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## County level predictors of homicide and suicide in the state of Florida

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County-Level Predictors of Homicide and Suicide in the State of Florida

by

Kelly K. Browning

A dissertation submitted in partial fulfillment  
of the requirements for the degree of  
Doctor of Philosophy  
Department of Criminology  
College of Arts and Sciences  
University of South Florida

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Disorganization Theory, Strain Theory, County Level Violence

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## Dedication

Many people have been responsible for the successful completion of this dissertation and my educational achievements to date. My mother has been a large part of the driving force that has kept me focused through times of challenge during the pursuit of my education. I am forever grateful for her consistent and immeasurable encouragement to stay focused on my dreams and her reminders to me to bounce higher when faced with challenges. She has, and will remain always, both an inspiration in overcoming life's challenges, as well as a hero of mine.

I have been privileged throughout my life to attract compassionate and accepting friends who have pushed me when I needed to be pushed and reined me in when I needed grounding. They are too numerous to name and many too modest to accept recognition. So to those friends who have offered both support and advice when needed . . . I am eternally thankful for your friendship.

Finally, one person has been particularly understanding, encouraging, and accommodating during the process of writing this manuscript. Brian, I will forever appreciate the strength, respect and consideration you have provided over the past year. I know I am extremely fortunate as not only have I found someone well-versed in doctoral study and research, but also I have found my lifetime best-friend and partner. By the time this manuscript is printed we will be husband and wife. Once again I will have been given the wonderful opportunity to open a new chapter in my life. I can not wait.

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## County-Level Predictors of Homicide and Suicide in the State of Florida

Kelly K. Browning

### ABSTRACT

The present study expands the range of theoretical perspectives and empirical questions that have occupied the recent literature on homicide and suicide. The study examines county-level predictors for homicide and suicide in all sixty-seven counties in Florida. The current examination identifies which county-level variables are most closely related to each other, which variables explain the greatest amount of differences within the Florida counties, as well as which variables are most significantly correlated with the homicide and suicide rate by county. Additionally, the variables included in the present research are driven by the theoretical perspectives of social disorganization and anomie/strain theory. Using principal components regression the present study found that Income, Education, and Poverty, Infant Mortality, and Domestic Violence were predictors of homicide. Using the same components to explore the suicide rate, the research found that Age and Divorce were positively associated with suicide. In contrast to homicide, infant mortality rates were negatively associated with suicide rate in Florida counties.

## Chapter One

### Introduction and Overview of the Study

#### *Introduction*

A large volume of academic literature exists concerning two forms of violence, homicide and suicide, and their considerable variation in prevalence among different geographic locations. This dissertation adds to the existing literature by determining how a selected group of demographic, economic, and cultural variables are correlated with the rates of homicide and suicide among the 67 counties in the state of Florida. The primary objective of the study is to identify the general “social environments” within Florida counties that are associated with varying levels of both homicide and suicide, thereby providing possible explanations as to why the residents of some counties may be more (or less) prone to suicide and homicide than residents of other counties.

In general, violence is defined as “the intentional use of physical force or power, threatened or actual, against another person or against oneself or a group of people, that results in or has a high likelihood of resulting in injury, death, psychological harm, ‘maldevelopment’ or deprivation” (Department of Injuries and Violence Prevention, World Health Organization, 2001). *Lethal violence* is that which results in death and consists of two forms of behavior, homicide (causing the death of others) and suicide (causing one’s own death). Given this definition, it is important to emphasize that the focus of the present study is not to discuss why *individuals* engage in either form of lethal violence; instead the objective is to ascertain why the populations of certain

geographically-bounded areas (counties) vary in the extent to which homicide and suicide occurs in their communities.

On the surface, homicide and suicide appear to be distinctly different behaviors, and could be expected to demonstrate very different sets of correlates. There is a considerable body of literature that supports this expectation; yet, there is another, albeit smaller, literature suggesting that there is considerable linkage between these two types of violence.<sup>1</sup> Therefore, a second objective of this study is to determine whether the correlates of homicide across Florida counties are different from the correlates of suicide across those same counties.

In pursuing these objectives, the present study advances the study of lethal violence by concentrating on correlates of homicide and suicide rates within one state, a focus rarely found in studies of this nature. Previous research, especially that concerning homicide, has typically explored the issue at a broader level by seeking to explain differences in rates across nations, and within the United States, across states, counties, and cities that span the nation (Parker, Land, & McCall, 1999). However, the extant bodies of research on homicide and suicide are almost exclusively focused on urban areas, and virtually neglect the correlates of homicide and suicide in rural areas. In contrast, the present research is unique because it addresses the question of whether the correlates of suicide and homicide shown to exist across these broad social spaces are useful indicators of homicide/suicide rates in a more restricted geographical space. The study of lethal violence rates across all counties within a single state allows for an assessment in both rural and urban spaces.

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<sup>1</sup> For detailed historical account of integrating homicide and suicide in research see Unnithan, Huff-Corzine, Corzine, and Whitt, 1994.

For a study of this nature to have meaning, the geographical space under scrutiny must exhibit variation (ideally, *considerable* variation) in both homicide and suicide rates as well as the variables being considered as potential correlates. Florida serves this need particularly well, exhibiting considerable range among its counties in both suicide and homicide. As evidence of this claim, county rates of homicide are listed in Table 1. As shown in this table, the range in rates for both forms of lethal violence is substantial, varying from two counties with no homicides during the period 2001-2003 to one with a high of 15.6 per 100,000 residents. The range is even greater for suicides, varying from one county with no recorded suicides during 2001-2003 to another with a rate of 28.6 per 100,000 residents.

Table 1

*Homicide and Suicide Rates by Florida County (3-year average, 2001-2003)*

<i>County</i>	<i>Homicide Rate</i>	<i>Suicide Rate</i>
Alachua	3.60	14.30
Baker	4.30	13.00
Bay	5.70	15.70
Bradford	6.30	10.00
Brevard	4.30	18.40
Broward	5.40	13.70
Calhoun	10.00	15.00
Charlotte	2.70	18.10
Citrus	5.40	20.70
Clay	3.30	16.30
Collier	2.80	12.00
Columbia	6.90	14.30
Dade	9.00	9.20
Desoto	7.00	9.00
Dixie	9.20	18.40
Duval	12.20	14.00
Escambia	5.70	12.50
Flagler	1.70	12.60
Franklin	6.50	16.30
Gadsden	11.60	7.20
Gilchrist	.00	11.00
Glades	15.60	18.70
Gulf	.00	15.20
Hamilton	9.60	4.80
Hardee	3.70	11.00
Hendry	11.00	8.20
Hernando	5.10	20.80
Highland	5.60	16.40
Hillsborough	6.20	12.40
Holmes	3.50	8.90
Indian R	4.20	14.30
Jackson	6.20	11.10
Jefferson	7.50	15.00
Lafayette	.00	27.60
Lake	4.10	17.70
Lee	6.50	14.80
Leon	2.90	8.90
Levy	1.80	26.80

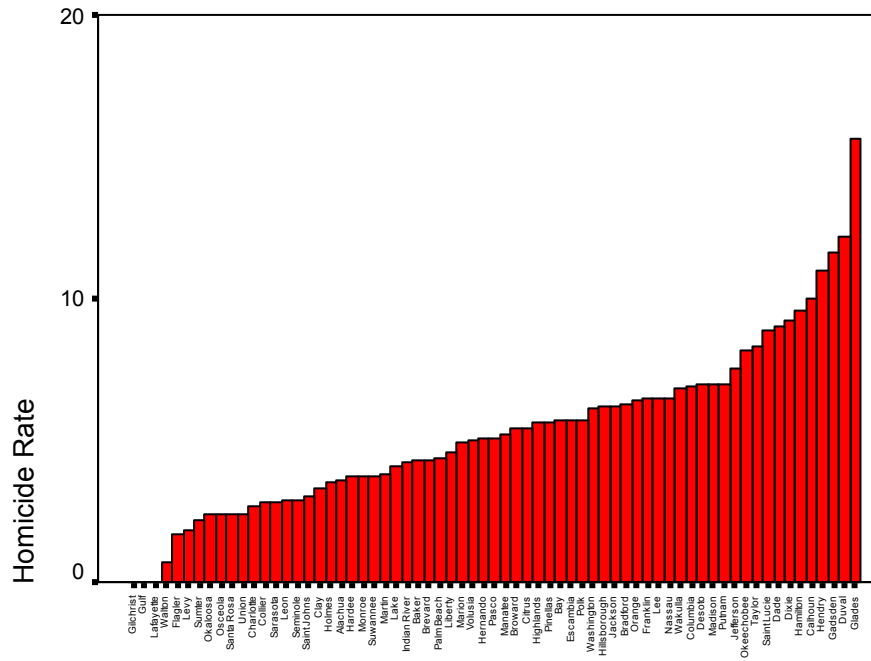
(table continues)

Table 1. (Continued)

<i>County</i>	<i>Homicide Rate</i>	<i>Suicide Rate</i>
Liberty	4.60	.00
Madison	7.00	12.30
Manatee	5.20	15.30
Marion	4.90	17.70
Martin	3.80	16.60
Monroe	3.70	23.10
Nassau	6.50	15.20
Okaloosa	2.40	13.90
Okeechobee	8.20	13.60
Orange	6.40	9.30
Osceola	2.40	14.10
Palm Bea	4.40	13.30
Pasco	5.10	18.90
Pinellas	5.60	17.40
Polk	5.70	12.90
Putnam	7.00	14.90
Saint Jo	3.00	14.30
Saint Lu	8.90	15.20
Santa Rosa	2.40	15.10
Sarasota	2.80	17.90
Seminole	2.90	13.00
Sumter	2.20	13.10
Suwannee	3.70	16.50
Taylor	8.30	18.30
Union	2.40	17.00
Volusia	5.00	18.30
Wakulla	6.80	15.00
Walton	.70	16.10
Washington	6.10	7.70

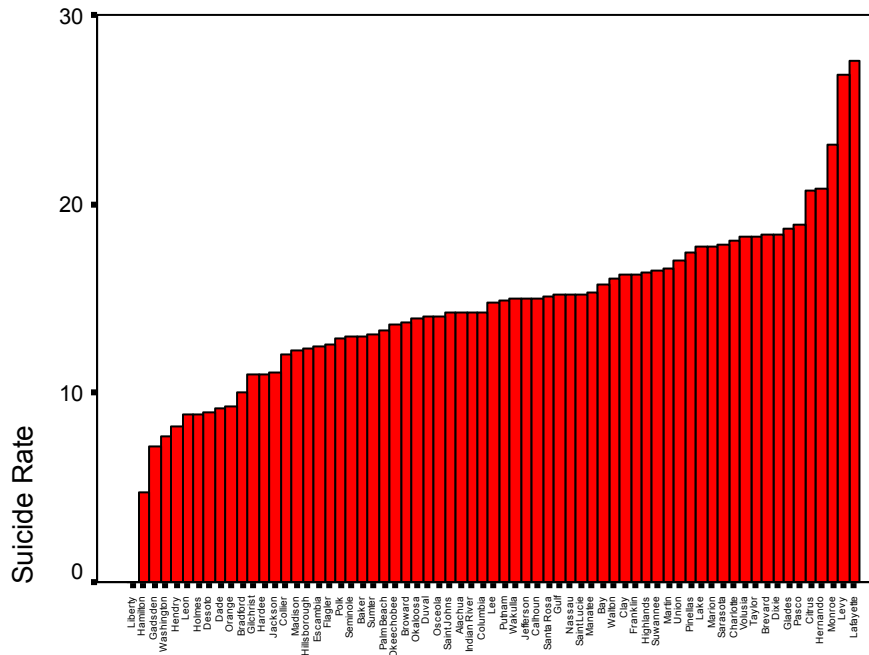
As a visual aid to further exemplify the diversity of homicide and suicide rates among Florida counties, their distributions are shown as charts in Figures 1 and 2.

Noting the arrangement of counties in accordance with their rates, another factor becomes apparent, namely that high (or low) suicide rates do not necessarily co-occur in the same counties. This suggests that an independent assessment of each form of lethal violence is warranted and may yield divergent findings.



Counties in Florida

Figure 1. Homicide Rate\* Among Florida Counties, Lowest to Highest  
 NOTE: \*per 100,000 residents; 3-year average, 2001-2003



Counties in Florida

Figure 2. Suicide Rate\* Among Florida Counties, Lowest to Highest  
 NOTE: \*per 100,000 residents; 3-year average, 2001-2003

In addition to its variation in rates of lethal violence, Florida is a demographically, economically, and culturally diverse state that exhibits very different demographic and socio-economic structures among its 67 counties. This diversity is important because the theoretical perspectives that inform the macro-level study of homicide and suicide are grounded in an assumption of heterogeneous variables of this nature. Therefore, before proceeding to a consideration of the variables employed in this study, the general theoretical framework that has informed the macro-level (non-individual level) study of homicide and suicide is discussed in Chapter Two. The method of the study is discussed in Chapter Three, with special attention afforded the process by which a large array of possible correlates are reduced to a more substantively and statistically meaningful set of



variables to be analyzed. Results of the analysis are presented in Chapter Four, followed by a discussion in Chapter Five of the research findings and their possible implication for public policy directed toward the reduction of homicide and suicide.

## Chapter Two

### Explaining Homicide and Suicide

#### *Homicide Research and Theory*

Two questions dominate the homicide literature: why certain individuals have tendencies to commit homicide (Toch, 1969) and why rates of homicide differ from place to place. The first question requires comparing the characteristics and experiences of offenders and nonoffenders. This question was not examined within the context of this paper. The second question is the one pursued in this study: not what kind of individuals tend to commit homicide, but what social conditions make it likely that more people will commit homicide in some locations and not others (Blau & Blau, 1982).

