of societal restraint over an individual's actions. They posited that the forces that compel an individual to engage in suicide or homicide as an act of (economic) frustration is determined by the business cycle and geographical region of examination.

In chapter 1, it was shown that the significant increase in the suicide rate overall (based on the economic indicator of unemployment) was due to the increase in white suicide over the examined period. In chapter 2, the same result was demonstrated, even when including

[57] Jacquin, Kristine M. "Violence." *Encyclopedia Britannica*, Encyclopedia Britannica, Inc., www.britannica.com/topic/violence.

socioeconomic variables The unemployment rate was positive and significant only for white males. Both papers referenced the seminal work on the subject conducted by Anne Case and Angus Deaton (2015;2017). Case and Deaton (2017) posited that increases in white morbidity and suicide mortality were the result of increases in diseases of despair[58], that led to "deaths of despair". This paper argues that the economic frustration of whites that once led to homicide of blacks, now leads to suicide of whites as societal regulation (through penal consequence and changing social norms) has surged, described by increases in morbidity and suicide mortality amongst whites.

This paper contributes to economic history and political economics literature by offering a culmination of analytical evidence that reasonably attributes the recent phenomenon as surface economic frustration that increases morbidity and suicide mortality amongst whites. In depth examination of past and recent etiology reveals that deaths of despair have risen as a result of increased frustration over the changing demographic structure in America (Versey et al.,2019)

This paper proceeds as follows: Part 2 is the review of previous literature on the connection between suicide and homicide and their relation to economic frustration. Part 3 explains the legal and social environment that allowed disgruntled whites to displace their economic frustration on blacks in America. Part 4 outlines the racial resentment in a historical context, offering a foundation for the sentiment felt by white Americans today. Part 5 offers recent examples of current research that provides evidence of resentment as a result of changing

[58] Diseases of despair are those diseases that result from alcohol (liver disease/cirrhosis of the liver), illegal drug overdose and suicide. Merit, Michael, et al. "*Appalachian Diseases of Despair".* The Walsh Center for Rural Health Analysis, Aug. 2017, HTTP://WALSHCENTER.NORC.ORG.

demographics. Part 6. addresses the treatment of drug abusers of different races as a special case of these recent examples, and Part 7 concludes the argument of the paper.

3.2 Previous Literature on Frustration

3.2.1 Lethal Violence – Homicide and Suicide

The link between homicide and suicide has been studied for centuries by prominent sociologists such as Enrico Marcelli (1881), Enrico Ferri (1915) and Emilie Durkheim (1897). Although most early studies were relegated to analysis of descriptive statistics (means, standard deviations and correlation coefficients), most tried to demonstrate that suicide and homicide paralleled in their underlying causes.

Durkheim (1897) was foundational in the analysis of suicide, but he also evaluated the link between homicide and suicide. Durkheim posited that "anomie[59]" is the regulating force that determines an individual intent to engage in homicide or suicide. The social connection of the individual will determine the direction of lethality, noting that the less sophistication of the society will direct the individual lethality outward.

Henry and Short (1954) augmented this idea from social connection to social regulation. They suggested that the more regulated an individual is within society, there will be greater propensity of that individual to express her frustration outward in the form of homicide. This regulation comes in the form of societal restraint, such as dependence on welfare assistance and

[59] Anomie (anomy) "…in societies or individuals, a condition of instability resulting from a breakdown of standards and values or from a lack of purpose or ideals." The Editors of Encyclopedia Britannica. "Anomie." *Encyclopædia Britannica*, Encyclopædia Britannica, Inc., 20 Nov. 2017, www.britannica.com/topic/anomie.

policing. Less regulation allows an individual to turn his aggressions inward, presumably due to the inflection of personal problems and less blame attributed to external factors.

Unithan et al. (1994) was the foundational work that proposed the "stream theory of lethal violence". Their model posited that forces of production (socio-cultural causes of systemic frustration, i.e. economic frustration) and forces of direction, delegated the response of an individual to engage in homicide or suicide. They suggested that the forces of production are the "river" of violence and the speed of the river depends on the level of frustration (but the river never halts since lethal violence is always present). The streams are suicide and homicide, and the determination of the chosen method is the structural and cultural patterns that affect the designation of responsibility for frustration (Huf-Corzine et al., 1995).

3.2.2 Frustration-Aggression Hypothesis

Frustration is a reasonable response to the adversities one experiences through the course of one's life. Some psychologists propose that aggression is a natural response to this frustration through anger (Berkowitz 1989; Battigali et al., 2019). In this paper I use the frustration-aggression hypothesis to understand the behavioral response of individuals who direct their aggression internally (suicide) or externally (homicide) and what possible explanations there could be for the decision to engage in one or the other. It must be stated that there are (essentially) three concepts of aggression and its origin that this paper will address but is not the focus of this research.

3.2.2.1 Instinct

One of the most influential suggestions of the origin of aggression was proposed by Sigmund Freud (1920) as an explanation for the destructive tendencies in human beings. He supposed that aggression was instinctual, and the internalization or externalization of that

aggression is driven by the direction of *Thanatos*. *Thanatos* is better known as the "death instinct" and is the innate disintegration of life that motivates individuals toward death[60] . In the case of suicide, this drive does not respond to the limits demanded by self-preservation. He posited that displacement can redirect our self-destructive energy outward, so we aggress against others to avoid aggressing against ourselves.

Freud adopted the idea from Sabina Spielrein (1912), where she proposed that the negative feelings that occur during intimacy (disgust and anxiety) originate from a destructive instinct or a "death instinct" (Caropreso, 2016). Karl Jung (1912) also expressed the same sentiment as it relates to the instinctual desires of intimacy. He states that the anxiety an individual feels when thinking about intimacy is born of the natural desire for (unbounded) passion and the societal regulation placed on individuals. Indecisiveness leaves decisions to "Fate", and the inability to choose (risk taking), must stifle an "exotic wish", which is a form of self-murder.

3.2.2.2 Learned

The learned concept of aggression supposes that aggression is the result of social learning and not of an instinct inherent to humans. Proponents of the social learning theory suggest that aggression does not have to be inherent to a single individual for them to engage in aggressive behavior (Bandura and Walters,1963). The tedium of trial and error in response to an any action committed is not feasible, our responses are mostly born from our observations of other's actions and the positive and negative consequences that result (Bandura, 1978). Through anthropological

[60] Eros is the antithesis of Thanatos; according to Freud, it is the force that drives individuals to live.

observations and psychological studies of child development, the authors suggest that aggressive behavior as a response is learned in its usage and its mediation.

Dutton (1999) reviewed a series of studies, particularly abuse in relationships and the response of the concomitants, as well as the children. He found that the social learning model was lacking in that the results of studies conducted showed major discrepancies in the rates of aggression demonstrated by children that had been exposed to parental violence. Namely, the propensity of females who had witnessed parental violence were not as likely as their male counterparts to engage in violence in the home. His proposition was that observational learning is the cornerstone for the social learning theory, but learning can also occur through trial and error. The learned response of an individual on future behavior can occur even if it is inherent to the individual.

3.2.2.3 External Stimulation

In the external concept, the predicted response (aggression) is the result of external stimuli, namely frustration. The frustration-aggression hypothesis began with the seminal work of Dollard et al (1939), where it was posited that aggression is "any sequence of behavior, the goal response to which is the injury of the person toward whom it is directed." (p.9). The initial research was critiqued heavily, as it assumed that aggression would certainly follow frustration and frustration always preceded aggression[61]. Berkowitz (1989) made the interpretation of Dollard et al. (1939) to include that frustration does not always lead to aggression, but the instigation to aggression, better known as anger. Dollard et al. (1939) stated that the target of the

[61] Although heavily criticized for the implication of a definite outcome, they do also state that aggression is not always the result of frustration, due to several instances, primarily inhibition.

aggression can be different than the source of the frustration through displacement (p.41). They specifically note:

"An apparently similar tendency is to be observed in the behavior of southern whites toward the Negro. The positive correlation between low economic indices and number of lynchings, cited in Chapter II, represents not only the variation of aggression with the variation in strength of the frustration but also the displacement of aggression to the Negroes. By no stretch of the imagination could it be assumed that the lynched Negro were the source of the frustration…" (p.44)

The authors state that the inhibition to aggression can be the anticipation of punishment (or the anticipation of failure) (p.32).