In order to better answer this second question we must ascertain what, if any, variations in social conditions are associated with the differences in crime rates within examined locations. Homicide researchers have long studied the question of why rates of criminal violence differ from place to place or from time to time to ascertain which variations in social conditions are associated with the differences in crime rates. Past research has examined the effects of structural factors on homicide rates in social units at different levels of aggregation in the United States. Units of analysis that have been examined in the United States include census tracts (Avakame, 1997; Krivo & Peterson, 1996; Morenoff & Sampson, 1997; Schuerman & Kobrin, 1986); American Indian reservations (Bachman, 1991); cities (Bailey, 1984; Chamlin, 1989; Cohen, 1990; Land et al., 1988; Loftin & Parker, 1985; Messner & Golden, 1992; Parker, 1989; Sampson

1985, 1986), metropolitan areas or SMSAs (Blau & Blau, 1982; Blau & Golden, 1986; Crutchfield, Geerken & Gove, 1982; Harer & Steffensmeier, 1992; Land, McCall, & Cohen, 1990; Messner, 1982, 1983a, 1983b; Rosenfeld, 1986; Simpson, 1985; Williams, 1984); counties (Kposowa & Breault, 1993); states (Gastil, 1971; Huff-Corzine, Corzine & Moore, 1986; Land et al., 1990; Loftin & Hill, 1974; Parker & Smith, 1979; Smith & Parker, 1980), and the nation over time (LaFree & Drass, 1992, 1996; Smith, Devine, & Sheley, 1992).

As would be expected, the findings from the above studies yield a noteworthy number of incongruities with regard to which structural factors appear to have a significant impact on homicide rates within the designated units of analysis. However, a number of factors are commonly identified as influences on homicide rates. In studies that examined the structural factor of percentage of divorced persons in the population, there was a positive statistically significant coefficient with homicide rates regardless of unit of analysis (Blau & Blau, 1982; Blau & Golden, 1986; Land et al., 1990; Messner & Golden, 1992; Sampson, 1986; Simpson, 1985; Williams, 1984; and Williams & Flewelling, 1988). Population size, density and structure (both urban and rural) have also been found to have a positive significant coefficient with homicide rates regardless of unit of analysis (Bailey, 1984; Blau & Golden, 1986; Jackson, 1984; Land et al., 1990; Loftin & Parker, 1985; Messner, 1983a, 1983b, 1982; Messner & Golden, 1992; Parker, 1989; Sampson, 1985, 1986; Williams, 1984; and Williams & Flewelling, 1988).

Conversely, population size, density and structure (urban and rural) have also been found to have negative statistically significant coefficients with homicide and suicide rates (Bailey, Blau & Blau, 1982; Chamlin, 1989; Crutchfield et al., 1982; 1984; Harer &

Steffensmeier, 1992; Huff-Corzine et al., 1986; Gastil, 1971; Loftin & Hill, 1974; Loftin & Parker, 1985; Messner, 1983a, 1983b, 1982; Parker, 1989; Rosenfeld, 1986; Simpson, 1985; Williams, 1984; Smith & Parker, 1980).

Several recent studies have dealt with covariates of homicide rates informed by the effects of age (Land et al., 1990). One long-standing viewpoint is the greater propensity for teenagers and young adults to commit more crimes than individuals at other ages (Hirschi & Gottfredson, 1983). There has been much disagreement with regard to the validity of this relationship as an accepted basic fact (Baldwin, 1985; Greenberg, 1985; Hirschi & Gottfredson, 1985a, 1985b; Land et al., 1990). Despite the disagreement, the existence and invariance of the age and crime-propensity relationship is well established (Land et al., 1990). Most studies of homicide rates posit a positive relationship between the concentration of teenage and young adult population and homicide rate.<sup>2</sup>

Percentage of population aged 15-29 has been found to have a positive statistically significant effect at the state level (Land et al., 1990) and a negative statistically significant effect at city level (Land et al., 1990; Bailey, 1984), as well as no statistical significance at city and SMSA level (Harer & Steffensmeier, 1992; Land et al., 1990; Messner, 1983b, 1982; Messner & Golden, 1992; Simpson, 1985). Percentage of population aged 20-34 was found to have no significance at city level analysis (Parker, 1989), at the SMSA level analysis (Messner, 1983a), and at the state level of analysis (Huff-Corzine et al., 1986; Parker & Smith, 1979; Smith & Parker, 1980), as well as a

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<sup>2</sup> It is important to note the substantial variability in the particular age-structure index used by researchers to operationalize this proposition. For further discussion see Cohen and Land, 1987; Land et al., 1990.

positive statistically significant effect at the state level (Gastil, 1971; Loftin & Hill, 1974) and a negative statistically significant effect at the SMSA level (Messner, 1983a).

Percentage female-headed households and population mobility were found to have no significance at the city level (Chamlin, 1989), but mobility had a positive and statistically significant coefficient at the SMSA level (Crutchfield et al., 1982). In the city (Bailey, 1984; Chamlin, 1989; Land et al., 1990; Messner & Golden, 1992; Parker, 1989; Sampson, 1985, 1986; Williams & Flewelling, 1988), SMSA (Blau & Blau, 1982; Blau & Golden, 1986; Harer & Steffensmeier, 1992; Land et al., 1990; Messner, 1983a, 1983b; Rosenfeld, 1986; Simpson, 1985; Williams, 1984) and state level (Huff-Corzine et al., 1986; Land et al., 1990; Loftin & Hill, 1974; Parker & Smith, 1979; Smith & Parker, 1980) analyses, resource deprivation indices, unemployment rate, poverty and income inequality were found to have positive and statistically significant coefficients with homicide. On the contrary, at the city and SMSA levels of analysis poverty (Chamlin, 1989; Messner, 1982) and unemployment rate (Crutchfield et al., 1982; Land et al., 1990; Sampson, 1985) were found to have negative and statistically significant influences on homicide. Further, unemployment rate, income inequality, percentage black population, racial inequality, white-black income difference, poverty, and percentage non-white were found at all levels of analysis to have no statistical significance (Bailey, 1984; Blau & Golden, 1986; Chamlin, 1989; Crutchfield et al., 1982; Harer & Steffensmeier, 1992; Huff-Corzine et al., 1986; Land, et al., 1990; Loftin & Hill, 1974; Loftin & Parker, 1985; Messner, 1983a, 1983b, 1982; Parker, 1989; Parker & Smith, 1979, 1980; Rosenfeld, 1986; Sampson, 1985; Simpson, 1985; Williams, 1984). Median number of years of education was found to have no significance at the

SMSA level of analysis (Crutchfield et al., 1982), but in Gastil's (1971) early study at the state level it was found to have a negative statistically significant effect.

### *Theoretical Perspectives*

Although the choice of variables in the macro-level research of homicide may appear somewhat arbitrary, it is theoretically driven. Of the dominant social-structural theoretical approaches to the study of homicide and suicide two are frequently employed in research: social disorganization theory, and anomie/strain theory<sup>3</sup>. These structural perspectives are grounded in the argument that killings of one person by another are not merely idiosyncratic, individual acts of violence. Rather, they are "social facts" that are distributed in patterned ways.<sup>4</sup>

### *Social Disorganization*

The social disorganization theoretical approach to the study of crime was first developed during urban crime and delinquency studies by sociologists at the University of Chicago and the Institute for Juvenile Research in Chicago in the 1920s and 1930s (Shaw & McKay, 1942, 1969). These researchers found that high crime rates persisted in certain Chicago neighborhoods for long periods of time despite changes in the racial and ethnic composition of these communities. They constructed social disorganization theory out of a theory of urban ecology that viewed the city as analogous to the natural ecological communities of plants and animals (Park & Burgess, McKenzie, 1928). Their

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<sup>3</sup> Theoretical and empirical efforts have also examined the role of cultural differences in explaining rates of violence (Wolfgang & Ferracuti, 1967). The subculture of violence thesis argues that southerners have a greater predisposition for violence because southern regional culture permits or demands violent responses to situations in which one's honor, family, or possessions are challenged or assaulted. While this theoretical perspective has been popular in examining homicide rates, the current study did not include any county-level variables that would be applicable to the subculture of violence viewpoint. Therefore, the subculture of violence thesis was not utilized to examine homicide or suicide rates in the current study.

<sup>4</sup> Durkheim (1895/1964) defines social facts in the *Rules of Sociological Method* and applies the idea to what is commonly viewed as an individual act in *Suicide* (1897/1966).

findings have led to a vast amount of subsequent sociological and criminological research that focused on how the ecological conditions of a specified area shape crime rates over and above the characteristics of individual residents.

According to Bursik (1988), social disorganization refers to the failure of a community structure to recognize the common values of its residents and maintain effective social control. Bursik argued that the original social disorganization theorists were not putting forth that urban ecology, economic conditions, and rapid social change were the direct cause of crime, but rather that social disorganization weakens the informal social controls within the community, and as a result allows high crime rates to occur. Consequently, the lack of social control is an important factor in the social disorganization concept. More specifically, structural barriers obstruct development of the formal and informal ties that help a community solve common problems. It is the social and economic changes in a community that lead to the weakening of group cohesion and to the breakdown in social control mechanisms, creating conflict and increasing the potential for crime. Therefore, from a social disorganization theoretical approach, the study of crime is not focused on the *kinds of people* explanations of crime, but on the effects of *kinds of places* that create conditions favorable or unfavorable to crime.

Sampson and Groves (1989) extended Shaw and McKay's original measures of social class, residential mobility, and family disruption by adding several key components to the concept of social disorganization: community supervision of teenage gangs, informal friendship networks, and participation in formal organizations. They

found that most of the variables were significantly related to social disorganization, but most were better predictors of rates of crime victimization than criminal offenses.

Rather than following Sampson and Groves' model of measuring social disorganization directly, most contemporary researchers continue to examine social disorganization indirectly using social conditions in different geographical areas. For example, Gottfredson and associates (1991) tested social disorganization theory by correlating census-block level data on disrupted families, poverty, unemployment, income, and education with individual-level self-reports of delinquent behavior of interpersonal aggression, theft and vandalism, and drug use (Akers & Sellers, 2004). Conversely, Warner and Pierce (1993) report strong relationships between rates of telephone calls to police and neighborhood poverty, racial heterogeneity, residential instability, family disruption, and high density of housing units as measures of social disorganization.

Stark (1987) attempted to update the ecological theory by devising a theory of "deviant places." He identified population density, poverty, mixed use, transients, and dilapidation as the urban conditions that induced moral cynicism, increased opportunity and motivation for crime and deviance, and diminished social control. The rationale is that these variables are correlated with crime rates because they attract the more deviant, and drive out the more conforming, people and activities. Although Stark created propositions connecting these factors of deviant places to crime he offered no key data and subsequent research has not tested his theory.

Since the original studies of Shaw and McKay, a great deal of research has been done on the ecology of urban crime and delinquency. In subsequent research, social



disorganization theory has attempted to provide the context for understanding the association between macro-level characteristics and crime rates at different community levels (Bursik, 1988; Bursik & Grasmick, 1993; Kornhauser, 1978; Petee & Kowalski, 1993; Sampson, 1991; Sampson & Groves, 1989, Smith & Brewer, 1992; Smith & Jarjoura, 1988; Stark, 1987). In these studies, structural variables such as percentage of young, percentage of divorced persons, racial heterogeneity, unit population size, and population density, have often been used as indicative of disorder in community social organization. The concept of social disorganization has also been applied to the conditions of a family, a whole society, or some segment of society (Rose, 1954).

More specifically, social disorganization theory of crime applies control to the level of communities. In other words, social disorganization theory posits that crime (in the present case, homicide) results when community controls are weakened by residential turnover, population heterogeneity, and economic deprivation (Bursik, 1988; Shaw & McKay, 1969).

#### *Anomie/Strain Theory*

Classic strain theory emerged out of anomie theory, which was developed by the sociologist Emile Durkheim. Durkheim originally applied the term *anomie*, a state of normlessness, to the impact that the lack of social regulation in modern society had in promoting higher rates of suicide (Akers, 2000). He focused on the decrease of societal restraint and the strain that resulted at the macro level. Later, Merton (1938, 1957) applied Durkheim's idea of anomie to the condition of modern industrial societies, especially in the United States. He hypothesized that society had a cultural imbalance between the goals and the norms in society. To Merton, an integrated society maintains a

balance between social structure (social means) and culture (approved goals). From the macro perspective, anomie/strain is exhibited in the inability of society to set limits on goals and regulate individual conduct. Anomie is the form that societal negative integration takes when there is dissociation between valued cultural ends and legitimate societal means to those ends. Merton proposed that criminal behavior was caused by a state of normlessness or lack of social regulation, where there was a disassociation between valued cultural ends and legitimate societal means to those ends. In this state of normlessness, society places a strong emphasis on reaching goals but not on socially approved means of reaching those goals. Society promotes the ideal that there is equal opportunity for all to reach their goals, but in reality, the lower classes do not have an equal opportunity to reach their goals. For example, many people in society do not have equal access to institutions such as those needed to access material and social resources for physical survival and for meeting the conditions of full social membership as defined by the norms of a particular society (Messner & Rosenfeld, 1999). By regulating access to wealth, power, and prestige, institutions determine the life opportunities of a population. This institutional function is relevant to homicide because constraints on life chances are potential sources of motivation for aggression and violence. According to anomie/strain theories, crime and violence result from structural conditions that deprive people of the resources and rewards that they need, expect, or desire (Messner & Rosenfeld, 1999).

Merton's thesis links crime to the disjuncture between society's success goals and the institutionalized means for achieving them. It is restricted or blocked economic opportunities of a community in conjunction with feelings of injustice and resentment

that increase the likelihood of crime in a geographical area. More specifically, as the people who are economically deprived in a community become conscious of their blocked economic resources and develop resentment toward what they perceive as an unfair system, their likelihood for violence increases.

*Our primary aim is to discover how some social structures exert a definite pressure upon certain persons in the society to engage in nonconformist rather than conformist conduct. . . . high rates of deviant behavior in these groups [occur] not because the human beings comprising them are compounded of distinctive biological tendencies but because they are responding normally to the social situation in which they find themselves.*  
-Robert Merton<sup>5</sup>

When people attempt to deal with social disorganization, it can cause strain.

Merton first mentioned strain as a part of his theory of anomie, in which he asserted that the discrepancy between aspirations and expectations causes strain on lower classes to use whatever means available to reach their goals, be they legal or illegal. The classic strain theories of Merton (1968)<sup>6</sup>, Cohen (1955), and Cloward and Ohlin (1960) argue that crime should be highest among individuals who place a high relative emphasis on monetary success or middle-class status, but do not expect to achieve such success through legitimate channels (Agnew, 1995). Therefore, these theories predict that crime is greatest when there is a strong desire for monetary success and a low expectation of fulfilling that desire. Classic strain theorists also hypothesize that there is a strong relationship between social class and delinquency. In other words, because lower-class

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<sup>5</sup> Robert K. Merton, *Social Structure and Anomie*.

<sup>6</sup> There is some disagreement over whether Merton's theory was strictly macro or whether it includes a micro component. For further discussion, see Menard, 1995.

individuals most often lack the means to achieve economic success or middle-class status, crime is more likely concentrated in the lower class.

Anomie/strain theorists have also examined the concentration of crime in lower-class urban areas, and among lower-class and minority groups. They hypothesize that among certain racial or minority groups crimes are a response to unfulfilled promises of justice and equity because often these minority groups are more likely to be blocked from educational and employment opportunities. When an economically disadvantaged group experiences relative deprivation from these blocked opportunities that produce frustration, eventually violence will result. It is this approach that explains the linkage between economic conditions and violence. Consequently, anomie/strain theorists use economic and racial inequity measures to test for strain in a community. Often the measures used are in the form of component indices that include measures of poverty, unemployment, income inequality, racial inequity, racial segregation and the percentage of Black residents as indicators of strain.

Messner & Rosenfeld (2001) extended Merton's macro-level theory into institutional-anomie theory in their book, *Crime and the American Dream*. They extended the analysis to a variety of institutions in the social structure. In particular, they apply Merton's argument of culture and describe their vision of the "American dream," which, they make a case, includes at least four value orientations favorable to criminal behavior (Messner & Rosenfeld, 2001; Akers & Sellers, 2004). First, a strong *achievement orientation* enables a culture where people are valued based on what they achieve or possess. Second, *individualism* pushes people to make it on their own encouraging competition rather than cooperation. Third, *universalism* develops a belief

that all people must desire and strive toward the same success goal. Finally, *fetishism of money* promotes the belief that money itself is the sole “metric of success” and since the accumulation of money has no set end point, the pursuit of money becomes relentless (Messner & Rosenfeld, 2001, p. 63). These values orientations engender a social structure in which the economic institution dominates and overshadows the influence of other social institutions such as the family, the schools, or the government. As a result, these noneconomic institutions lose their ability to exert control over members of society, who are driven to pursue unrelentingly economic goals with few restraints (Messner & Rosenfeld, 2001; Akers and Sellers, 2004).

According to Messner & Rosenfeld (1999), social class, race, gender, and age are all major correlates of homicide related to social stratification. Social stratification frequently refers to inequality in the possession of, and access to, economic resources (Messner, 1982, 1988). Poverty may also refer to a condition in which persons have trouble obtaining the basic necessities for a healthy life. From an anomie/strain theoretical perspective, poverty is likely to produce the strain that can push or pressure people to commit acts of lethal violence (Messner & Rosenfeld, 1999). As noted by Williams and Flewelling (1988), it is logical to think that when people live under conditions of extreme scarcity, the struggle for survival becomes intensified. These conditions go together with an accumulation of troubled psychological manifestations, ranging from a deep sense of powerlessness and brutalization to anger, anxiety, and alienation (Williams & Flewelling, 1988, p. 423). Consequently, these manifestations can incite physical aggression in conflict situations.

For the purpose of the present study, variables derived from social disorganization and anomie/strain theory perspectives will be examined. While social disorganization and anomie/strain theories have developed from different theoretical and research traditions, they share a common theme. Both theories propose that social order, stability, and integration are conducive to conformity, while disorder and instability are favorable to crime. In the present study, a county is the social system that is described as socially organized and integrated if there is an internal consensus on its norms and values, a strong cohesion exists among its members, and social interaction proceeds in an orderly way. On the contrary, the system is described as disorganized or anomic if there is a disruption in its social cohesion or integration, a breakdown in social control, or instability among its elements.

#### *Suicide Background and Integration with Homicide*

The relationship between homicide and suicide has long been of interest. Toward the beginning of the 19<sup>th</sup> century an inverse relationship was noted between homicide and suicide rates by Guerry (1833). Throughout the nineteenth century, several researchers found an inverse relationship between these lethal violence rates (see Maury, 1860; Morselli, 1879). The Italian criminologist Morselli (1879) took a strong stance on the joint lethal violence relationship when he wrote, “the polar character of suicide and homicide is an absolutely general law...always found changing inversely with one another” (p. 243). While many early researchers noted the relationship between homicide and suicide, it was only through the infamous work of the French sociologist Emile Durkheim in 1897 that the relationship became well-known in the research community (Durkheim, 1951). Durkheim found when examining European lethal violence rates that

the inverse relationship between homicide and suicide was not always verifiable. He described the relationship between the two by stating: “anomie begets a state of exasperation and irritated weariness which may turn against the person himself or another according to the circumstances” (p. 357). Tarde (1912) and Halfbacks (1930) also found exceptions to the inverse relationship between homicide and suicide rates that had been previously posited.

The legendary psychology researcher Freud talks about the relationship between homicide and suicide in *Mourning and Melancholia* 1917 when he wrote “we have long known that no neurotic harbors thoughts of suicide which are not murderous impulses against others redirected upon himself” (Freud, 1955, p. 162). Henry and Short (1954) were among the first contemporary researchers to argue that suicide and homicide are reflections of the same underlying factor: the stresses caused by unemployment. They were among the first researchers to examine homicide and suicide rates with reference to economic changes. They found that as the economy flourished, the homicide rate increased and suicide decreased. The opposite occurred in times of economic depression. Henry and Short suggested that the higher and lower social classes showed different responses to frustration, the former choosing suicide when their financial well-being was threatened, the latter attacking others, blaming them for their misfortune. Gold (1958) examined the socialization process in American class structure, showing that the manner in which children are socialized, particularly whether or not they received punishment, is later a formative factor in their choice of homicide or suicide. Gold sought to prove that suicide or homicide, which he regarded as principally a psychological problem, was resolute to some extent by sociological variables.

Pokorny (1968) compared four acts of human violence and found that homicide and suicide were both more prevalent in males, but were dissimilar with regard to all other parameters. He concluded that homicide and suicide were polar opposite acts of violence. One study conducted by Palmer (1968) studied homicide and suicide in 40 non-literate societies and tested the hypothesis that homicide and suicide rates varied inversely. He also examined the relationship between the frequency of punishment in a society, and both suicide and homicide. He found that there was a tendency for homicide and suicide each to increase as overall punishment increased. In other words, he postulated that violence, whether in the form of severe punishment, homicide, or suicide, gives rise to violence.

Hendin (1969) examined the relationship between suicide and homicide among young urban black males and found a direct relationship between them. Kendell (1970) proposed a hypothesis that “depression...is caused by the inhibition of aggressive responses to frustration” (p. 308). Accordingly, Kendell recommended that the frequency of depression would increase in situations where aggression was provoked but its obvious expression prohibited and, on the other hand, that the incidence of depression would be lower when aggression could be expressed outwardly. Kendell noted that “homicide is outward directed aggression in its simplest and most extreme form” (p. 310).

Holinger (1979) looked at violent deaths, namely suicides, homicides and accidents, in the age group 1-39 years from 1961-1975. He found that in those years the rates of suicide and homicide almost doubled in the age groups 10-14 years, 15-19 years and 20-24 years. Holinger questioned the idea that suicide and homicide were inversely related and he noted analogous patterns of suicide and homicide from the time when



systematic data collection began in the 1900s. In Holinger's later study (1987), he found significant positive correlations between the suicide and homicide rates for 15-24 year olds and the percentage of 15-24 year olds in the U.S. population from 1933 to 1982. Holinger suggested that the suicide and homicide pattern for certain age groups might be predictable but he warned that there could be methodological problems in using national mortality and population data (1991). Similar to Holinger's studies, Griffith and Bell (1989) reviewed trends in suicide and homicide among the black population between 1950-1986. They found in the black male age group 25-34 years there was a positive relationship between homicide and suicide rates.

A positive relationship between economic variables and homicide and suicide has been found in a wide range of data sets (see Lester & Yang, 1994a, 1994b). Lester has written widely on suicide and homicide under a number of headings including the effects of socialization (1967); relationship with alcohol (1980); relationship to latitude, longitude, and the weather (1986); the quality of life in various countries (1990); and the association between involvement in war and rates of suicide and homicide (1991). Leenaars and Lester (1994) looked at the variation in suicide and homicide rates in Canada and the U.S. with regard to social and economic variables including marriage, birth, divorce and unemployment rates. They had different results in the two countries and particularly noteworthy was that the marriage rate in Canada did not have a protective effect on suicide as would be expected. Instead, marriage was found to significantly contribute to the homicide rate. The authors examined this finding in an historical context. They concluded that in studying suicide it was valuable to simultaneously study other types of violent behavior including sociological variables

between countries. In Lester's (2001) meta-analysis he found five consistent correlates of homicide rates: homicide rates are generally higher in regions where divorce rates, suicide rates, unemployment rates, the population, and per capita income are higher.

McKenna, Kelleher and Corcoran (1997) noted that in general, suicide, homicide and indictable crime rates are positively related and reflect the level of disorder and disharmony in society. They continue by stating that it would now appear too simplistic to regard suicide solely as inwardly directed aggression and homicide as outwardly directed aggression as has been the case in many writings up to now.

Durkheim laid the foundation for the macro social view of suicide determination by emphasizing the importance of society's influence on the individual, particularly the individual's social integration. He used 19<sup>th</sup> century European data to conclude that economic crisis, the divorce rate, and religious affiliation were correlated with suicide rates (Gibbs, 1994). In 1897, Durkheim developed the first model explaining suicide patterns using demographic, sociological, and economic variables. Later, his model served as the basis for extended empirical research by sociologists, criminologists, and economists. One of the most notable extensions was offered by Henry and Short (1954).

Henry and Short used the business index as an indicator of the general economic outlook of the society. The researchers found significant correlations between suicide rates and cyclical economic variables. High status individuals were at greater risk during recessions due to their greater relative loss of status and income during economic crises. According to these researchers, status differences explained the absolute differences in suicide rates between males and females, as well as between whites and nonwhites. According to this theory, the comparatively high suicide rates of white males were

explained by their comparatively high status. Henry and Short argue that frustration results when environmental factors block people's aspirations. This frustration increases the risk of either suicide or homicide, depending on how much control people feel they have over their lives. Henry and Short found that suicide and homicide vary inversely, so if suicide rates increase, then homicide rates decline. Since economically deprived people tend to feel they have less control over their ability to make a good living, according to the researchers, we would expect to find that minorities living in poverty would experience higher levels of frustration. They argued that suicide varies negatively and homicide varies positively with the strength of external restraint over behavior (1954, p. 17). Basically, Henry and Short's argument is an extension of a simplistic frustration-aggression thesis and their contribution, like Durkheim's, is that they posit it is a relational system that determines the direction of aggression regardless of whether it is acted out via homicide or suicide. However, their findings suffered from efficiency problems, a shortcoming addressed in the work of Pierre in 1967. Pierre concludes that a positive relationship exists between the business cycle variable and suicide rates.

Lester (1994) documented patterns of suicide and homicide in the United States using state-level data in 1980. He found that suicide rates were strongly related with the level of interstate migration. Divorce rates and homicide rates were strongly related with the percentage of black residents in each state. Furthermore, he found that men have both higher homicide and suicide rates than women, and that gender differential is contingent upon other socioeconomic factors such as divorce rates, etc. However, Lester did not conclude with a theoretical argument about the inherent relation or lack thereof among these two forms of violence.

Much of the recent contribution to the literature on suicide is attributable to Yang and Lester and focuses on economic correlates. These authors examined the relationship between unemployment and suicide rates in a series of empirical papers in various regression settings: time series, cross-country, and across U.S. states (Yang, 1989, 1992; Yang & Lester, 1995, 1996, 1998; Yang, Lester, & Stack, 1992), and found a negative relationship between the female labor force level and the suicide rates in the United States (Yang & Lester, 1992).

Later Chuang and Huang (1997) used a panel of Taiwanese cities and counties in a cross-state analysis. The authors examined explanatory variables and found the proportion of elderly population, population in poverty, the proportion of aboriginal population, and migration variables significantly correlated with suicide rates.

Pampel and Williamson (2001) found that change in suicide and homicide rates are contingent upon demographic structure, family change, and sociopolitical equality using cross-national data. The researchers found that large age cohorts exacerbate youth economic prospects but enhance the well being of the elderly cohort, thus leading to higher youth lethal violence rates than elderly. Furthermore, changes in work, marriage, divorce, and fertility were also noted as possibly increasing youth lethal violence relative to the elderly. Pampel and Williamson argue that lethal violence is moderated through social institutions that emphasize an egalitarian distribution of scarce resources. They conclude that both homicide and suicide react to these social determinants in a comparable way across nations.