3.2.3 Aggression Driven Depression (5-HT Depression)

Research on the psychopathology[62] of anxiety/aggression driven depression, known as 5-HT ergic (serotonin = 5-hydroxitryptomine), show that dysregulation of anxiety and/or aggression are the symptoms of depression, along with mood lowering (van Praag, 1996). These types of depression are caused by stressful events or occurrences of psychotraumatic events. Anxiety/Aggression driven depression is conceived as susceptibility factors and decreased coping ability which increases the risk of depression. The individual's aggression turns inward and manifests itself as self-degeneration or suicidality and can also be directed outward with symptoms such as anger (van Praag, 2001).

[62] Baars et al. (2011) notes that psychiatric diseases may be observed in non-clinical populations on a milder level which suggests a continuum between disease and normal behavior, i.e. this phenomenon can occur in individuals who do not exhibit psychiatric disorders.

3.2.4 Partial Suicide

Durkheim (1897) defined suicide as being "applied to all cases of death resulting directly or indirectly from a positive or negative act of the victim himself, which he knows will produce this result."(p.42) Suicide described in this way would also include those actions that an individual engages in (wittingly), that may result in death. Karl Menninger (1938) specifically addressed self-harm as a self-destructive action that is used to divert a form of greater self-destruction, consequent of the elements of aggressiveness (p.161). Psychologist call this partial suicide and drug use (Ross, 2014), alcoholism (Pompili et al., 2010) and smoking (Miller et al., 2010), may account for the increase in overdose deaths, alcohol related liver disease and respiratory disease[63]. These coping mechanisms are a form of self-murder to avoid the overt action itself. Menninger states:

"…self-destruction is accomplished in spite of and at the same timely means of the very device used by the sufferer to relive his pain and avert this feared destruction." – Man Against Himself, 1938, pg. 161

3.3 The Rise and (partial) Fall of Jim Crow Laws

In 1863, after the emancipation of black slaves in the southern states, two more years of war (with the help of enlisted black servicemen) and the defeat of the confederacy, America was faced with a challenge that would last longer than the war itself; what should be done about the

[63] I must note that this activity is not clear in its direction of self-destruction. Individuals who are depressed are more likely to smoke and smoking causes depression. Miller, M., et al. "Cigarette Smoking and Suicide: A Prospective Study of 300, 000 Male Active-Duty Army Soldiers." *American Journal of Epidemiology*, vol. 151, no. 11, 2000, pp. 1060–1063., doi:10.1093/oxfordjournals.aje.a010148.

negro? In 1865 the 13th [64] amendment was ratified, and America began the "Reconstruction Period" (1865-1877), a period in which the federal government aimed at reorganizing the southern states for admittance back into the union and paving the way for negros and whites to coexist in a slavery free society. By 1877, the reconstruction period was largely a failure due to the increasingly violent attempts to thwart progress. President Andrew Johnson[65] stifled much of the effort by ensuring that southern elections were successful for most of the confederacy leadership. During this period the terrorist organization known as the Ku Klux Klan emerged, and was effective at targeting Republican lawmakers and voting blacks in the South (Foner, 2019).

After the attempted reconstruction period, most of the southern states enacted what are known as the "Jim Crow[66]" laws. Jim Crow laws were state and local statutes that legalized the systematic disparagement, imprisonment, marginalization and segregation of blacks in the South (History.com, 2019). In 1896, the Supreme Court ruled on "Plessy vs. Ferguson[67]", which set federal precedence for the "separate but equal" doctrine adopted by the Louisiana in 1890.

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[64] The 13th amendment to the constitution states "Neither slavery nor involuntary servitude, except as a punishment for crime whereof the party shall have been duly convicted, shall exist within the United States, or any place subject to their jurisdiction." "The 13th Amendment of the U.S. Constitution." *National Constitution Center – The 13th Amendment of the U.S. Constitution*, constitutioncenter.org/interactive-constitution/amendment/amendment-xiii.

[65] Andrew Johnson was the 17th president of the United States from (1865-1869), and the first to be impeached in 1868. Johnson was the democratic vice president to Abraham Lincoln and abhorred by most of congress throughout his tenure due to his extremely racist values. Johnson stifled reconstruction at every turn, including terminating William T. Sherman's Special Field Orders No.15 given by President Abraham Lincoln. This order was to ensure that each black family receive 40 acres (of the nearly 400,000 confiscated during and after the civil war) and a mule for cultivation (Foner, 2019).

[66] Jim Crow was a fictional character created in 1830 by Thomas Dartmouth Rice. Rice was an entertainer that created the blackface character to disparage lazy slaves. His show toured America and Europe for decades. Andrews, Evan. "Was Jim Crow a Real Person?" *History.com*, A&E Television Networks, 29 Jan. 2014, www.history.com/news/was-jim-crow-a-real-person.

[67] Plessy vs. Ferguson was a case on railway car segregation. Homer Plessy was a Louisiana resident who was $\frac{1}{8}$th black and was arrested for sitting in a white railway car. Plessy and the East Louisiana Railroad Company took the case to the Supreme Court and lost, citing the separate but equal doctrine. Landmark Supreme Court. "Cases - Plessy v. Ferguson." *Landmark Supreme Court Cases*, www.landmarkcases.org/cases/plessy-v-ferguson.

During the Jim Crow era, southern whites (and some in the North) had free reign to terrorize any blacks they felt were gaining educational or economic superiority (NPR, 2015). It was difficult for blacks to find jobs or to own their own establishments, stifling any economic mobility for blacks, especially in the South. The (official) Jim Crow era ended in 1954 with the Supreme Court ruling on Brown vs the Board of education, and the 1964 Civil Rights Act made discrimination based on color illegal in the United States.

3.4 Psychological Wage and Victimhood

Of the most influential black leaders in history, is William Edward Burghardt Dubois, also known as W.E.B. Dubois. Throughout his life, W.E.B. Dubois wrote a series of books and articles describing the social and economic conditions as well as the injustices perpetrated against black people. Dubois was extremely critical of government institutions and the response of America after the emancipation of the slaves. He also described what is known as "The Great Migration[68]". While editor of "The Crisis"[69], a magazine created by Dubois during his time with the National Association for the Advancement of Colored People (NAACP), he wrote about the migration of blacks from the South to the North. Although, he cautioned against an imbalance of educated northern negros and southern laborers, he unequivocally advocated for the southern negro to migrate North for the betterment of themselves and their families. The large number of negros migrating from the South were undoubtedly less intelligent and less efficient than the

[68] "The Great Migration generally refers to the massive internal migration of Blacks from the South to urban centers in other parts of the country. Between 1910 and 1970, an estimated 6 million Blacks left the South." Website Services & Coordination Staff, and US Census Bureau. "The Great Migration, 1910 to 1970." *U.S. Census*, 1 Mar. 1994, www.census.gov/dataviz/visualizations/020/.

[69] The magazine is a periodical that considers the ailments of America with regard to race relations, namely racial prejudice and social injustice. It was published from 1910-1934 with Dubois as editor and continues to be in circulation as of today.

established northerner, and since the white majority felt threatened by the mass of newcomers, racial irritations, hatred and segregation ensued, turning the North into an effective South. As southern blacks migrated to cities (mostly northern), economic frustration and labor tensions manifested into the same terror experienced in the South.

His most critical analysis was that of the of the capitalist class and the racial economic tension created between the white laborer and the negro laborer. Dubois (1935, p.700) noted that the white laborer was given license to terrorize the negro laborer as compensation for the lowest wage possible. The capitalist class was extremely efficient in their ability to ensure that poor whites would vote for the same people that were robbing them. Subversion of core economic principles with regard to supply and demand of labor, was relatively easy. If whites asked for a higher wage than subsistence, black laborers would take their place, which kept white labor organizers in order. Terror from the white labor class kept labor class blacks subservient in economic and social standing as blacks were afraid of earning a higher wage or owning anything of value for fear of retaliation from poor whites (Dubois, 1935, p.701).