Jungeilges and Kirchgassner (2002) used a panel of 30 countries and found that the significance of variables such as real income per capita, income growth rates, and a

civil liberties index, were dependent on the age group and gender being considered. The researchers also found a positive correlation between the level of civil liberty and suicide rates, which increased with age, and additionally, they found that the coefficient estimates on real income per capita and its growth rate were greater in importance for males than for females.

Conceivably, the most considerable advance during the past 10 years was perhaps by Unnithan, Huff-Corzine, Corzine & Whitt (1994). They explain both homicide and suicide as two sides of the same phenomenon, using a conceptualization they call stream analogy. These researchers put forth that homicide and suicide are two alternative channels in a single stream of lethal violence and that suicide and homicide rates are a function of two sets of causal mechanisms; the forces of production and the forces of direction. Forces of production refer to social and cultural factors that are responsible for the total amount of lethal violence, and forces of direction refer to cultural and structural factors that direct the form of lethal violence to suicide or homicide. Both forces of production and forces of direction determine which members of society will direct their violent drives to either suicide or homicide. The higher tendency of external blame will result in a higher homicide rate relative to the suicide rate. On the other hand, factors that increase the likelihood of internal attribution of blame increase the risk of suicide.

Batton (1999) examined nationwide homicide and suicide data throughout most of the 20<sup>th</sup> century in order to test the stream analogy as proposed by Unnithan et al. Batton found that rates of alcohol consumption, immigration, and divorce were related to external attribution of blame that resulted in a higher tendency for violence to be

expressed as homicide. She also concludes that other factors, such as economic deprivation, were related to either forces of production or direction.

### *The Present Study*

Based on the foregoing discussion, it is obvious that an expansive literature supports the notion that social-structural factors related to population composition, broad cultural factors, and – especially – economic conditions combine to strongly influence the homicide rates of persons within a geographical space. However, the applicability of any given factor may vary, especially across specific geographical spaces. Said another way, these factors may explain homicide rates better in some places than others, making assessment of specific places a fertile topic for research.

Many inconsistencies were established in the above review of studies that have examined the effect of structural factors on homicide rates across geographical space. Revealing the variance in these findings is critical. Why does the empirical literature on the structural covariates of homicide rates demonstrate such inconsistent findings across different geographical units? Some of the variation may be explained by type of unit of analysis. For example, the demographic selected composition of cities across the nation may be quite uncomparable to that of states across the nation. Because most studies of homicide rates are limited primarily to urban geographical areas, however, the social structural analyses of homicide in rural areas has been neglected. The present study seeks to expand on the type of unit of analysis by examining rates of lethal violence across all counties in a single state. This unit of analysis affords the opportunity to assess the structural correlates of homicide and suicide in both primarily urban and primarily rural counties within a given geographical space.

A second reason for the variation in structural covariates of the homicide rates may be attributed to statistical or methodological difficulties. More specifically, Land et al (1990) assert that much of the inconsistency apparent in earlier studies must be ascribed to collinearity among variables. Most studies of homicide use multiple-regression analysis. Some of the studies use more recent methodological innovations in regression analysis such as diagnostic plots and residual analysis (see, e.g., Cook & Weisberg, 1982; Neter, Wasserman & Kutner, 1983), but most do not (Land et al., 1990, p. 934). When using multiple regression with predictor variables that are collinear, researchers can not take the regression coefficients at face value (Land et al, 1990).

Problems with the use of multiple regression analysis for area-based data on delinquency (and, by extension, to crime) were identified by Gordon (1967, 1968) over two decades ago (Land et al., 1990). Again, the most dangerous of these is the influence of multicollinearity on the substantive inferences that can be drawn from partialing in regression analysis (Parker, Land, McCall, 1999). A collinearity problem exists when there is a high correlation between two or more covariates included in an analysis (p. 117). Collinearity among regressors is coupled with (a) large changes in the estimated regression coefficients when a variable is added or deleted, or when an observation is altered or deleted; (b) wide confidence intervals, nonsignificant test statistics, and algebraic signs opposite to those expected from the theoretical considerations or previous experience for important independent variables; and (c) a corresponding instability of the regression-coefficient estimates from sample to sample (Land et al., p. 934). If collinearity occurs, the sampling errors in the observed correlations will be magnified in the process of estimating parameters, and consequently the estimates are inefficient and

unreliable (Heise, 1975, p. 187). Preceding studies of homicide rates have noted the existence of multicollinearity (Huff-Corzine et al., 1986; Loftin & Hill, 1974; Messner, 1982; Smith & Parker, 1980). According to Parker, et al. (1999), even though previous studies examining homicide rates recognize the potential for problems with collinearity among regressor variables, few studies make attempts to correct for its presence among covariates in multiple regression analysis. Despite the possible influence of multicollinearity on the pattern of earlier studies' inconsistent findings, this issue was not given more careful and comprehensive examination until Land et al.'s. (1990) research and subsequently that of Parker et al. (1999) where they indicate that principal components analysis is suitable for eliminating the obstacles associated with collinearity and partialing fallacy problems because it reduces the regressor space of the covariates, or more simply, it eliminates collinearity and instability of the partial regression coefficients (p. 118).

According to Parker et al. (1999), partialing fallacy can even create more troubling problems than those associated with just collinearity. Partialing fallacy is harmful collinearity that occurs when the correlations of predictor variables with each other are greater than the correlations of those predictors with the dependent variable, a situation common in homicide and suicide studies. Land et al. (1990) offer a persuasive case that many earlier homicide analyses are inundated by the partialing fallacy. The researchers explain that the result of this condition is the distribution of all explained variance to that regressor among an intercorrelated set that possesses the possibly very slightly higher correlation with the dependent variable.<sup>7</sup> Parker et al. (1999) continue by

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<sup>7</sup> See Gordon, 1967 and Parker et al., 1999 for further partialing fallacy discussion.



stating that recent methodological advances provide statistical innovations to correct for methodological weaknesses and the inconsistencies produced by past research. Furthermore, these researchers propose that principal components analysis (PCA) is appropriate for eliminating the barriers attached with the partialing fallacy and collinearity problems. In essence, principal components analysis is a data reduction technique that allows the researcher to establish the basic extent of relationships among a set of independent variables. Using PCA allows variables to group into one or more independent composite indexes, often representing a particular underlying social or economic concept (Kim & Mueller, 1985, p. 4). Principal components analysis is a type of factor analysis. A limitation of this approach, however, is that it prevents researchers from testing competing theories when using highly correlated conceptual measures (Parker et al., 1999). Fortunately, that is not an issue for the present research because the object is not to pit one theory versus another in determining what factors best predict homicide and suicide. Instead, the theories discussed in the preceding sections are intended to serve as guides for the choice of variables to be utilized in the analyses, so multiple theoretical perspectives are drawn from. Therefore, principal components analysis was chosen for the present research to help eliminate problems associated with collinearity or partialing fallacy. The components resulting from the principal components analysis will then be used in a multiple linear regression model with homicide and suicide rates.

As discussed above, the impact of factors related to population composition, cultural factors and economic conditions are well established for homicide, but the literature is much less clear regarding their impact on suicide rates. Yet, the impact of

homicide-related factors could be theorized as equally relevant to explaining suicide, though perhaps the dynamics of the influence could vary (e.g., social disorganization could be associated with both homicide and suicide rates, but for different reasons). That dimension is explored in the present research, the analytic strategies of which are presented in the chapters to follow.

## Chapter Three

### Method

#### *Selection and Specification of Variables Utilized in the Study*

As described in the preceding chapter, the social-structural study of homicide and suicide has yielded an array of factors that are correlated in some fashion with those two forms of violence. Factors reflecting a social disorganization perspective are thought to be reflective of a community's ability to develop and maintain strong systems of social relationships and, by extension, social control of its members. These variables typically encompass the areas of economic status, ethnic diversity, family disruption, population size or density, and residential instability. Research operating from an anomie/strain perspective tends to examine factors thought to undermine opportunities for some persons to successfully participate in the larger society, thereby increasing the likelihood of their violating the society's norms. Consequently, factors related to poverty, inequality, unemployment, family instability, and racial heterogeneity dominate the classes of variables utilized in this approach (for a comprehensive summary and review of many of these studies, including their variables and findings, see Parker et al., 1999).

Realistically, there is an overlap in the types of variables used in both traditions; however, the variables may be thought to represent different functions, depending on the theoretical framework that informs the particular study in question. To reiterate a point made earlier, the purpose of the study is not to determine which of these theories is the more robust explanation of homicide and suicide, but to instead use them as complementary traditions that can be used together in providing a comprehensive assessment of conditions related to both forms of lethal violence.

### *Initial Selection of Variables and Data Sources*

Following an extensive review of previous homicide and suicide studies sharing the general focus and objectives of the present research, a total of 35 variables were identified for which a direct, or reasonable proxy, measure was available for Florida counties. In some cases, the variables were different measures of a single factor (e.g., different age categories) used in one or more previous studies. A list of these variables is provided in Appendix A.

All of the variables shown in Appendix A are county-level measures of various socio-economic and demographic factors, and were obtained from the United States Bureau of the Census at [www.census.gov](http://www.census.gov) utilizing the Census 2000 Summary Files for the state of Florida and choosing county as the geographical area for comparison. Rates of homicide and suicide per 100,000 residents were obtained from the Data Queries function found in the Florida Department of Public Health's Community Health Assessment Resource at [www.floridacharts.com](http://www.floridacharts.com), and to reduce the influence of year-to-year fluctuations, represent three-year averages for the period 2001-2003.

### *Selection of Specific Variables for the Study*

The 35 selected variables were first examined with boxplots to determine if their distributions were approximately normal and allowed the use of Pearson's correlation coefficients. A review of Pearson's correlation coefficients among the 35 measures immediately revealed high levels of correlation among a number of the variables, signaling potential problems of multicollinearity. Subsequent iterations of Pearson's correlation coefficient explored multiple combinations and subsets of variables, their relationships with homicide and suicide rates, their correlations with one and another, and

their performance in various iterations of multivariate analyses. The results of these exercises produced a set of 9 variables that were utilized in the principal components analysis and then in the multiple linear regression to test their association with homicide and suicide rates. The theoretical rationale for inclusion of each of these variables and their utilization in creating the components are as follows:

*Median Household Income (Standardized), Percent Families Below the Poverty Line, and Infant Mortality:* The link between economic variables and crime is based on the premise that it is the economy of a society organizes the production and distribution of goods and services within that society (Messner & Rosenfeld, 1999). Research has consistently demonstrated that rates of violence, and rates of homicide in particular, are higher in urban areas experiencing various forms of economic distress. This decline may be due to an overall decline in the economy as a whole, or because of shifts in the economic structure that adversely impact a particular segment of the community. Because these areas often suffer a host of other social problems, social disorganization theorists see these communities as particularly vulnerable to an undermining of social control and the manifestation of non-normative behaviors (for a particularly comprehensive statement of this expectation, see Bursik and Grasmick, 1993). Although its negative impact is also a major focus of anomie/strain theory as well, social disorganization theorists believe poverty is a key component of economic distress, and is a root cause of a host of other social ills that can negatively impact a community's sense of order and stability (Warner & Pierce, 1993).

As discussed in the previous chapter, the role of economic status in anomie/strain theory is most easily understood under the failure to achieve positively valued stimuli

(Agnew, 1999). Individuals have particular goals they wish to attain, but if someone or something blocks the achievement of those goals, then strain may develop. For example, success via wealth may be the desired goal of individuals, but if their social status or blocked educational opportunities prevent them from realistically achieving the wealth they desire, strain can be produced. Furthermore, strain can develop when money is not available to an individual through legitimate means.

Correlations between economic variables and homicide rates are well established, though at times not entirely consistent (Parker et al., 1999). The general thrust of the literature is that homicide rates will increase in conjunction with increased levels of economic distress, and this expectation frames a substantial portion of homicide research at the aggregate level. In contrast, the impact of economic variables on suicide rates is less well established, and perhaps even contradictory.

*Race - Percent Population Black:* Social disorganization theory would predict that rates of violence will be higher in counties with more ethnic diversity. Ethnic diversity interferes with communication among adults (Shaw & McKay, 1942). Effective communication is less probable in the face of ethnic diversity because differences in customs and a lack of shared experiences may raise fear and mistrust (Sampson & Groves, 1989). It is imperative to differentiate this theoretically driven assumption about heterogeneity from ethnic differences in offense rates. Sampson and Groves (1989) see crime as occurring from interactions between ethnic groups, not from some groups being more crime prone than others.

From an anomie/strain perspective, race is a strong sociodemographic correlate of homicide, with members of disadvantaged minority groups being overrepresented as both

victims and offenders of homicide. A prominent explanation offered by researchers for this pattern has to do with the inequality between racial groups. The general hypothesis informing this research is that inequalities rooted in ascribed characteristics such as race are likely to be a particularly potent source of criminal violence (Messner & Rosenfeld, 1999)<sup>8</sup>.

*Sex Ratio – Males per 100 Females:* The sex ratio within communities has been related to lethal violence, though in contradictory ways. On the one hand, a high sex ratio (more males than females) could be related to homicide rates within a community because of the greatly disproportionate involvement of men in homicide and suicide. Thus, it is plausible that homicide and suicide rates would be higher in communities with higher sex ratios. However, a low sex ratio (fewer males) could signal a community in which the ratio has resulted from high rates of criminality and other social dysfunction among males (Messner & Rosenfeld, 1999), resulting in an inverse relationship between sex ratio and homicide/suicide within a community.

*Family – Domestic Violence Rate and Percent Population Divorced:* The family as a social institution in examining the structural correlates of crime is important because it is the family that socializes members in the values and beliefs of the society. As is expected in the present study, research discussed earlier has shown that violence rates are elevated in communities with greater levels of family disruption. Sampson (1985) hypothesized that unshared parenting can strain parents' resources of energy, money, and time, which can interfere with their ability to supervise their children and communicate

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<sup>8</sup> For further discussion on racial inequality hypothesis, see Blau and Blau (1982) and Blau and Schwartz, (1984).

with other adults in the neighborhood. Limited networks of adult supervision are created by the fewer number of parents in a community relative to the number of children.