3.4.1 Atlanta Race Riot of 1906

During the Great Migration, negroes from the South came to the North in search of jobs, better schools and better living conditions. Although Atlanta was still located in a former slave state, at the turn of the century, Atlanta Georgia was becoming an economic hub of the South. The increased pressure on municipal resources and economic opportunities, began to upset the white labor class. From September 22-24, chaos ensued in the city as local media reported claims of four white women being sexually assaulted by black men (Mixon and Kuhn, 2015). White men and boys descended on the black portions of the city, killing black men and women as they rode streetcars or worked in local businesses. State militia was summoned to quell the violence

(not by protecting blacks or even stopping whites, but by disarmament of blacks who had secured weapons in retaliation for the violence). Of the dead, were 25-40 blacks and two whites (Bartlett, 2019).

W.E.B. Dubois lived in Atlanta from 1897-1910, after accepting a position at Atlanta University. His reaction to the violence was to continue his diplomatic efforts in search of a compromise that ended the needless murder of black citizens. Dubois was torn between condemning the terrorism by the whites and his acknowledgment of sporadic crime committed by poor blacks. He was criticized by his political rival Booker T. Washington, in his response and took the opportunity to promote his own agenda of acquiescence[70] (Capeci and Knight, 1996).

3.4.2 East St. Louis Race Riots of 1917 (East St. Louis Massacre)

One of the largest landing places for negroes during the Great Migration was East St. Louis, IL, an industrial area that contained manufacturing plants and harbors located on the Mississippi River. Tensions between union workers and black laborers started the "East St. Louis Massacre" in May of 1917 and ending at the beginning of June 1917. The massacre was one of the worst race riots that this country has ever seen. Black men, women and children were beaten and shot as they fled fires in residential neighborhoods (Wang, 2008). In the aftermath, amongst the dead were nine whites, 100-200 blacks and over 6,000 black residents were forced from their homes (Belleville News, 2017).

[70] Booker T. Washington was head of the Tuskegee Institute and advocated a conciliatory stance with regard to race relations in the South. Washington proposed "The Atlanta Compromise" which consisted of three conciliatory pillars for the "economic achievement" of the American negro: 1. The American negro would no longer seek suffrage as a requisite to inclusion, 2. The attainment of basic civil rights would not be pursued and 3. Higher education would also not be pursued by the negro (other than schooling to increase industrial efficacy).

In the September 1917 edition of *The Crisis*, W.E.B. Dubois wrote a second-hand account of the aftermath. He described the incident and the factors leading up to the incident. He designated economic frustration of privileged white unioners who needed someone to blame for their diminished strike position as the reason for the melee. The blame wasn't given to the "…foreigners, Czechs, Slovaks and Lithuanians…", it was reserved for blacks, a growing menace in white industrial areas (The Crisis, 1917). Dubois believed that as capitalism took hold after the civil war, poor whites were sold the idea that their whiteness was a "public and psychological wage" (Dubois, 1935). This was constructed was a premium for poor whites who were in no better financial situation than blacks, and the belief of this idea helped poor whites accept their financial, social and political position.

3.4.3 Chicago Race Riots of 1919 (Red Summer)

Beginning in 1916, Chicago was seen as beacon of hope for southern blacks wishing to cross the Mason-Dixon line. It was one of the first major cities reached by southern blacks in the North and was transformed into an industrial and manufacturing giant in the Midwest. After WWI, nearly 380,000 black soldiers had returned after serving a country that did not serve them. Chicago was one of the main settling places of discharged servicemen and growing labor competition between migrating blacks, returning servicemen and whites in service yards, factories and mills, led to a resurgence of the Ku Klux Klan. Economic and racial animus permeated on both sides and the murder of a black boy who had mistakenly crossed into a white beach section in Lake Michigan, sparked an outrage that resulted in 15 dead whites, 23 dead blacks and nearly 500 injured (Higgins, 2019).

In the May 1917 edition of *The Crisis,* Dubois advocated for black men and boys to join the war (Johnson, 2015). Dubois expressed the idea that if negros were given a chance to prove

their efficacy as laborers, scholars and citizens of the United States, they could surely gain the respect and civility of the dominating group. In the May 1919 issue of *The Crisis*, Dubois wrote of the injustice black soldiers suffered when they returned from WWI. It was Dubois' hope that the black man could gain the respect of the whites through an offering of blood against an enemy of the country for which they (supposedly) belonged. All they returned to were no jobs, no land and no respect. "…*We return. We return from fighting. We return fighting*" (Dubois, 1919).

3.5 The Martyrs for Inequality

Recent studies on the health impacts of white supremacy on whites have indicated that the beneficiaries of the system are dying at higher rates. Jonathan Metzl is a professor of Sociology and Psychology at Vanderbilt University. His recent release "Dying of Whiteness: How the Politics of Racial Resentment is Killing America's Heartland" (2019), addresses some of the issues at the heart of American politics today: healthcare and guns. He documents first-hand accounts of individuals in three states that are conservative in their political structures: Missouri, Tennessee and Kansas, but suffer most in the areas of suicides and health outcomes.

3.5.1 Suicide (Guns)

In the state of Missouri, Metzl interviewed a "coping with suicide" support group in the relatively rural area of Cape Girardeau. He begins by describing the notable gun culture of the area, even to an outsider. In the airport, he noticed many of the individuals dawning hunting camouflage on their clothing, vehicles and other such accessories. After commenting on a series of billboards and advertisements for guns and gun related products, he encounters a cab driver who was himself carrying a gun openly. When the cab driver was asked what guns meant to him personally, he stated "Freedom, Liberty and Patriotism" (p.29).

Guns as a culture has been a benefit to manufacturers and a detriment to these areas that consider guns to be freedom. Guns as a subculture started around the time of the Civil Rights Act of 1964, with a boom in gun sales from 1960 to 1980 (Kleck, 2017). Mencken and Froese (2019) suggest that Americans, particularly white males in economic distress (the largest subgroup of gun owners) see guns as a way to reestablish control and signify moral fortitude. Economically frustrated white males see guns as a neutralizer in a chaotic world and guns offer them the ability to be heroic, to restore order to the nation, something separate from the federal government. This idea that guns represent freedom and liberty comes at a heavy cost. In 2009, 92% of gun suicides were white males, and over the period of 2009-2015 nearly 80% (p.46).

3.5.2 Healthcare (The Affordable Care Act)

One of the states with the worst health outcomes is Tennessee, earning the position of 7th unhealthiest state in the year 2018 (Fite, 2018), most notably in the areas of cardiovascular disease, cancer and mental health. Metzl interviews a 41-year-old uninsured white man named "Trevor" who suffered from Hepatitis C that caused an inflamed liver and consequently, jaundice. Tennessee did not adopt the Affordable Care Act (Obamacare), and state legislature fought hard to avoid the expansion. When asked about the benefits he could be receiving if he lived in neighboring Kentucky[71], he stated "We don't need any more government in our lives. And in any case, no way I want my tax dollars paying for Mexicans or welfare queens." (p.3) This individual is representative of a larger population of sick individuals that refuse to support measures that would help themselves and their families because they don't want others to have benefit either. Willer et al. (2016) conducted a study of white Americans and their support for the Tea Party, a political affiliation that promotes libertarian ideas such as smaller government and

[71] Kentucky did adopt the Affordable Care Act in 2013.

lower taxes. The authors found that support for the Tea party is largely due to racial resentment of a growing population of minorities, they called "declining whiteness" The Tea Party platform fervently opposes the Affordable Care Act, citing it is an example of government overreach and an intrusion into American's lives. Craig and Richeson (2014) found that white Americans who identified as unaffiliated leaned more towards the Republican Party and conservative policy positions when it was believed that California had become a majority-minority state.

There is also evidence that racial attitudes affected the reception of the Affordable Care Act during its proposition and even more so, after its implementation. Tesler (2012) found that in a nationally representative survey, Obama's race impacted the views different subgroups had of the Affordable Care Act, negatively for whites and positively for blacks.

Deaton and Lubotsky (2001) examined the impact of income inequality and racial composition on mortality statistics for all population, blacks and whites for the periods 1980 and 1990. Their analysis determined that income inequality was not a significant factor in increased morbidity for whites when controlling for educational level or the fraction of blacks at the state and MSA regional levels. Fraction of black was significant and positive at every level of aggregation. They refrain from offering an unobserved reason for the increase in white mortality as a function of the racial composition.

Case and Deaton (2015) conducted a study of all-cause mortality amongst white non-Hispanic males and females between 1999 and 2013. This paper set out to describe the overall trends in morbidity and mortality. They continued their analysis in (2017) between the years of 1999 and 2015 and this paper analyzed the changes in the age-specific mortality rates to offer a more complete picture by dissecting cohorts by age, gender and education. In this paper they found that the amongst high school educated and lower individuals, the mortality rate for whites

in 1999 was 30% lower than blacks of the same education level (745 vs 922 per 100,000), in 2015 it was 30% higher (927 vs 703 per 100,000). This marked increase in the mortality rate of uneducated whites was largely due to increases in alcohol related liver mortality, drug overdose and suicide, with notable decreases in heart disease and cancer mortality[72]. They attribute this to the cumulative disadvantage of lower educated whites who have lost labor market opportunities as well as health in childhood, child rearing and religion. Although they refrain from coming to a specific conclusion as to why this phenomenon is occurring, they do note that globalization and automation have contributed as "underlying deep causes". It is my opinion that they have stated that which could be stated simpler, diminished privilege.

These instances point to a greater cause for concern in America. White Americans are dying of illnesses that can be addressed with policy initiatives that affect everyone regardless of race, but austerity is preferred to their own well-being. When threatened, the structure of white supremacy that has always prevailed in this country (and still does to this day) is protected (sometimes unconsciously) by those who do not realize how the system benefits them directly.

3.6 Treatment of the Addiction versus Treatment for the Crime

Racial resentment also dictates how we treat drug abusers; either as criminals or victims. This provides an extension of a modern example of the thesis presented in this chapter. Opioid usage has been given the federal designation of "national emergency" and users are seen as

[72] These three causes of death are called "Diseases of despair". "These are three classes of behavior-related medical conditions that increase in groups of people who experience despair due to a sense that their long-term social and economic outlook is bleak" "Diseases of Despair." *Wikipedia*, Wikimedia Foundation, 16 Sept. 2019, en.wikipedia.org/wiki/Diseases of despair.

victims of the medical industry writ large. Even pharmaceutical companies have been held accountable for their role in the dissemination of drugs such as oxycontin and Vicodin, and some doctors have been held to account for providing an ease of access to the drugs. This concern rings hollow for individuals who addressed the same concern during the crack epidemic of the 1980's. The response (social and federal) was a criminal one. The prison industrial complex was the answer to the drug problem and others such as vagrancy and mental illness, as long as these ailments were largely affecting minority communities. Keller (2017) outlines the complex approach taken to address the opioid crisis in places like Gloucester, Massachusetts that have adopted "Good Samaritan" measures that treat the addict as a victim by ensuring that opioid overdoses and observers will not be subject to arrest. He also notes that drug related crimes have fallen by 27% and overdoses fell by 80%. This stance is in full contrast with the approach taken during the starting in the 1980's, where increased police presence and drug targeting were used at the street level. While harsher sentences and mandatory minimums were heavily enforced at the height of the crack era in the courts. The lack of compassion for crack addicts went hand in hand with the stigmatization of the users. Netherland and Hansen (2016) completed a comparison study between the media coverage of white prescription opioid users with black and Latino heroin users from 2001-2011. They noted that the media helped draw a symbolic and legal distinction between the two types of addicts of the same underlying substance. The idea of victimhood replaces the legal adjudication of (so called) criminals.

3.7 Conclusion

As was the case in the early 1900s, economic frustration of uneducated whites is the cause of this increased violent death and morbidity. In the East St. Louis massacre, labor union

whites were upset that blacks had gained a position relative to theirs, earning comparable pay and living in neighborhoods similar to their own. Terrorism of black neighborhoods was a direct result of this perceived disenfranchisement. The same goes for the Atlanta race riots.

This point has two parts: first, as blacks (and other minorities) gain relative position in the social, political and economic atmosphere in America, via increased incomes, educational attainment and political capital, the "public and psychological wage" that poor whites received has decreased. This realization of their true economic position has increased their destructive behavior exhibited as coping mechanisms: alcoholism, drug usage and rejection of cultural norms such as marriage and educational attainment. These behaviors increase morbidity via liver disease, respiratory disease and heart disease. The second part is the internalization of economic frustration. In the early to mid-20th century (and prior) lynch mobs and other forms of racial terrorism were a way for poor whites to externalize their economic frustration. Jim Crow laws were effective in keeping an uneven distribution of power and wealth, until the 1970s. Now that changes in racial composition have affected minority labor mobility and globalization has prevailed, those same uneducated whites are experiencing a frustration that they must internalize. Which is leading to the increased morbidity and mortality of that demographic. We see it in not only our health data, but also in our politics. The election of a white nationalist as president, and his overwhelming support from the white uneducated population, is arguably a response to the increasing trend. White victimhood has been on election ballots since Ronald Regan coined the term "welfare queens" as a description of black women who receive public assistance, and Donald Trump's statements about Mexicans invading the country to rape (white) women and get (white) children hooked on drugs (Trump, 2015). A promise to "Make America Great Again"

may have been internalized by some as a promise to return to a time when whites of all strata had a clear economic advantage over all minorities.

Proposition of racial prejudices leads to exploitation of working whites to the point where they vote against their own interest and begin to increase the morbidity and mortality rates. The despair permeates throughout not just the victim itself but also through the family and can affect their health and morbidity as well. The driver of this phenomenon is fear and resentment. Fear of losing the majority in population, while dying as martyrs for a cause they don't fully understand. Future research aimed at understanding the underlying causes of fear (and or hatred) of other groups of people that supersedes the instinct of self-preservation, would benefit members of all demographics and economic strata.

CHAPTER 3 REFERENCES

Bandura, Albert, and Richard H. Walters. *Social Learning and Personality Development*. Holt, Rinehart and Winston, 1976.

Bandura, Albert. "Social Learning Theory of Aggression." *Journal of Communication*, vol. 28, no. 3, 1978, pp. 12–29., doi:10.1111/j.1460-2466.1978.tb01621.x.

Battigalli, Pierpaolo, et al. "Frustration, Aggression, and Anger in Leader-Follower Games." *Games and Economic Behavior*, vol. 117, 2019, pp. 15–39., doi:10.1016/j.geb.2019.06.001.

Caropreso, Fátima. (2016). The death drive according to Sabina Spielrein. Psicologia USP, 27(3), 414-419. https://dx.doi.org/10.1590/0103-656420150058

Dutton, Donald D. "Limitation of Social Learning Models in Explaining Intimate Aggression." *Violence in Intimate Relationships*, by Ximena B. Arriaga and Stuart Oskamp, Sage, 1999, pp. 73–78.

Ferri, Enrico. *Criminal Sociology*. D. Appleton and Company, 1915.

Foner, Eric. "Reconstruction." *Encyclopedia Britannica*, Encyclopedia Britannica, Inc., 21 Aug. 2019, www.britannica.com/event/Reconstruction-United-States-history#ref1096633.

Gurr, Ted Robert. *Why Men Rebel*. Princeton University Press, 1970.

History.com Editors. "Jim Crow Laws." *History.com*, A&E Television Networks, 28 Feb. 2018, www.history.com/topics/early-20th-century-us/jim-crow-laws.

History.com Editors. "The Red Summer of 1919." *History.com*, A&E Television Networks, 2 Dec. 2009, www.history.com/topics/black-history/chicago-race-riot-of-1919.