*Education – Percent Population Without High School Diploma:* The more integrated people are into social life, the lower we would expect the lethal violence rates. Educational growth leads to increased economic opportunity and an increase in external restraint. Thus, we would expect that a greater proportion of the population without a high school diploma would result in greater strain, less external restraint, and greater homicide rates. The relationship between education and suicide however, is less clear.

*Median Age:* The social stratification of age is also important to examine because it could have important implications for violence. As has been demonstrated in prior research, the age effect on crime will result in higher overall rates of crime when the youthful population is increasing and lower crime rates when it is decreasing. Therefore we would expect aggregate crime rates to increase or decrease simply as a function of changes in the age composition in the population. Greenberg (1977, 1981) combines strain and control theories of crime in his influential structural interpretation of the relationship between age and crime (p. 35). Greenberg posits that levels of crime peak in the middle to late teens because adolescents experience difficulties achieving socially approved goals through conventional means and are free from the confinements of childhood and the restraining influences of adulthood. He argues that teenagers' uncertain position in the labor market does not generate the resources necessary to fulfill the heightened consumption demands of contemporary adolescent subcultures. Based on these assumptions, communities with younger populations could be expected to have higher rates of homicide. In contrast, the expectation regarding suicide is unclear,



because both younger and older age groups typically display the highest rates of suicide within a community.

#### *Further Alteration of the Variables*

Despite the considerable reduction in data achieved by the initial procedures, further analyses revealed that substantial problems of multicollinearity still existed to an extent that prohibited a standard ordinary least squares procedure. This is evident through a perusal of Table 2, where Pearson's correlation coefficients for the variables of the study are shown. Of the 9 predictor variables, 3 can be seen as having a correlation coefficient of .70 or higher with at least one other independent variable, signaling a potentially serious problem with collinearity that would undermine the reliability of any subsequent regression results. The partialing fallacy described by Land et al. (1990) and Parker et al. (1999) is also evident in Table 2. For example, Percent Population without High School Diploma and Percent Families Living in Poverty have a Pearson's correlation coefficient of 0.840, much greater than either variable has with the dependent variables (homicide rate and suicide rate). Given the theoretical importance of all of these variables, omitting one or more was not viewed as a viable option.

Table 2

*Pearson's correlation coefficient matrix for potential county-level predictor variables, homicide rate, and suicide rate.*

	Homicide Rate	Suicide Rate	Infant Mortality Rate	Domestic Violence Rate	Median Household Income	Percent Population without H.S. Diploma	Percent Families Living in Poverty	Median Age	Percent Population African-American	Percent Population Divorced	Males per 100 Females
Homicide Rate	1.000										
Suicide Rate	-0.228	1.000									
<b><i>Infant Mortality Rate</i></b>	0.336*	-0.260*	1.000								
<b>Domestic Violence Rate</b>	0.281*	-0.173	0.101	1.000							
<b>Median Household Income</b>	-0.253*	0.052	-0.275*	-0.180	1.000						
<b><i>Percent Population without H.S. Diploma</i></b>	0.391**	-0.285*	0.088	0.127	-0.742**	1.000					
<b><i>Percent Families Living in Poverty</i></b>	0.350**	-0.388**	0.376**	0.260*	-0.793**	0.840**	1.000				
<i>Median Age</i>	-0.201	0.443**	-0.147	-0.147	0.097	-0.304*	-0.486**	1.000			
Percent Population African-	0.092	-0.149	0.027	-0.044	-0.293*	0.226	0.218	-0.070	1.000		
<i>Percent Population Divorced</i>	-0.047	0.294*	-0.056	0.123	0.019	-0.180	-0.118	0.106	0.090	1.000	
Males per 100 Females	-0.057	-0.060	0.081	-0.115	-0.222	0.291*	0.295*	-0.158	0.188	0.310*	1.000

NOTE: \* -  $P < 0.05$ , \*\* -  $P < 0.01$ . Variables in **bold** denote significant Pearson's correlation coefficients with homicide, variables in *italics* denote significant Pearson's correlation coefficients with suicide.

As discussed in Chapter Two, Land et al. (1990; also, Parker et al., 1999) have discussed at length the methodological issues that plague macro-level homicide research, especially that related to multicollinearity and what they term the “partialing fallacy.” Heeding these warnings, contemporary researchers are increasingly adopting strategies designed to cope with these types of statistical problems. A commonly recommended strategy is to utilize Principal Components Analysis (PCA), a data reduction technique that transforms a set of variables into independent components accounting for the variance among units of analysis present in the original data (Kim & Mueller, 1985; Quinn & Keough, 2002). That strategy was adopted for this study, so a discussion of the PCA technique and its applicability to the present study is warranted.

#### *Overview of Principal Components Analysis*

Conceptually, PCA rotates axes in a multivariate “cloud” of points so that the first axis (first component) explains the greatest amount of variation among units of analysis present in the original data. The second axis (component two) explains the greatest amount of variation that remains after the first component is extracted, and is independent of the first component. This procedure is repeated until an equal number of components to the original number of variables had been extracted<sup>9</sup> (in the present case nine variables equaled nine components). Principal components analysis uses a correlation matrix or covariance matrix to examine the relationships among the original variables. A correlation matrix is less sensitive to non-normality and outliers than a covariance matrix and the latter is primarily used when the differences in the amount of variance present in each of the original variables has some intuitive meaning. Therefore, a correlation matrix

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<sup>9</sup> For a thorough and understandable discussion of principal components analysis, see Quinn and Keough, 2002.

was used for this study. The meaning of the components is interpreted using the eigenvectors (loadings) of each original variable on each component. The closer to one the eigenvector is, the greater the contribution of that variable to the variance explained by that component. Because the extracted components were used in further analysis (multiple linear regression in the current study) and interpretability is an important aspect of any research, the components were rotated to maximize the difference among the loadings of the original variables on the components. Rotation of components shifts the axes the components represent slightly so that the loadings of the original variables on the components are nearer zero or one. The trade-off when rotating components is that the first few components will explain less of the variance present among units of analysis in the original variables, so data reduction is not as efficient (i.e., it requires a greater number of components to explain an equal amount of the variation among units of analysis present in the original variables with the rotated components than with unrotated components). Component rotation can be of two types: orthogonal and oblique. Orthogonal rotation maintains the independence of components, an important feature when using the components as predictor variables in multiple linear regression. Varimax rotation of the components was chosen, as it is a widely accepted orthogonal rotation technique.

When using PCA as a data reduction technique, fewer components will be retained than the original number of variables in the dataset. Although the number of components retained is subjective a rule for selecting the number of components is usually used. Common methods of determining the number of components to retain include retaining components with eigenvalues greater than one, examining scree plots,

using tests of eigenvalue equality, and analyzing residuals (Quinn & Keough, 2002).

None of the above rules apply, however, for principal components regression (see below), so all components were retained for further analysis.

In addition to data reduction, PCA can be used to graphically represent the similarities and differences among the units of analysis (counties in the present study). PCA gives each unit a score for each component, with the first extracted components explaining the greatest amount of variation among counties as described above. Thus, a scatter plot of the first two extracted components was used to demonstrate the relationship of the counties to each other given the sociological variables examined. Counties that appear close to each other on the plot have similar socioeconomic conditions.

#### *Principal Components Regression*

Multiple linear regression is the standard multivariate analysis used to examine the relationship of predictor variables with a dependent variable. Though widely used, a major problem in multiple linear regression is collinearity among predictor variables (Quinn & Keough, 2002). Collinearity results in unstable models in which the deletion or alteration of a single variable or observation can substantially change the coefficients of the remaining variables. A method to combat this problem involves conducting multiple linear regression on the components extracted by PCA from the original variables, a procedure termed principal components regression. One of the disadvantages of this technique is explaining the results of the regression model in terms of the original variables. That is, the variables are transformed into components without intuitive meaning. Interpretation of these components is accomplished by assigning variables with

the largest loadings within a component as the meaning of that component. Interpretation is most straightforward when the loadings of variables on a component are close to one or zero; interpretations become less clear when the loadings of variables on a component are similar. For this reason, varimax rotation (described above) was used to increase the interpretability of the components in terms of the original variables.

It is also possible to recalculate standardized partial regression coefficients for the original variables by multiplying the component loading (eigenvector) matrix from the principal components analysis by the partial regression coefficient vector from the principal components regression model. This approach provides an unambiguous interpretation of the regression model in terms of the original components. If all the components are used in the regression analysis, however, the result of the recalculation is the same as the regression coefficients from a multiple linear regression model on the original (standardized) variables, with the exception that the standard errors on the regression coefficients will be smaller (Quinn & Keough, 2002). This technique was not used in the current study.

Another difficulty in using principal components regression is deciding how many components to use. There are no clear-cut guidelines for deciding which components to use in the multiple linear regression (Quinn & Keough, 2002), especially because variables that explain a great deal of variance among sampling units may not have a strong relationship with the dependent variable. Because of this difficulty, all nine extracted components were used in a multiple linear regression with homicide.

*Data Analysis: Statistical Package and Choice of Significance Levels*

The software package Statistical Package for the Social Sciences (SPSS) Version 10.0 was used for all analyses. Significance levels were set at  $p < 0.10$  (unless otherwise noted) to avoid Type II error. The decision was made to minimize Type II error, recognizing the relatively small sample size entailed in having only 67 counties to comprise the database. However, with few exceptions, the emergent results produced associations that were consistently less than  $p < .05$ , thus achieving the more standard level of significance used in social science research.

## Chapter 4

### Results and Discussion

#### *Principal Components Analysis of the Independent Variables*

The varimax-rotated solution of the principal components analysis on the nine variables resulted in the variable loadings (eigenvectors) on the nine components given in Table 3. Components one through seven were easily interpreted because the loadings were generally close to one or zero while the last two components showed substantially smaller eigenvectors. Nevertheless, as found through multiple iterations of these factors in ensuing regression equations with these components, the maximum amount of variance explained (adjusted  $R^2$ ) was obtained through the retention of all nine components.<sup>9</sup> Each of the components was named and subsequently interpreted according to the variables demonstrating the most pronounced loadings within that component. These components are named in Table 4, and more focused descriptive information is provided about each of them.

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<sup>9</sup> Alternative analyses are included in the discussion section using two slightly modified versions of the original nine component model.



Table 3

*Eigenvalues, Percent Variance Explained, and Variable Loadings on the Nine Varimax-Rotated Components of Principal Components Analysis.*

	<i>Rotated Component</i>								
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>
Eigenvalue	2.523	1.095	1.059	1.015	1.014	1.012	1.001	.202	.078
% Variance Explained	28.039	12.166	11.770	11.282	11.262	11.244	11.125	2.243	.869
<i>Variable</i>									
Infant Mortality Rate	.136	-.061	<b>.987</b>	-.024	.042	.002	.029	-.016	.008
Standardized Median Household Income	<b>-.893</b>	-.066	-.149	-.034	-.076	-.151	-.053	<b>.378</b>	.027
Standardized Domestic Violence Rate	.121	-.069	.044	.077	<b>.983</b>	-.032	-.076	-.006	.005
% Population without H.S. Diploma	<b>.927</b>	-.135	-.051	-.124	.033	.080	.141	<b>.240</b>	<b>-.138</b>
% Families in Poverty	<b>.862</b>	-.313	.230	-.057	.143	.076	.131	.029	<b>.242</b>
Median Age	-.164	<b>.978</b>	-.060	.055	-.068	-.022	-.069	-.012	-.005
% Population African-American	.155	-.023	.003	.048	-.032	<b>.983</b>	.073	-.011	.001
% Population Divorced	.179	-.076	.033	.177	-.083	.079	<b>.957</b>	.000	.003
Males per 100 Females	-.086	.056	-.026	<b>.976</b>	.079	.049	.167	-.009	-.001

Note: Values in **bold** are variable loadings greater than 0.7 or, in the case of components 8 & 9, loadings substantially greater than other all other loadings for that component.