Huf-Corzine, Lin, et al. “Deadly Connection: Culture, Poverty and the Direction of Lethal Violence.” *Trends, Risks, and Interventions in Lethal Violence: Proceedings of the Third Annual Spring Symposium of the Homicide Research Working Group, Atlanta, Georgia*, by Carolyn R. Block and Richard Block, U.S. Department of Justice, Office of Justice Programs, National Institute of Justice, 1995, pp. 127–148.

Jones, Bradley, and Jocelyn Kiley. “More 'Warmth' for Trump among GOP Voters Concerned by Immigrants, Diversity.” *Pew Research Center*, Pew Research Center, 2 June 2016, www.pewresearch.org/fact-tank/2016/06/02/more-warmth-for-trump-among-gop-voters-concerned-by-immigrants-diversity/.

Jung, C. G. *Symbols of Transformation: an Analysis of the Prelude to a Case of Schizophrenia*. 1912.

Merit, Michael, et al. *Appalachian Diseases of Despair*. The Walsh Center for Rural Health Analysis, Aug. 2017, HTTP://WALSHCENTER.NORC.ORG.

Mixon, Gregory, and Clifford Kuhn. "Atlanta Race Riot of 1906." New Georgia Encyclopedia. 29 October 2015. Web. 16 October 2019.

Mols, Frank, and Jolanda Jetten. “Explaining the Appeal of Populist Right-Wing Parties in Times of Economic Prosperity.” *Political Psychology*, vol. 37, no. 2, 2015, pp. 275–292., doi:10.1111/pops.12258.

Morselli, Enrico Agostino. *Suicide: an Essay on Comparative Moral Statistics*. Kegan Paul, 1881.

Narayan, John. “The Wages of Whiteness in the Absence of Wages: Racial Capitalism, Reactionary Intercommunalism and the Rise of Trumpism.” *Third World Quarterly*, vol. 38, no. 11, 2017, pp. 2482–2500., doi:10.1080/01436597.2017.1368012.

Staff, NPR. “The Goal: To Remember Each Jim Crow Killing, From The '30s On.” *NPR*, NPR, 3 Jan. 2015, www.npr.org/sections/codeswitch/2015/01/03/374564307/the-goal-to-remember-each-jim-crow-killing-from-the-30s-on.

Trump, Donald. “Presidential Announcement Speech.” Campaign Rally. Campaign Rally, 16 June 2015, New York, Trump Tower.

Tyson, Alec, and Shiva Maniam. “Behind Trump's Victory: Divisions by Race, Gender and Education.” *Pew Research Center*, Pew Research Center, 9 Nov. 2016, www.pewresearch.org/fact-tank/2016/11/09/behind-trumps-victory-divisions-by-race-gender-education/.

CONCLUDING REMARKS

Throughout history suicide has remained a prominent resolution for individuals beleaguered by life's subjective adversities. Society has not always sought to truly understand suicide as a response to subjective or objective external conditions. Religious views of suicide have varied based on the denomination, but generally, suicide is and was condemned out of concern for the welfare of an individual's eternal soul. Even in environments of empathy towards those who died by suicide and their families, suicide was generally dismissed as a product of mental illness that could be managed through medication or psychological intervention. In some societies, suicide has also been promoted as the socially responsible action for individuals who are potential burdens to their immediate families or to society as a whole. These approaches fail to address the dynamics of social and individual human existence that impact the usage of suicide as a coping mechanism. Research such as this, seeks to gain a deeper insight into the socioeconomic influences of the decision for an individual to engage in suicide, while submitting to the fact that suicidal behavior is not monolithic, and the reasoning is completely individual.

Quantitative examination of the relationship between regional suicide outcomes and economic fluctuations has been established in chapter 1 and in previous literature (Ruhm, 2000; Gerdham and Ruhm, 2006; Granados and Roux, 2009), giving credence to the theoretical impact of outside forces on aggregate suicide rates.

Further examination in chapter 2 showed that suicide outcomes over business cycle fluctuations vary by demographic subgroup, females and males and black and white. Estimation at the county level warranted the use of a more specific econometric technique, namely the usage of the zero-inflated negative binomial model in effort to correctly account for the distribution of

the data. This research further developed the relationship between socioeconomic factors such as marital status, educational attainment and income inequality (proxied by the Gini coefficient). Income inequality was a strong determinant in suicide outcomes for all demographic subgroups, but the impact was largest for blacks. Income inequality is posited to have such a strong association for blacks due to the racial inequality that blacks face regardless of economic conditions.

Qualitative reasoning for increased suicide rates amongst whites was addressed in chapter 3. Increasing suicide rates amongst whites was determined to be a result of changing demographics in America, namely, the increased social standing of minorities relative to whites. Using the philosophies of W.E.B. Dubois and his idea of the "psychological wage", the increased suicide rates can be attributed to the decline in the premium for being white. Poor whites accepted their financial position, as long as it was higher than minorities. As poor whites become relegated to the same financial hardships as blacks without externalization of economic frustration against blacks, whites have begun to internalize their frustration, resulting in increased morbidity and mortality of whites.

The implication of this research is to emphasize the importance of segregating suicide outcomes by subgroup, subregion and time period in effort properly address the phenomenon. Correlated social factors require the consideration of variable intersection in the impact determination of economic fluctuations.

CONCLUDING REMARKS REFERENCES

Gerdtham, Ulf-G., and Christopher J. Ruhm. "Deaths Rise in Good Economic Times: Evidence from the OECD." *Economics & Human Biology*, vol. 4, no. 3, 2006, pp. 298–316., doi: 10.1016/j.ehb.2006.04.001.

Granados, J. A. Tapia, and A. V. Diez Roux. "Life and Death during the Great Depression." *Proceedings of the National Academy of Sciences*, vol. 106, no. 41, 2009, pp. 17290–17295., doi:10.1073/pnas.0904491106.

Ruhm, C. J. "Are Recessions Good for Your Health?" *The Quarterly Journal of Economics*, vol. 115, no. 2, 2000, pp. 617–650., doi:10.1162/003355300554872.

APPENDIX A
Chapter 1 Additional Content

A.1 Chapter 1 Additional Content: Variable Definitions

Each variable is broken into race (non-Hispanic Black and non-Hispanic White) and gender (male and female). The data was collected for the years 2005-2012 and aggregated to the county, and state levels

Age-Adjusted Suicide Rate (per 100k):

$$\text{(Race) (Sex) Suicide Rate}_{it} = \frac{Number\ of\ (Race)\ (Sex)\ Suicides\ in\ cohort}{Total\ Number\ of\ (Race)\ Persons}$$

Population Share (Age Control):

$$\text{(Race) (Sex) Less than 5 years old Rate}_{it} = \frac{Number\ of\ (Race)\ (Sex)\ Persons{<}5\ in\ cohort}{Total\ Number\ of\ (Race)\ Persons}$$

$$\text{(Race) (Sex) 65 plus years old Rate}_{it} = \frac{Number\ of\ (Race)\ (Sex)\ Persons{<}5\ in\ cohort}{Total\ Number\ of\ (Race)\ Persons}$$

Per Capita: Per Capita income of each race cohort

Unemployment:

$$\text{(Race) (Sex) 16 – 64 Unem. Rate}_{it} = \frac{Number\ of\ (Race)\ (Sex)\ Persons\ in\ 16{-}64\ Unemployed}{(Race)(Sex)\ Labor\ Force}$$

Educational Attainment (Control): Educational Attainment is broken into 4 groups

$$\text{(Race) (Sex) (Education Level) Rate}_{it} = \frac{Number\ of\ (Race)\ (Sex)\ Persons\ in\ (Education\ Level)}{(Race)(Sex)\ Education\ Pop\ 25+}$$

A.2 Chapter 1 Additional Content: Suicide Count Rolling Average Calculation

In effort to regress the independent variables on a regressand that captures the same time period, I consistently constructed the suicide count to be a rolling average over a 5-year period using the following function:

$$Suic_{it}^{gj} = \frac{\sum_{t+5}^{t} Suic_{it}^{gj}}{5}$$

where *Suic* is the number of suicides, subscript *i* indicates the region, *t* indicates the year, the superscript *g* indexes the gender, the superscript *j* indexes the race.