Table 4

*Variable Loadings for Varimax-Rotated Components of Principal Components Analysis and Eigenvalues.*

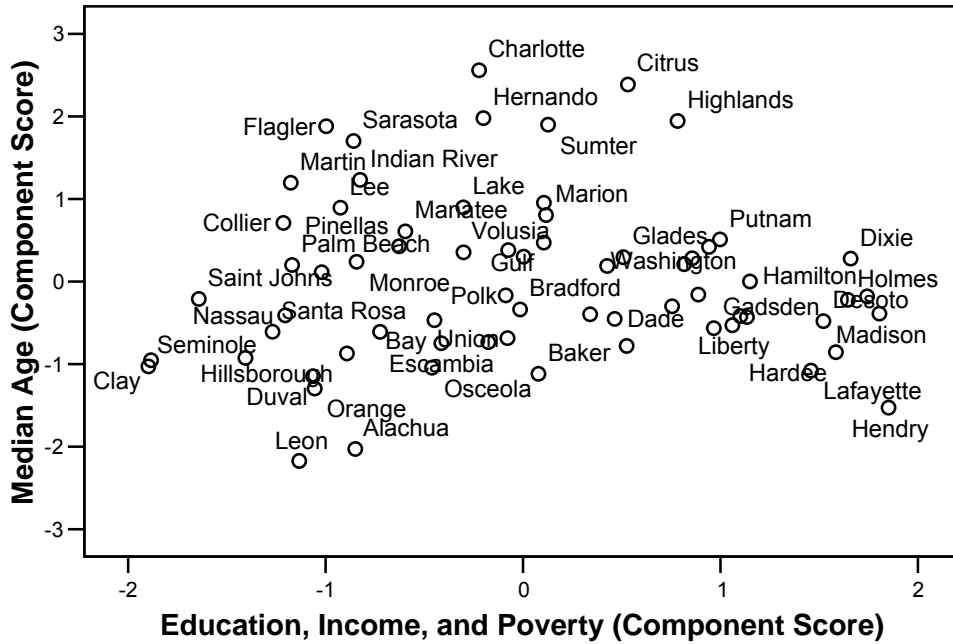
<i>Component 1: Education, Income, and Poverty</i>	
<b>Variable(s)</b>	<b>Component Loadings</b>
Median Household Income	-0.893
Percent Families Living in Poverty	0.862
Percent Population without High School Diploma	0.927
<b>Eigenvalue</b>	<b>2.523</b>
<i>Component 2: Age</i>	
<b>Variable(s)</b>	<b>Component Loadings</b>
Median Age in County	0.978
<b>Eigenvalue</b>	<b>1.095</b>
<i>Component 3: Infant Mortality</i>	
<b>Variable(s)</b>	<b>Component Loadings</b>
Infant Mortality Rate	0.987
<b>Eigenvalue</b>	<b>1.059</b>
<i>Component 4: Divorce</i>	
<b>Variable(s)</b>	<b>Component Loadings</b>
Percent Total Population Divorced	0.976
<b>Eigenvalue</b>	<b>1.015</b>
<i>Component 5: Domestic Violence</i>	
<b>Variable(s)</b>	<b>Component Loadings</b>
Standardized Domestic Violence Rate	0.983
<b>Eigenvalue</b>	<b>1.014</b>
<i>Component 6: Black</i>	
<b>Variable(s)</b>	<b>Component Loadings</b>
Percent of Total Population Black or African-American	0.983
<b>Eigenvalue</b>	<b>1.012</b>
<i>Component 7: Sex Ratio</i>	
<b>Variable(s)</b>	<b>Component Loadings</b>
Males per 100 Females (Total Population)	0.957
<b>Eigenvalue</b>	<b>1.001</b>
<i>Component 8: Income and Education</i>	
<b>Variable(s)</b>	<b>Component Loadings</b>
Median Household Income	0.378
Percent Population without High School Diploma	0.240
<b>Eigenvalue</b>	<b>0.202</b>
<i>Component 9: Poverty and Education</i>	
<b>Variable(s)</b>	<b>Component Loadings</b>
Percent Families Living in Poverty	0.242
Percent Population without High School Diploma	-0.138
<b>Eigenvalue</b>	<b>.078</b>

NOTE: In Table 4 only variables with loading greater than 0.7 or, in the case of components 8 & 9, loadings substantially greater than all other loadings for that component are included. These components were used as independent variables in the multiple linear regression models for homicide rate and suicide rate.

In Figure 3, the two components that explain the most amount of variance among Florida counties are component one Education, Income and Poverty, and component 2 Median Age. These components together explained 40.21% of the variance among counties present in the original nine variables. Numbers on the axes represent the component scores of the counties. Although the component scores are on an interval scale (i.e., the difference between 2 & 3 is the same as the difference between 0 & 1), their values are not easily interpreted in terms of the specific values of the original variables. This figure is included to visually represent the multivariate similarities and differences among Florida counties with regard to the nine socioeconomic variables.

### Extracted Components 1 & 2 from PCA

Components 1 & 2 account for 40.21% of the variance present among counties in the original variables



Note: Income and education decrease from left to right,  
poverty increases from left to right

Figure 3. Scatter plot of Florida Counties Along Gradients Representing Education, Income, and Poverty and Median Age.

### *Principal Components Regression: Homicide*

The components extracted with principal components analysis were used as independent variables in multiple linear regression on homicide rate and suicide rate. The results of this procedure are presented in Table 5, where it can be seen that a regression of the components on homicide rate indicated a statistically significant relationship and yielded an adjusted  $R^2$  of .300 ( $F[9,57] = 4.141$ ,  $p = 0.000$ ). The component whose primary loadings were on Education, Income, and Poverty showed the strongest relationship ( $B = .322$ ), followed by components with Infant Mortality ( $B = .288$ ) and Domestic Violence ( $B = .220$ ) as their primary loadings. In all cases, the direction of the relationship was consistent with the literature.

In contrast, it is difficult to interpret components 8 and 9, both of which represent alternative loadings of the primary elements found in component one. These two components have very low eigenvalues and explain the leftover variation present in the original data that cannot be explained by component one. In essence, income and education appear to contribute to increases in the homicide rates in a manner different (alternatively loaded) from the influence suggested by component one, but the direction of the influence is consistent. However, the final loading, one representing yet another variation on component one in which education and poverty play a role, shows a direction opposite from what would be expected. That said, component one demonstrates the stronger relationship, so it is used preferentially for interpreting the results of the multiple linear regression.

Table 5

*Regression Coefficients, [Standardized Regression Coefficients], and (t-statistics) from Multiple Linear Regression of Components 1-9 on Homicide Rates.*

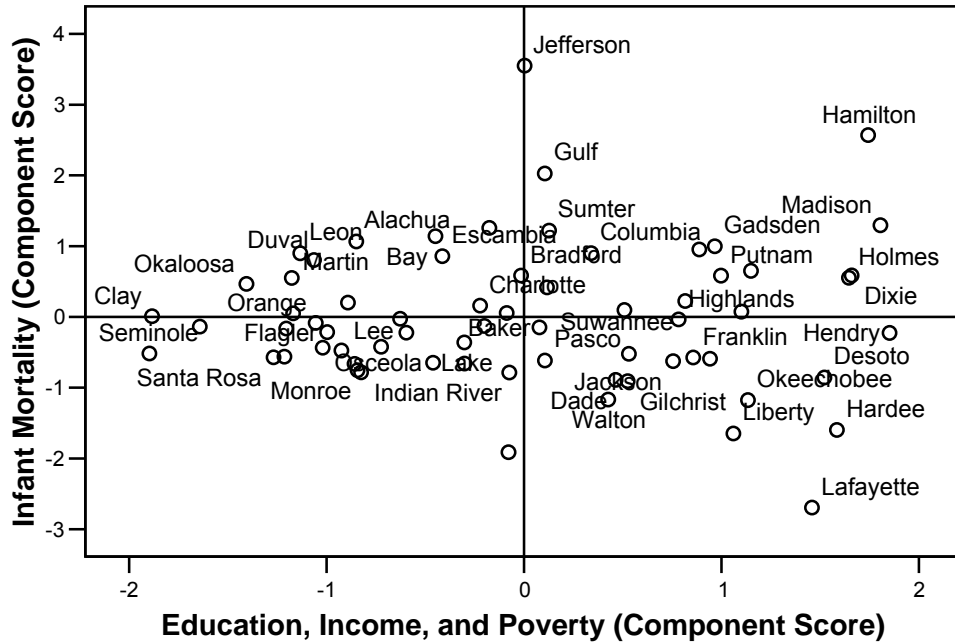
	<i>Homicide Rate</i>
Constant	5.301 (17.348)**
<u>Education, Income and Poverty</u>	0.964 [0.322] (3.131)**
Age	-0.371 [-0.124] (-1.205)
<u>Infant Mortality</u>	0.861 [0.288] (2.796)**
Divorce	-6.731E-03 [-.002] (-0.022)
<u>Domestic Violence</u>	0.658 [0.220] (2.137)**
Percent Population Black	0.176 [0.059] (0.572)
Sex Ratio	-0.369 [-0.123] (-1.199)
<u>Income and Education</u>	0.757 [0.253] (2.459)**
<u>Poverty and Education</u>	-0.743 [-0.248] (-2.412)**
Adjusted R <sup>2</sup>	0.300
N	67

NOTE: \* - p<0.10, \*\* - p<0.05. Components underlined denote potential predictors of homicide.

Figure 4 presents a two-dimensional representation of the multivariate distance between counties based on a combination of Education, Income, and Poverty (component one) and Infant Mortality (component 3), the components with the largest two coefficients in the multiple linear regression model for homicide. According to Figure 4, we would expect Florida counties in the upper right quadrant to have greater homicide rates than those in the lower left quadrant. When we refer back to Table 1, we see that this expected relationship holds true, adding confidence to the general findings suggested by the principal components regression. For example, Gadsden County has a homicide rate of 11.60 homicides per 100,000 people while Flagler County has a homicide rate of 1.70 homicides per 100,000 people. It is important to note that such observations are tendencies only, and exceptions are likely to occur. To be clear, homicide data were not used to construct Figure 4, but rather Figure 4 is a spatial representation of the differences and similarities of the counties based upon the two components with the greatest coefficients in the multiple linear regression with homicide.

### Extracted Components 1 & 3 from PCA

Components 1 & 3 account for 39.81% of the variance present among counties in the original variables



Note: Income and education decrease from left to right,  
poverty increases from left to right.

Figure 4. Scatter Plot of Florida Counties Along Gradients Representing Education, Income, and Poverty and Infant Mortality.

#### Principal Components Regression: Suicide

The regression procedure was repeated for suicide rate, and the results are shown in Table 6. As this table shows, the components again indicated a statistically significant relationship, and shows an adjusted  $R^2$  of .341 ( $F [9,57] = 4.794, p = 0.000$ ), one that is arguably surprising, given that the model is more theoretically constructed as an explanation for homicide. As can be seen in Table 6, a different set of factors emerge as the primary predictors. Namely, Median Age (Component 2) and Divorce (Component 4), were significantly and positively associated with suicide rate, a direction expected by



social disorganization and anomie/strain traditions. In contrast, Infant Mortality (Component 3), and Income and Education (as captured in Component 8) are significantly and negatively associated with suicide rate, a finding not readily predicted by either theoretical perspective. However, the negative association with Income and Education (at least as manifested in Component 8) is consistent with the general pattern of suicide prevalence in the United States being inversely correlated with social class; to reiterate, this pattern is not easily accounted for by either theory. It should be noted, however, that the difficulty in interpretation of Component 8 makes the above conclusion regarding the relationship between income, education, and suicide suspect.

Table 6

*Regression Coefficients, [Standardized Regression Coefficients], and (t-statistics) From Multiple Linear Regression of Components 1-9 on Homicide Rates and Suicide Rates.*

	<i>Homicide Rate</i>	<i>Suicide Rate</i>
Constant	5.301 (17.348)**	14.482 (32.397)**
<u>Education, Income and Poverty</u>	0.964 [0.322] (3.131)**	-0.659 [-0.146] (-1.464)
<i>Age</i>	-0.371 [-0.124] (-1.205)	1.704 [0.378] (3.782)**
<u><i>Infant Mortality</i></u>	0.861 [0.288] (2.796)**	-0.937 [-0.208] (-2.081)**
<i>Divorce</i>	-6.731E-03 [-0.002] (-0.022)	1.291 [0.287] (2.867)**
<u>Domestic Violence</u>	0.658 [0.220] (2.137)**	-0.694 [-0.154] (-1.542)
Percent Population Black	0.176 [0.059] (0.572)	-0.615 [-0.136] (-1.365)
Sex Ratio	-0.369 [-0.123] (-1.199)	-0.240 [-0.053] (-0.532)
<u><i>Income and Education</i></u>	0.757 [0.253] (2.459)**	-1.267 [-0.281] (-2.814)**
<u>Poverty and Education</u>	-0.743 [-0.248] (-2.412)**	-0.588 [-0.130] (-1.305)
Adjusted R <sup>2</sup>	0.300	0.341
N	67	67

NOTE: \* - P<0.10, \*\* - P<0.05. Components underlined denote potential predictors of homicide and components in italics denote potential predictors of suicide.

Replicating the procedure used with homicide, Figure 5 is a two-dimensional representation of the multivariate distance between counties based upon Median Age and Divorce, the components with the two largest coefficients in the regression model for suicide. According to Figure 5, counties in the upper right quadrant tend to have greater suicide rates than those in the lower left quadrant. For example, Levy County has a suicide rate of 26.80 suicides per 100,000 people, while Hamilton County has a suicide rate of 4.80 suicides per 100,000 people (see Table 1). Please note that such observations are tendencies only, and exceptions are likely to occur. This figure was constructed without using suicide data, but rather is a spatial representation of the differences and similarities of the counties based upon the two components with the greatest coefficients in the multiple linear regression with suicide.



### *Modification One: Utilizing First Seven Components*

After analyzing the variable loadings on each of the original nine components given in Table 3, it was obvious that components one through seven were easily interpreted because loadings were generally close to one or zero while the last two components showed substantially smaller variable loadings. In contrast, components eight and nine, both of which represent alternative loadings of the primary elements found in component one, were difficult to interpret and provided results contrary to theory and common sense. Thus, any conclusions drawn from these two components are spurious (i.e., statistical significance does not equal sociological significance).

In addition to the difficulty interpreting components 8 & 9, these two components contributed little to the variation present among counties in the original nine variables. Components one through seven had eigenvalues of 1.00 or greater and collectively explained greater than 96% of the variation present among counties in the original nine variables. In contrast, components eight and nine had eigenvalues of 0.202 and 0.078, explaining only two percent and one percent of the variation present among counties in the original nine variables, respectively. Because the first seven components extracted with principal components analysis explained most of the variance among counties present in the original nine variables and were easy to interpret in terms of these variables, the first seven components were used as independent variables in multiple linear regression on homicide rate and suicide rates. The results demonstrate that a regression of the components on homicide rates indicated a statistically significant relationship and yielded an adjusted  $R^2$  of .183 ( $F[7,59] = 3.109$ ,  $p = 0.007$ ). The component whose primary loadings were on Education, Income, and Poverty showed the

strongest relationship ( $\beta = .322$ ), followed by components with Infant Mortality ( $\beta = .288$ ) and Domestic Violence ( $\beta = .220$ ) as their primary loadings. In all cases, the direction of the relationship was consistent with the literature, (Table 7).