A.3 Chapter 1 Additional Content: Age Standardization Calculation

Due to population differences in each subgroup by age and the subsequent difference in the number of suicides by age cohort, age–standardized suicide rates were calculated for each gender/race subgroup using the following method:

Step 1: Age Population Rate

$$Pop\ Rate_{it}^{gjk} = \frac{Pop_{it}^{gjk}}{Pop\ _{it}^{gj}}$$

Step 2: Age Specific Suicide Rate

$$Suic\ Rate_{it}^{gj} * Pop\ Rate_{it}^{gjk}$$

Step 3: Race/Gender Suicide Rate

$$\sum_{7}^{1} Age\ Adj.Suic.Rate$$

where *Suic* is the number of suicides, subscript *i* indicates the region, *t* indicates the year, the superscript *g* indexes the gender, the superscript *j* indexes the race and superscript *k* indexes the age group. In Step 1., the age specific population rates were calculated for each subgroup. In step 2, the gender/race specific suicide rates were multiplied by the age group proportion of the subgroup population to get the age specific suicide rates for each age group. In step 3, the age specific suicide rates were summed and yielded the subgroup age specific suicide rate. There are seven age cohorts: 0-14, 15-24, 25-34, 35-44, 45-54, 55-64 and 65 plus.

A.4 Chapter 1 Additional Content: Data Sources

Table of Data Sources

Variable	Table	Description	Format	Location
Number of Suicides	Non-Public Use Mortality Files	Individual Death Data in U.S.	N/A	CDC
Age	Sex by Age - B01001B (Black or African American Alone) - B01001A (White Alone)	Sex by Age by County	American Community Survey (5-Year Estimates)	Social Explorer (https://www.socialexplorer.com/)
Education	Sex by Educational Attainment - C15002B (Black or African American Alone) - C15002A (White Alone)	Sex by Educational Attainment for the Population 25 Years and Over	American Community Survey (5-Year Estimates)	Social Explorer (https://www.socialexplorer.com/)
Unemployment	Sex by Employment Status - C23002B (Black or African American Alone) - C23002A (White Alone)	Sex by Employment Status for the Population 16 Years and Over	American Community Survey (5-Year Estimates)	Social Explorer (https://www.socialexplorer.com/)
Per Capita Income	Per Capita Income – B19301B (Black or African American Alone) - B19301A (White Alone)	Per Capita Income by Race	American Community Survey (5-Year Estimates	Social Explorer (https://www.socialexplorer.com/)

A.5 Chapter 1 Additional Content: Additional Tables

TABLE 1.1 STATE LEVEL DESCRIPTIVE STATISTICS

	STATE				
VARIABLES	All Population	Black Males	Black Females	White Males	White Females
Suicide: per 100,000					
Suicide Rate	15.21	10.85	2.56	26.33	6.88
	(4.84)	(7.9)	(4.11)	(6.8)	(2.41)
Unemployment:					
Unemployment Rate	5.59	14.86	13.15	6.96	6.01
	(1.37)	(4.33)	(3.66)	(1.76)	(1.76)
Educational Attainment:					
Less than High School Rate	9.94	16.8	16.3	9.65	8.6
	(3.62)	(4.97)	(4.96)	(3.38)	(3.03)
High School Rate	29.05	32.6	27.4	29.5	29.1
	(4.46)	(5.56)	(5.73)	(4.89)	(4.59)
Some College Rate	30.9	32.3	35.3	29.4	31.8
	(4.06)	(5.9)	(5.48)	(4.22)	(4.29)
Bachelor's Plus Rate	29.5	18.2	21	31.4	30.5
	(5.79)	(5.43)	(5.34)	(6.26)	(5.96)
Age:					
Less Than 5 Years	5.62	7.79	7.99	5.55	5.16
	(.728)	(1.48)	(2.21)	(.758)	(.746)
65 Plus	15.3	6.3	8.69	14.6	18
	(2.14)	(2)	(3.15)	(2.26)	(2.48)
Percent Black	12.48				
	(10.53)				
Income:					
Per Capita Income	27.13	18.10	18.10	28.95	28.95
	(4.48)	(4.07)	(4.07)	(5.28)	(5.28)
	N = 400	N = 400	N = 400	N = 400	N = 400

Note: each variable is described as a percent (except suicide rates)

Standard deviations reported in parentheses

TABLE 1.2 COUNTY LEVEL DESCRIPTIVE STATISTICS

	COUNTY				
VARIABLES	All Population	Black Males	Black Females	White Males	White Females
Suicide: per 100,000					
Suicide Rate	15.72	15.33	4.05	28.02	6.17
	(17.32)	(302.3)	(230.9)	(32.2)	(13.84)
Unemployment:					
Unemployment Rate	7.682	14.95	12.19	7.29	6.45
	(3.662)	(18.9)	(17.62)	(3.7)	(3.36)
Educational Attainment:					
Less than High School Rate	13.5	23	19.4	13.4	11.6
	(6.62)	(20.1)	(20.3)	(6.68)	(5.74)
High School Rate	35.4	35.7	29.3	36.2	34.2
	(7.3)	(22.6)	(23.2)	(8.46)	(7.41)
Some College Rate	30.3	26.5	30.3	28.8	32.1
	(5.66)	(21.2)	(23.8)	(6.1)	(5.95)
Bachelor's Plus Rate	20.8	11.6	15.3	21.6	22.1
	(9.51)	(16.8)	(19.4)	(10.8)	(9.72)
Age:					
Less Than 5 Years	5.63	5.8	6.87	5.47	5.13
	(1.39)	(8.64)	(11.1)	(1.34)	(1.34)
65 Plus	16	7.29	7.23	16.9	20.4
	(4.85)	(10.6)	(9.74)	(4.91)	(5.07)
Percent Black	16				
	(4.85)				
Income: in thousands					
Per Capita Income	23.05	13.67	13.94	24.83	24.83
	(5.81)	(9.96)	(9.84)	(6.41)	(6.41)
	N = 24984	N = 23481	N = 22574	N = 24977	N = 24977

Note: each variable is described as a percent (except suicide rates)

Standard deviations reported in parentheses

TABLE 1.4 STATE LEVEL REGRESSION RESULTS

	STATE									
VARIABLES	(1) All Population	(2) All Population	(3) Black Male	(4) Black Male	(5) Black Female	(6) Black Female	(7) White Male	(8) White Male	(9) White Female	(10) White Female
Unemployment Rate	0.0162*	0.0260***	-0.0282	-0.00982	-7.83e-05	-0.0107	0.0116	0.0104	0.0158	0.0272
	(0.00910)	(0.00963)	(0.0420)	(0.0459)	(0.0282)	(0.0251)	(0.0111)	(0.0101)	(0.0264)	(0.0222)
Education										
Reference: High School										
Less than High School		0.0355*		0.0646		0.0368		0.0199		0.0259
		(0.0188)		(0.0544)		(0.0293)		(0.0201)		(0.0334)
Some College		0.00742		-0.0236		0.0107		-0.00569		0.0129
		(0.0279)		(0.0277)		(0.0304)		(0.0243)		(0.0307)
Bachelor's Plus		-0.0550		0.0120		-0.0232		-0.00694		-0.0777*
		(0.0448)		(0.0374)		(0.0275)		(0.0285)		(0.0427)
Income										
Per Capita Income (1K)		0.0273**		0.121		0.0899		0.0188**		0.0271
		(0.0102)		(0.108)		(0.0666)		(0.00892)		(0.0167)
Population (Age Control)										
Less than 5		-0.0849*		0.132		0.112*		-0.118**		-0.0329
		(0.0491)		(0.145)		(0.0557)		(0.0472)		(0.0974)
65 Plus		0.00454		0.107		0.0966		0.00934		-0.0216
		(0.0322)		(0.122)		(0.0913)		(0.0370)		(0.0245)
Percent Black		-0.0290*								
		(0.0149)								
Constant	2.547***	3.551*	2.453***	-2.020	0.916***	-2.670	3.110***	3.367**	1.803***	3.149
	(0.0569)	(1.933)	(0.581)	(3.822)	(0.341)	(2.587)	(0.0611)	(1.609)	(0.127)	(2.402)
Observations	400	400	400	400	400	400	400	400	400	400
Number of States	50	50	50	50	50	50	50	50	50	50
State FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Robust Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

TABLE 1.5 STATE LEVEL REGRESSION RESULTS (ROLLING AVERAGE SUICIDE RATE)

	STATE									
VARIABLES	(1) All Population	(2) All Population	(3) Black Male	(4) Black Male	(5) Black Female	(6) Black Female	(7) White Male	(8) White Male	(9) White Female	(10) White Female
Unemployment Rate	0.0131***	0.0147**	-0.0584	0.00286	-0.0738	-0.0182	-0.00522	0.000974	0.0281***	0.0197
	(0.00415)	(0.00717)	(0.0465)	(0.0384)	(0.0892)	(0.0375)	(0.00797)	(0.00843)	(0.00679)	(0.0159)
Education										
Reference: High School										
Less than High School		0.0281**		0.0962**		0.00460		0.0126		0.0380*
		(0.0120)		(0.0448)		(0.0518)		(0.0116)		(0.0204)
Some College		0.00190		-0.0629*		-0.108***		-0.00321		0.0103
		(0.0134)		(0.0342)		(0.0345)		(0.0175)		(0.0260)
Bachelor's Plus		-0.0479*		0.0296		-0.190***		-0.0148		-0.0208
		(0.0268)		(0.0586)		(0.0445)		(0.0220)		(0.0183)
Income										
Per Capita Income (1K)		0.0332***		0.193**		0.1000		0.0153**		0.0148
		(0.00841)		(0.0760)		(0.0950)		(0.00689)		(0.0126)
Population (Age Control/Black)										
Less than 5		-0.0185		-0.0507		-0.109		-0.0914***		-0.0417
		(0.0332)		(0.0834)		(0.0861)		(0.0321)		(0.0558)
65 Plus		-0.0206		-0.129		-0.136		-0.0207		-0.0416**
		(0.0222)		(0.140)		(0.156)		(0.0241)		(0.0177)
Percent black		-0.0435***								
		(0.00828)								
Constant	2.715***	3.727***	3.217***	0.265	1.848*	8.939**	3.010***	3.265***	1.921***	2.308
	(0.0493)	(1.001)	(0.620)	(2.426)	(1.036)	(3.531)	(0.0518)	(0.0458)	(0.0433)	(1.694)
Observations	400	400	400	400	400	400	400	400	400	400
Number of States	50	50	50	50	50	50	50	50	50	50
State FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Robust Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0

TABLE 1.6 COUNTY LEVEL REGRESSION RESULTS

	COUNTY									
VARIABLES	(1) All Population	(2) All Population	(3) Black Male	(4) Black Male	(5) Black Female	(6) Black Female	(7) White Male	(8) White Male	(9) White Female	(10) White Female
Unemployment Rate	0.104***	0.0539***	-0.000268***	-0.000174*	-6.71e-05***	-8.01e-05	0.0571***	0.0269***	0.0130***	0.0114**
	(0.0144)	(0.0178)	(8.01e-05)	(8.94e-05)	(2.13e-05)	(5.27e-05)	(0.00694)	(0.00805)	(0.00478)	(0.00479)
Education *Reference: High School*										
Less than HS		0.00683***		-5.51e-05		0.000364		0.0136***		0.00207
		(0.00181)		(0.000222)		(0.000409)		(0.00429)		(0.00181)
Some College		0.0147***		-0.000115		-4.20e-05**		0.0110***		1.15e-05
		(0.00136)		(0.000125)		(2.12e-05)		(0.00368)		(0.00103)
Bachelor's Plus		0.00126		0.000205		-4.83e-05		0.000876		8.61e-05
		(0.000983)		(0.000413)		(2.94e-05)		(0.00287)		(0.00108)
Income Per Capita Income (1K)		-0.00554		-0.000735**		0.000189		-0.00752		-0.00125
		(0.00710)		(0.000365)		(0.000463)		(0.00524)		(0.00290)
Population (Age Control)										
Less than 5		0.0261		-0.000163*		-5.16e-05**		0.0300		-0.00559
		(0.0234)		(9.83e-05)		(2.04e-05)		(0.0257)		(0.00362)
65 Plus		-0.00204		0.000348		-0.000201		0.00328		-0.00110
		(0.00636)		(0.000591)		(0.000167)		(0.00408)		(0.00131)
Constant	0.0122***	0.00667***	0.0125***	0.0288**	0.00295***	0.00457*	0.0235***	0.0244***	0.00872***	0.00990***
	(0.000563)	(0.00104)	(0.000598)	(0.0121)	(0.000349)	(0.00264)	(0.000597)	(0.00278)	(0.000365)	(0.000914)
Observations	24,984	24,984	23,481	23,481	22,574	22,574	24,977	24,977	24,977	24,977
Number of Counties	3,123	3,123	3,058	3,058	3,002	3,002	3,123	3,123	3,123	3,123
State FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Robust Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.

TABLE 1.7 COUNTY LEVEL REGRESSION RESULTS (ROLLING AVERAGE SUICIDE RATE)

	COUNTY									
VARIABLES	(1) All Population	(2) All Population	(3) Black Male	(4) Black Male	(5) Black Female	(6) Black Female	(7) White Male	(8) White Male	(9) White Female	(10) White Female
Unemployment Rate	0.0338**	0.0268*	0.000281	0.000319	-4.76e-05	-2.98e-05	0.00348	0.00319	-0.00452	-0.00529
	(0.0150)	(0.0148)	(0.000685)	(0.000685)	(0.000522)	(0.000528)	(0.00299)	(0.00293)	(0.00398)	(0.00395)
Education *Reference: High School*										
Less than HS		-0.0226		-0.000576		0.000175		-0.00263		-0.0119***
		(0.0171)		(0.000751)		(0.000366)		(0.00310)		(0.00444)
Some College		-0.0225*		-5.13e-05		2.17e-05		-0.000360		-0.0105***
		(0.0136)		(0.000652)		(0.000301)		(0.00290)		(0.00369)
Bachelor's Plus		0.00802		-0.000343		0.000477		-0.00638*		-0.00484
		(0.0133)		(0.000928)		(0.000486)		(0.00346)		(0.00360)
Income Per Capita Income (1K)		-0.0458***		0.000418		0.000799		0.00304		-0.00966*
		(0.0148)		(0.00117)		(0.000493)		(0.00606)		(0.00493)
Population (Age Control/Black)										
Less than 5		-0.134***		-0.00184		-2.76e-05		0.00142		0.00728
		(0.0460)		(0.00173)		(0.000475)		(0.0112)		(0.00907)
65 Plus		-0.0386**		0.00115		-0.000238		-0.000815		-0.00316
		(0.0194)		(0.00143)		(0.000249)		(0.00574)		(0.00644)
Percent black		-0.159***								
		(0.0306)								
Constant	-7.597***	-2.853***	1.034***	1.051***	0.320***	0.274***	3.140***	3.264***	1.581***	2.395***
	(0.105)	(0.889)	(0.0227)	(0.0455)	(0.00636)	(0.0239)	(0.0202)	(0.195)	(0.0242)	(0.264)
Observations	24,984	24,984	23,481	23,481	22,574	22,574	24,977	24,977	24,977	24,977
Counties	3,123	3,123	3,058	3,058	3,002	3,002	3,123	3,123	3,123	3,123
State FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Robust Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

APPENDIX B

Chapter 2 Additional Content

B.1 Chapter 2 Additional Content: Variable Definitions

Each variable is broken into race (non-Hispanic Black and non-Hispanic White) and gender (male and female). The data was collected for the years 2005-2012 and aggregated to the county level (*i*). [73]

Suicide Count:

(Race) (Sex) Suicide Count$_{it}$

Age: Broken into 6 Age Cohorts: 0 – 14, 15 – 24, 25 – 34, 45 – 54, 55 – 64, 65 plus

$$\text{(Race) (Sex) Age Rate}_{it} = \frac{Number\ of\ (Race)\ (Sex)\ Age\ cohort}{Total\ Number\ of\ (Race)\ Persons}$$

Per Capita: (Race) Per Capita Income$_{it}$

Unemployment:

$$\text{(Race) (Sex) 16 – 64 Unem. Rate}_{it} = \frac{Number\ of\ (Race)\ (Sex)\ Persons\ in\ 16{-}64\ Unemployed}{(Race)(Sex)\ Labor\ Force}$$

Educational Attainment: Broken into 4 groups: Less than High School, High School, Some College, Bachelors Plus

$$\text{(Race) (Sex) (Education Level) Rate}_{it} = \frac{Number\ of\ (Race)\ (Sex)\ Persons\ in\ (Education\ Level)}{(Race)(Sex)\ Education\ Status\ Pop\ 25+}$$

[73] These variables are not segregated by race/gender demographic: Gini Coefficient is by county (*i*) and time (*t*). Unemployment Insurance and Gun Ownership are state level (*s*) and time (*t*).