The regression model for suicide using the first seven components was also statistically significant with an  $R^2$  of 0.256 ( $F[7,59] = 4.242$ ,  $p = 0.001$ ). The significant components in this model were those representing Age ( $\beta = .378$ ), Divorce ( $\beta = .287$ ), and Infant Mortality ( $\beta = -.208$ ). These results were consistent with the nine component model (Table 8).

Utilizing the first seven components instead of the full nine component model dropped the adjusted  $R^2$  from a .300 to a .183 for homicide and from .341 to .256 for suicide. This is to be expected because “As more variables are added to a model,  $R^2$  cannot decrease so that models with more predictors will always appear to fit the data better” (Quinn & Keough, 2002, p. 122).

Table 7

*Comparison of Multiple Linear Regression Models for Homicide*

	<i>9-Component Model</i>	<i>7-Component Model</i>	<i>Mixed Model</i>
Adjusted $R^2$	0.300	0.183	0.168
Significant, Positive Relationships	Poverty (component 1) Infant Mortality Domestic Violence Component 8	Poverty (component 1) Infant Mortality Domestic Violence*	Poverty (component 1) Infant Mortality Rate
Significant, Negative Relationships	Education (component 1) Income (component 1) Component 9	Education (component 1) Income (component 1)	Education (component 1) Income (component 1)

\* - Significant at  $p < 0.10$ , all others significant at  $p < 0.05$  (actual value  $p = 0.053$ )

NOTE: The measure of education used in this study was percent population without high school diploma, which has a positive relationship with homicide. However, in the above table education is denoted as a negative relationship with homicide because as the amount of high school graduates increases, homicide decreases.

Table 8

*Comparison of Multiple Linear Regression Models for Suicide*

	<i>9-Component Model</i>	<i>7-Component Model</i>	<i>Mixed Model</i>
Adjusted R <sup>2</sup>	0.341	0.256	0.258
Significant, Positive Relationships	Age Divorce	Age Divorce	Age Divorce
Significant, Negative Relationships	Infant Mortality Component 8	Infant Mortality*	(none)

\* - Significant at  $p < 0.10$ , all others significant at  $p < 0.05$  (actual value  $p = 0.055$ )

*Modification Two: Utilizing Component One and the Original Independent Variables*

In the second modification of our original nine component model, only component one of the principle components analysis was used because it was the only component that represented multiple, collinear, original variables. All other components represented only one original variable, so the original variables represented by these components were used in this modification. The modification was chosen because using a factor score to approximate the combined effects of highly correlated independent variables has been increasingly employed in social science literature (for recent examples in homicide research to use this approach, see Parker, 2004; Wadsworth and Kubrin, 2004).

As discussed previously when considering Table 2, those independent variables in this study with the highest correlations with each other are the standardized median household income, percent population without a high school diploma, and percent of families living in poverty. These same variables dominated the loadings in component one when all nine variables were included, and together form a variable that captures various dimensions of poverty within a community. Although these three variables all

have strong correlations with one another, they are not so highly correlated that one can be treated as a proxy of the other two. Hence, the factor analytic technique allows the resulting factor score to serve as a measure of the concept, while retaining the other independent variables in a non-transformed state. As a precaution, diagnostic tests were performed to detect any multicollinearity present in the equations. The highest Variance Inflation Factor (VIF) score was 1.477, a figure well below the 4.0 traditionally used to signal possible problems with multicollinearity (Fisher & Mason, 1981).

A comparison of this regression analysis with the others for homicide rate is shown in Table 7. Again, because there are fewer variables than in the 9-component principle components regression model, the adjusted  $R^2$  decreased (.168 vs. .300) for this modified model. However, the pattern of relationships among the variables is arguably clearer. Two variables, the regression factor representing poverty, as well as original variable infant mortality rate, both achieve statistical significance, showing standardized regression coefficients of .273 and .249, respectively. This result is similar to both PCA regression models, with the exception that the standardized domestic violence rate does not achieve significance as a single (non-component) variable.

A bit more substantive shift can be seen for the suicide model presented in Table 8. Again, there is a drop in the adjusted  $R^2$ , from .341 to .258. Two variables, median age and percent of the population divorced, are statistically significant that, in the PCA models, were the highest loading variables of their components. In contrast, a statistically significant effect is not found for the infant mortality rate, or for the potentially spurious poverty factor (component 8), both of which showed significance in the 9-variable PCA model.



To clarify, the shift in statistically significant effects between the models does not indicate that those losing significance in the PCA models have no effect. This alternative simply suggests that the component with those variables as the dominant factor had an impact that is not captured in the single variables, a fact reflected in the lower amounts of variance explained. An alternative explanation for not detecting statistical significance of domestic violence rate and infant mortality rate in the mixed models for homicide and suicide, respectively, is the increase in the standard errors of the regression coefficients when any amount of collinearity is present in the model. The variance inflation factor (VIF) scores for the PCA models were all 1.00, indicating that there was no collinearity among predictor variables to inflate the variance. Although the VIF scores for the mixed model were well within accepted limits, any value for the VIF above one indicates the amount by which the variance (and thus, the standard errors) of the regression coefficients increases relative to the variance observed when no collinearity is present among the predictor variables. This increase in the standard errors reduces the statistical power of tests of differences among the regression coefficients, potentially leading to the lack of significance observed for some variables in the mixed model.

Employing these two modifications of the original analysis were valuable in further clarifying which variables have the most pronounced impact on the two forms of violence, at least at the county level in Florida. It is important to note that regardless of which of the models with or without modifications were examined, all three, the original nine component model, the seven component model, and the mixed component model have produced consistent findings.

## Chapter Five

### Discussion

#### *Summary*

The present research was unique in that it was one of the few studies that has attempted to discern the relationship of macro-level factors and homicide within a restricted geographical space—all counties within one state. Utilizing a traditional approach, the study drew heavily on the existing literature to guide selection of the variables to be tested and methodological pitfalls to avoid. Furthermore, the study examined whether a model for homicide predictors could also be applied to suicide.

The findings for county-level predictors of homicide are in line with previous research and expectations articulated by the social disorganization and anomie/strain theories that framed this study. An educational/economic component representing education, income, and poverty was found to have the strongest relationship (i.e., greatest partial regression coefficient) with homicide. Because of the strong positive loadings of percent families living in poverty and percent population without high school diploma on component one and component one's positive partial regression coefficient with homicide, as percent families living in poverty and percent population without high school diploma increase, homicide rates tend to increase as well. Conversely, because median household income had strong negative loadings on component one (and again because of component one's positive partial regression coefficient with homicide), as it increases, homicide rates tend to decrease.

These findings are in agreement with much past research and support both Social Disorganization Theory and Anomie Theory. For example in Land et al.'s (1990) meta analysis, for city, SMSA and state level analyses poverty and income inequality were found to have positive and statistically significant coefficients with homicide. In contrast, only two studies, Chamlin (1989), and Messner (1982), found poverty to have a negative relationship with homicide. As noted in Land et al.'s meta analysis a large number of studies that did not find a statistically significant relationship of poverty with homicide and the single study (Crutchfield et al., 1982) that found no statistically significant relationship of educational attainment with homicide may have been plagued by collinearity, which inflates standard errors of partial regression coefficients and makes finding statistically significant relationships difficult. This study is an improvement on these earlier studies because collinearity was dealt with up-front using principal components analysis, rather than the post-hoc approach of eliminating variables that have a high variance inflation factor.

The positive relationship of homicide with poverty agrees with Stark's (1987) expansion of social disorganization theory and assessment that poverty, among other forces, attracts the deviant and repels the conformist. The relationship between the educational/economic component and homicide is a strong element of anomie theory. Anomie theory is often expressed in terms of dissociation between valued cultural ends and legitimate societal means to those ends. Western culture places great value on economic attainment, and when such attainment is blocked because of limited educational and economic opportunities criminal behavior becomes more prevalent.

Infant mortality, which was represented by a strong positive loading on component three, had the second strongest, positive relationship with homicide. It is unclear what the causal relationship between infant mortality and homicide is, as stress induced by living in areas with high homicide rates may cause low birth weight and high infant mortality rates, rather than the converse (Sampson, R.S. & Raudenbush, 2001). Social disorganization theory posits that infant mortality rates will be higher in areas without a supportive infrastructure supporting quality education and healthcare (Shaw & McKay, 1942). Infant mortality may also be a source of strain in anomie theory because it could be a negative stimulus to affected families.

Domestic violence, which was represented by a strong positive loading on component five, also had a statistically significant, positive relationship with homicide. This variable was not included in previous research and represents a new predictor of homicide. The positive relationship of domestic violence with homicide agrees with social disorganization theory because domestic violence rates may tend to be higher in places that have fewer social controls over such behavior. A direct link between anomie/strain theory and domestic violence can be posited when anomie/strain theory is looked at from the perspective of presentation of a negative stimulus (Agnew, 1999). Domestic violence is clearly a negative stimulus; thus, high domestic violence rates potentially lead to high homicide rates.

The final two significant partial correlation coefficients in the multiple linear regression model with homicide were for components eight and nine. Because these components had low eigenvalues, collectively explaining only 3% of the variance present among counties in the original nine variables, and because the loadings of the original

variables on these components were low, they are very difficult to interpret. Because their eigenvalues were close to zero, most of the variation in these components was captured in previous components (an indication of collinearity; Quinn & Keough, 2002). Conclusions drawn from these components are likely to be spurious, as statistical significance does not equal substantive significance. For example, the relationship of component eight to homicide via the multiple linear regression model indicates that as household income increases, so too do homicide rates. This conclusion is exactly opposite that drawn from component one, a component accounting for a greater than ten-fold amount of the variance present among counties in the original variables and having a loading from median household income of -0.893, as opposed to the loading of 0.378 from the same variable on component eight. Component one also has a greater partial regression coefficient in the multiple linear regression model than components eight and nine. For these reasons, components eight and nine are not discussed further. The alternative models, both of which eliminate the spurious components eight and nine, agree with the results presented above. This indicates that the above findings are robust to modification of the variables, the primary concern when dealing with collinearity in multiple linear regression.

The strongest predictor of suicide was median age, which had a strong, positive loading on component two as well as a strong, positive relationship with suicide rate among Florida counties. This is in agreement with the findings of Chuang and Huang (1997) in Taiwan. Although median age is a significant predictor of suicide, it should be noted that in this macro-level study, it is impossible to determine whether it is the older individuals committing suicide or a higher proportion of the younger population

committing suicide in those areas where a greater proportion of the population is represented by the elderly. Median age does not appear to fit social disorganization theory particularly well, but a link between median age and anomie theory may exist if expectations of a quality retirement are not met because of deteriorating health, loss of loved ones, or financial difficulties.

Divorce, which had a strong, positive loading on component four, was also a statistically significant, positive predictor of suicide among Florida counties. Durkheim found a similar positive relationship between divorce rate and suicide in 19<sup>th</sup> century Europe (Gibbs, 1994). Divorce rate may indicate some level of social disorganization, and the findings of the Project on Human Development in Chicago Neighborhoods indicate that a good marriage can help young adults to avoid criminal behavior (Sampson, & Raudenbush, 2001, p. 8).

As in the multiple linear regression model for homicide, infant mortality also had a statistically significant relationship with suicide. In contrast to the findings for homicide, however, the relationship of infant mortality to suicide was negative, meaning that counties that have higher infant mortality rates tend to have lower suicide rates. Although not immediately intuitively obvious, this finding may lend some support to the stream theory of lethal violence (Unnithan et al., 1994). The logic behind this argument is that lethal violence is expressed as homicide in counties with high infant mortality rates, but lethal violence is expressed as suicide in counties with low infant mortality rates.

### *Strengths and Weaknesses of the Study*

Perhaps the greatest strength of this study is the use of principal components analysis to deal with collinearity prior to conducting the regression analysis, rather than removing variables after observing collinearity diagnostics from the multiple linear regression as has traditionally been the case in the homicide and suicide literature. In most prior studies using multiple linear regression of predictor variables upon homicide and suicide, collinearity was either not addressed or was dealt with by eliminating variables with a large variance inflation factor (VIF). This approach is appropriate when variables are conceptually and statistically redundant, but can lead to loss of important information contained in distinct, but collinear variables (Quinn & Keough, 2002). For example, in this study variables representing income (Median Household Income) and education (Percent Population without High School Diploma), were highly collinear, but represented two distinct phenomena. Rather than eliminating one of these variables, principal components analysis used the correlation structure between these variables to create a composite variable in which both phenomena are represented. Recalculation of regression coefficients (see below) in terms of these original variables after principal components regression then allows the interpretation of the regression model in terms of these original variables, rather than eliminating one or the other. With principal components analysis, collinearity is eliminated mathematically prior to conducting the multiple linear regression, rather than by eliminating variables after completing the multiple linear regression as done when using VIF. This is not to suggest that principal components analysis is a cure-all, as the number of components retained for use in the regression model and interpretation of those components (when accomplished by

assigning an arbitrary cut-off value for variable loadings to determine which variables are represented in which components) are subjective. However, the elimination of collinearity with PCA is remains an objective, mathematical process.

Despite the benefit of more stable regression models using the extracted components from principal components analysis, there are two major problems associated with principal components regression. The first problem is interpreting the meaning of the components. This problem can be dealt with in a couple different ways. First, rotation of components, while decreasing the amount of variance explained by the first few components, increases their interpretability by shifting the axes so that component loadings are closer to one or zero. Orthogonal rotation techniques, such as the varimax rotation used in this study, maintain the independence of components. This independence is important when using the components in further analysis as in this study. The second way to deal with interpretation of the components is to recalculate standardized partial regression coefficients for the original variables by multiplying the eigenvector matrix from the principal components analysis by the partial regression coefficient vector from the principal components regression model. This approach provides an unambiguous interpretation of the regression model in terms of the original components. If all the components are used in the regression analysis, however, the result of the recalculation is the same as the regression coefficients from a multiple linear regression model on the original (standardized) variables, with the exception that the standard errors on the regression coefficients will be smaller (Quinn & Keough, 2002). This method was not used in this study, but would have been an interesting addition to the alternative regression model using the first seven components.



The second major problem with principal components regression is determining how many components to retain for use in the regression model. This can be problematic because components that explain most of the variance in the original variables (i.e., the first few components) may not be important in explaining the variance in the response variable (Quinn & Keough, 2002). In this study, all components were used in the regression model, with the result that the final two components were difficult to interpret. The alternative models eliminated components eight and nine with no changes in the significance of the partial regression coefficients of the other components included in the model. This suggests that these components, which explained little of the variance present in the original variables and were difficult to interpret, were unnecessary in the original multiple regression model.

Regardless of the statistical technique used, the small number of counties in Florida (67) limited the number of variables that could be used in the analysis and caused the  $R^2$  values to change substantially when two variables were eliminated. Also, the inferences drawn from this study are limited to macro-level processes, and cannot be extrapolated to individual, micro-level phenomena. Likewise, the use of data aggregated at the county level in Florida limits the inference to counties in Florida does not permit extrapolation to other spatial scales, or regions. Despite these limitations, however, important policy implications for counties in Florida can be derived from this study.

#### *Programs/Policy Implications*

Results of the principal components regression indicate that the variables with the strongest association with homicide were an educational/economic component, infant mortality, and domestic violence. There are several individual and/or community based

programs and/or policies that could help to alleviate these predictors of homicide within Florida counties. Because education and income were negatively associated with homicide, programs that increase educational and quality employment opportunities are likely to help lower homicide rates. Unfortunately, the results do not allow for an estimation of the degree of impact, an objective that future studies might strive for. Increasing the accessibility and affordability of prenatal care to mothers, especially those who are young and/or poor, can be dealt with at a community level whereas, teaching young and first time mothers the importance of prenatal care can be an example of an individual level program that may also help reduce homicide rates. Other risk factors for infant mortality, such as cigarette smoking and alcohol consumption (National Public Health Week, 2004) may be decreased by programs aimed at combating these risk factors among pregnant women; decreases in homicide may also accompany a reduction in such behaviors, particularly if they are aimed at the general public. Policies discouraging domestic violence and programs assisting victims of domestic violence may have the added benefit of reducing homicide rates as well. Educating police officers, counselors, and medical personnel about the risk factors for domestic violence that leads to homicide, such as timing, type, severity, and frequency of domestic violence and the woman's response to domestic violence, could help to reduce the risk that domestic violence will lead to homicide (Block, 2003). Likewise, increasing the resources available to victims of domestic violence and reducing exposure of victims to future violence (taking into account the minimization of backlash homicides) would also likely help to alleviate the incidence of domestic abuse and those homicides that are linked to domestic violence (Dugan et al., 2003).

The variables with the strongest association with suicide were median age, divorce, and infant mortality. Unlike homicide, programs and policies to help reduce suicide rates within Florida counties are not clearly intuitive. For example, there is little that can ethically be done to reduce the median age of a county. This macro-level analysis also did not allow for an examination of the mechanism by which greater median age in a county might increase suicide rate. Is suicide more prevalent among seniors, and more seniors result in more suicide? Or does a greater proportion of seniors result in some form of stress that increases the suicide rate in the younger population? The answers to such questions are important when implementing policies and programs to help alleviate social forces leading to increased suicide rates. Current research suggests that the relationship between median age and suicide is because of a high prevalence of suicide among seniors (Seff, 2003). Thus, increasing support programs that deal with declining health in old age and the loss of loved ones may decrease suicide rates within this demographic group. In addition to these programs, educating doctors to recognize depression in elderly patients may help them to get the care and/or medication they need to relieve depression. Increasing the availability and acceptability of marriage counseling may help to reduce divorce rates, possibly having the added benefit of reducing suicide rates within counties. The negative relationship of infant mortality rates with suicide rates is not amenable to programmatic change, as most would not consider raising infant mortality a desirable goal. This negative relationship, however, which was opposite the relationship of infant mortality with homicide, may be indicative of a change in the form of lethal violence within a county for other, unknown reasons.

### *Further Research*

Perhaps the greatest contribution of this study is the use of an underutilized method for dealing with collinearity issues in sociological multiple regression studies. Unlike other methods of dealing with collinearity, principal components analysis retains most of the information that exists in the original variables. The greatest difficulty in using principal components regression is deciding how many components to retain in the regression analysis. Despite this challenge, principal components analysis is a valuable tool for the social sciences. Additional studies using other variables, other units of analysis and in other geographic regions can benefit from the use of principal components analysis to remove collinearity prior to multiple linear regression analysis.

Future studies of this nature may be better served by expanding the selection of variables to include some not normally utilized in the homicide/suicide literature, especially when exploring geographical spaces that have a relatively small set of units. In the present study, the total count of counties was 67, a relatively small number that makes complex analyses difficult. Faced with this, more creative variable selection and operationalization might be utilized, possibly yielding some fruitful avenues for research that have yet to be explored in a systematic fashion. Especially promising variables for future research might be the use of diversity indices to describe each unit of analysis in terms of racial or age diversity. Such methods would be a single measure of diversity, rather multiple variables representing percentages of the population which are necessarily non-independent because of the unit-sum constraint (i.e., the sum of percentages of all categories must equal 100%). Diversity indices would also have the benefit of more accurately reflecting anomie/strain theory because according to anomie/strain theory, it is

the difficulty in communication caused by racial diversity, rather than the number of people of each race, that causes strain leading to crime.

An additional problem relates to the non-independence of observations (counties), rather than the non-independence of predictor variables addressed in this study. Because of the spatial nature of the data, counties that are close to one another in space are likely to have similar socioeconomic conditions. For example, Hardee and Desoto Counties, which are adjacent counties in central peninsular Florida would be expected to have more socioeconomic forces in common than Dade County, in southeastern Florida, would have with Walton County in the Florida Panhandle. Spatial multiple linear regression calculates the spatial covariance structure of the units of analysis (for example, counties), and uses this covariance structure to alleviate the problems associated with non-independence of observations. This type of regression on components extracted with principal components analysis would be particularly powerful, eliminating both major non-independence issues in sociological research.

The method of recalculating the regression coefficients for the original variables from the eigenvector matrix and regression coefficients from principal components regression discussed previously was not used in this study, but is a very promising technique for future studies. Unfortunately, principal components regression provides stable regression models that themselves can be of little practical utility because of difficulties associated with interpreting the components in units that policymakers can understand. Recalculating the regression coefficients in terms of the original variables, however, maintains the stability and relatively small standard errors of the regression coefficients of the principal components regression model while creating a predictive

equation in terms of the original variables. Such an equation (preferably with a large  $R^2$ ), could be used to determine how changes in the predictor variables would affect homicide and suicide rates. This type of analysis would be very valuable to policymakers, allowing a cost:benefit analysis of alternative programs and policies.

### *Conclusions*

A large volume of academic literature exists concerning two forms of violence, homicide and suicide, and their considerable variation in prevalence among different geographic locations. This dissertation adds to the existing literature by determining how a selected group of demographic and socioeconomic variables are correlated with the rates of homicide and suicide among the 67 counties in the state of Florida. The primary objective of the study was to identify the general "social environments" within Florida counties that are associated with varying levels of both homicide and suicide, thereby providing possible explanations as to why the residents of some counties may be more (or less) prone to suicide and homicide than residents of other counties. In pursuing this subjective, principal components analysis was used to eliminate issues of collinearity that have plagued previous research.

The results indicated that Florida counties with greater educational attainment, higher income, lower infant mortality, and less domestic violence tended to have lower homicide rates. In contrast, Florida counties with greater median age, higher divorce rates, and lower infant mortality rates tended to have higher suicide rates. Several programs and policies to help increase educational attainment and income, aid seniors, and reduce infant mortality, domestic violence, and divorce were discussed as means of reducing both homicide and suicide within a county. The need for more research on these

topics is clear. It is hoped that this dissertation will serve to inform and direct the research efforts that take up this challenge.

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## Appendices

## Appendix A

### 35 Original Variable Definitions<sup>10</sup>

*Births to Mothers without H. S. Education* – Births to mothers without a high school education: three-year (2001-2003) rolling average.

*Infant Mortality Rate* – Infant mortality rate: three-year (2001-2003) rolling average.

*Standardized Domestic Violence Rate* – Number of cases of domestic violence per 100,000 individuals standardized by Std. DV rate = (DV rate/MAX DV rate)\*100.

*Standardized Median Household Income* – Median household income standardized by Std. MHI = (MHI/MAX MHI)\*100.

*% Population without H.S. Diploma* – Percent of population greater than 18 years of age without a high school diploma (2000). Does not count GED as high school diploma.

*% Population with Bachelor's Degree or Higher* – Percent of population with a Bachelor's degree or higher (2000).

*% Population 65+ yrs. In Poverty* – Percent of population aged 65 years or older living below poverty line (2000).

*% Families in Poverty* – Percent of families living below poverty line (2000).

*% Population in Urban Residence* – Percent of population living in urban area (2000).

*Median Age* – Median age of population (2000).

*Civilian Unemployment Rate* – Percent of civilian labor force unemployed (2000).

*% Population at Different Address Last 5 yrs.* – Percent of population that has lived in a different address within the prior five years (2000).

*% Population White (non-Hispanic or Latino)* – Percent of total population white, but not Hispanic or Latino (Florida).

*% Population White (one race)* – Percent of total population white (one race).

*% Population African-American* – Percent of total population black African-American.

*% Population Hispanic or Latino* – Percent of total population Hispanic or Latino.

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<sup>10</sup> Variable rates were used for each Florida county.

## Appendix A (Continued)

*% Population American Indian or Alaska Native* – Percent of total population. American Indian or Alaska Native.

*% Population Asian* – Percent of total population Asian.

*% Population 2+ Races* – Percent of total population two or more races.

*% Males Never Married* – Percent of males never married.

*% Females Divorced* – Percent of females divorced.

*% Population Divorced* – Percent of total population divorced.

*% Population Aged <18 yrs.* – Percent of total population under 18 years of age.

*% Population Aged 18-24 yrs.* – Percent of total population aged 18-24 years.

*% Population Aged 25-44 yrs.* – Percent of total population aged 25-44 years.

*% Population Aged 45-64 yrs.* – Percent of total population aged 45-64 years.

*% Population Aged 65+ yrs.* – Percent of total population aged 65 years or more.

*Males per 100 Females* – Number of males per 100 females in total population.

*% Total Household: Family Households* – Percent of total households made up of families.

*% Total Household: Family Household: Female Headed* – Percent of family households headed by female.

*% Total Household: Family Household: Married Couple* – Percent of family households headed by married couple.

*% Total Household: Family Household: Own Children <18* – Percent of family households that include head of household's own children less than 18 years of age.

*% Housing Units Owner-occupied* – Percent of total housing units occupied by the owner of the housing unit.

*% Housing Units Occupied by 1 Person* – Percent of total housing units occupied by a single occupant.

Appendix A (Continued)

*Ln-transformed Housing Unit Density* – Number of housing units per unit land area – natural log-transformed to reduce skew.

*Homicide Rate* – Number of homicides per 100,000 individuals.

*Suicide Rate* – Number of suicides per 100,000 individuals.

## Appendix B

### 9 Final Variables Selected for Analysis

*Infant Mortality Rate* – Infant mortality rate: three-year (2001-2003) rolling average by county.

*Domestic Violence Rate* – Number of cases of domestic violence per 100,000 individuals standardized by dividing the county domestic violence rate by the maximum domestic rate of all counties and multiplying it by 100. The formula is  $\text{Std. DV rate} = (\text{DV rate} / \text{MAX DV rate}) * 100$ .

*Median Household Income* – Standardized Median household income was calculated by dividing the individual county's median household income by the maximum median household of all the counties and multiplying it by 100. The formula is  $\text{Std. MHI} = (\text{MHI} / \text{MAX MHI}) * 100$ .

*Percent Population without high school diploma* – Percent of population greater than 18 years of age without a high school diploma (2000) for each county. This variable does not count GED as high school diploma.

*% Families in Poverty* – Percent of families in each county living below poverty line using the 2000 census data.

*Median Age* – Median age of population in each county using census 2000 data.

*% Population African-American* – Percent of total population black or African-American in each county.

*% Population Divorced* – Percent of total population divorced in each county.

*Males per 100 Females* – Number of males per 100 females in total population for each county.

*Homicide Rate* – Number of homicides per 100,000 individuals per county.

*Suicide Rate* – Number of suicides per 100,000 individuals per county.

## About the Author

Kelly K Browning graduated from University of Minnesota Moorhead State in 2005 with a Bachelor of Science degree in Criminal Justice. She received her Master of Science from the University of Central Florida where she graduated with the College of Health and Public Affairs Outstanding Graduate Student honor in 2000. In 2003 Ms. Browning was one of Florida's College Student of the Year nominees.

Ms. Browning's research interests are predominately focused on at-risk/disadvantaged youth and policies that impact these youth and their families. She has owned and operated a research consulting business for about five years. During that time she has worked on grants and conducted research for the National Center for Forensic Science, Substance Abuse Mental Health Service Administration, Mental Health Association and many local not-for-profit agencies dealing with at-risk youth and their families.

Ms. Browning was President of the Graduate and Professional Student Council (GPSC) for two years during her time at the University of South Florida, as well as the co-founding President of the Criminology Graduate Student Organization. She is presently and has been the Vice President of the Humanists of Florida Association for the past two years.

Currently, Ms. Browning is working as the Director of the Carl Sagan Academy charter middle school. A charter school focused on ensuring a disadvantaged population is given an opportunity to attend a school focused on providing a quality science, math, reading and citizenship curriculum.