Marital Status: Broken into 4 groups: Never Married, Married, Separated/Divorced, Widowed

(Race) (Sex) (Marital Status) $\text{Rate}_{it} = \frac{Number\ of\ (Race)\ (Sex)\ Persons\ in\ (Marital\ Status)}{(Race)(Sex)\ Martial\ Status\ Pop\ 25+}$

Gun Ownership: Broken into 3 groups: 0% – 20% = 1, >20% – <40% = 2, 40% Plus = 3

(State) (Index Level)

Unemployment Insurance:

(State) $\text{Unemployment Insurance}_{st} = Weekly\ Benefit\ Max_{st} * \frac{CPI_t}{CPI_{2010}}$

Gini Coefficient: $\text{Gini Coefficient}_{it}$

B.2 Chapter 2 Additional Content: Data Sources

Table of Data Sources

Variable	Table	Description	Format	Location
Number of Suicides	Non-Public Use Mortality Files	Individual Mortality Data in U.S.	N/A	CDC
Age	Sex by Age - B01001B (Black or African American Alone) - B01001A (White Alone)	Sex by Age by County	American Community Survey (5-Year Estimates)	Social Explorer (https://www.socialexplorer.com/)
Education	Sex by Educational Attainment - C15002B (Black or African American Alone) - C15002A (White Alone)	Sex by Educational Attainment for the Population 25 Years and Over	American Community Survey (5-Year Estimates)	Social Explorer (https://www.socialexplorer.com/)
Unemployment	Sex by Employment Status - C23002B (Black or African American Alone) - C23002A (White Alone)	Sex by Employment Status for the Population 16 Years and Over	American Community Survey (5-Year Estimates)	Social Explorer (https://www.socialexplorer.com/)
Per Capita Income	Per Capita Income – B19301B (Black or African American Alone) - B19301A (White Alone)	Per Capita Income by Race	American Community Survey (5-Year Estimates	Social Explorer (https://www.socialexplorer.com/)
Marital Status	Sex by Marital Status – B12002B (Black or African American Alone) - B12002A (White Alone)	Sex by Marital Status for the Population 15 and older	American Community Survey (5-Year Estimates	Social Explorer (https://www.socialexplorer.com/)

Gun Ownership	2004 Behavioral Risk Factor Surveillance System Survey	Any Firearms in Home? – Var: Firearm4	Behavioral Risk Factor Surveillance System - CDC	Center For Disease Control (https://www.cdc.gov/brfss/index.html)
Unemployment Insurance	Significant Provisions of State Unemployment Insurance Laws 2005-2012	Weekly Benefit Maximum Amount	Office of Workforce Security	United States Department of Labor (https://oui.doleta.gov/unemploy/statelaws.asp)
Inequality	Gini Index of Income Inequality	Gini Coefficient	American Community Survey (5-Year Estimates)	Social Explorer (https://www.socialexplorer.com/)

B.3 Chapter 2 Additional Content: Additional Table

TABLE 2.4 COUNTY LEVEL REGRESSION RESULTS (PERCENTAGES)

	COUNTY			
	(1)	(2)	(3)	(4)
VARIABLES	Black Male	Black Female	White Male	White Female
Unemployment:				
Unemployment Rate	0.00380	0.00683	0.0506***	0.00664
	(0.00510)	(0.0123)	(0.00912)	(0.00866)
Population:				
Population	9.27e-06***	5.62e-06***	8.25e-06***	6.24e-06***
	(1.56e-06)	(5.08e-07)	(1.07e-06)	(8.01e-07)
Marriage:				
Reference: Never Married				
Married	-0.0188***	-0.0292	-0.0210**	-0.0417***
	(0.00661)	(0.0234)	(0.00888)	(0.0104)
Divorce/Separated	0.0358***	0.0110	0.0154	0.0593***
	(0.00642)	(0.0264)	(0.0101)	(0.0118)
Widow	0.0171	-0.00720	-0.00422	-0.0746***
	(0.0287)	(0.0711)	(0.0113)	(0.0189)
Age:				
Reference: 25-34				
Age 0 – 14	0.0435***	-0.0188	-0.0164	-0.0401**
	(0.0142)	(0.0945)	(0.0150)	(0.0202)
Age 15 – 24	-0.0326**	-0.0708***	-0.0670***	-0.0570***
	(0.0166)	(0.0193)	(0.0113)	(0.0125)
Age 35 – 44	-0.0243	0.0252	-0.0703***	-0.0476**
	(0.0260)	(0.0187)	(0.0140)	(0.0209)
Age 45 – 54	-0.00492	-0.0148	-0.0325**	0.0258
	(0.0158)	(0.0564)	(0.0138)	(0.0256)
Age 55 – 64	-0.0303	-0.00757	-0.0905***	-0.121***

	(0.0242)	(0.0325)	(0.0163)	(0.0180)
Age 65 Plus	-0.0425**	-0.105	-0.0534***	0.00238
	(0.0180)	(0.0922)	(0.0124)	(0.0167)
Educational Attainment:				
Reference: High School				
Less Than High School	-0.0137	-0.0277	-0.00292	-0.0104*
	(0.00871)	(0.0478)	(0.00545)	(0.00623)
Some College	0.0303***	0.0298*	0.0535***	0.0422***
	(0.00825)	(0.0162)	(0.00506)	(0.00626)
Bachelors Plus	0.00890	0.00869	0.0295***	0.0169***
	(0.0109)	(0.0133)	(0.00463)	(0.00511)
Per Capita Income:				
Per Capita Income	3.37e-05	2.42e-06	5.06e-06	1.95e-05**
	(2.14e-05)	(7.36e-06)	(8.28e-06)	(8.35e-06)
Gun Ownership:				
Low Ownership (≤ 20%)	1.101***	-0.715	0.0395	0.135
	(0.328)	(0.619)	(0.121)	(0.129)
Medium Ownership (20%<x≤40%)	1.051***	-0.715	0.0705	0.278**
	(0.297)	(0.619)	(0.109)	(0.117)
High Ownership (< 40%)	0.904***	-0.715	0.347**	0.600***
	(0.281)	(0.619)	(0.172)	(0.176)
Unemployment Insurance:				
Unemployment Insurance	-4.04e-05	-8.51e-05	2.94e-06	3.60e-06
	(2.68e-05)	(5.85e-05)	(1.11e-05)	(1.93e-05)
Inequality:				
Gini Coefficient	8.913***	11.52***	1.673***	0.753
	(1.287)	(1.680)	(0.640)	(0.996)
Race Concentration				
Black			-0.00811***	0.000329
			(0.00262)	(0.00255)
White	-0.0123***	11.52***		
	(0.00295)	(1.680)		

Constant	-3.799**		3.824***	3.072**
	(1.709)		(1.086)	(1.508)
Observations	25,056	25,056	25,056	25,056
Non-Zero Observations	4281	1506	20169	12220
State FE	YES	YES	YES	YES
Time FE	YES	YES	YES	YES

Robust Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1