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Integration-Regulation and rural suicide: a test of three alternative models

Russell R. Davis

Louisiana State University and Agricultural and Mechanical College

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**INTEGRATION-REGULATION AND RURAL SUICIDE:
A TEST OF THREE ALTERNATIVE MODELS**

A Dissertation

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Doctor of Philosophy

in

The Department of Sociology

by
Russell R. Davis
B.S., The Ohio State University, 1995
M.S., The Ohio State University, 1998
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TABLE OF CONTENTS

Acknowledgments.....	ii
Abstract	v
Chapter 1: Introduction	1
Chapter 2: Theory	5
Introduction	5
Section 1: The Integration-Regulation Hypothesis of Suicide	6
Section 2: Integration-Regulation and Rural-Urban Location	9
Summary	13
Chapter 3: Literature Review	15
Introduction	15
Section 1: The Epidemiology of Rural Suicide	16
Section 2: Social Isolation and Rural Male Suicide	20
Introduction	20
Part 2A: Social Isolation, Micro and Macro Conceptions.....	21
Part 2B: Rural Fatalism Literature	22
Section 3: Social Disruption and Acute Anomie	26
Introduction	26
Part 3A: Social Disruption and Integration-Regulation Theory.....	27
Part 3B: Rural Community Social and Economic Change	28
Part 3C: Rural Disruption and Suicide	30
Section 4: Summary and Statement of Research Questions	33
Chapter 4: Data and Methods of Analysis	37
Introduction	37
Section 1: Rural and Urban County Definitions	38
Section 2: Data Sources	39
Part 2A: Dependent Variables.....	39
Part 2B: Independent Variables	40
Section 3: Model and Variable Specification	41
Part 3A: Model One Egoism and Chronic Anomie	41
Part 3B: Model Two Fatalism	45
Part 3C: Model Three Acute Anomie	49
Section 4: Empirical Procedures of Analysis	52
Chapter 5: Findings	55
Introduction	55
Section 1: Gulf States Rural-Urban Suicide Differentials, 1968-2001	55

Section 2: OLS Regression Analyses	59
Section 2A: Model-One Egoism and Chronic Anomie	60
Section 2B: Model-Two Fatalism	69
Section 2C: Model-Three Acute Anomie	79
Chapter 6: Discussion and Conclusions	89
Introduction	89
Section 1: Summary of Major Findings.....	90
Section 2: Benefits and Limitations Of This Study.....	97
Closing Statements	99
Bibliographic References	101
Appendix	111
Appendix 1: Variable Construction Detail.....	111
Appendix 1A: Model One Variable Construction Detail	111
Appendix 1B: Model Two Variable Construction Detail	114
Appendix 1C: Model Three Variable Construction Detail	116
Appendix 2: Data Transformation Values	118
Appendix 2A: Model One Data Transformation Values	118
Appendix 2B: Model Two Data Transformation Values.....	119
Appendix 2C: Model Three Data Transformation Values	120
Appendix 3: Pearson Correlation Coefficients.....	121
Appendix 3A: Model One Urban Pearson Correlations	121
Appendix 3B: Model One Rural Pearson Correlations	122
Appendix 3C: Model Two Urban Pearson Correlations	123
Appendix 3D: Model Two Rural Pearson Correlations	125
Appendix 3E: Model Three Urban Pearson Correlations	127
Appendix 3F: Model Three Rural Pearson Correlations	128
Vita	129

ABSTRACT

This dissertation is an examination of the social structural determinants of rural suicide rates. Examining rates of white male suicide in rural and urban counties of the U.S. Gulf States Region, this research adds to the existing literature by examining the theoretical and empirical implications of rural-urban location within sociology's Integration-Regulation Hypothesis of Suicide. Drawing upon suicide research from sociology, criminology and social psychology this study tests the differential explanatory power of three alternative theoretical and empirical predictor models of rural and urban suicide rates.

Overall findings from this study underscore the need to examine suicide rates as distinct outcomes of location-specific social processes. Longitudinal trends (1968-2001) in county suicide rates demonstrate a relatively recent change in the direction of the rural-urban suicide differential within the study region. Starting in the mid 1990's this study shows total, male, and white-male suicide rates are disproportionately higher for rural compared to urban counties. Descriptive analyses further indicates a high level of significant variation in predictor variables across rural and urban counties. Regression analyses show a mixed pattern of significant associations between predictor variables for both rural and urban counties, but do not indicate clear support for a single theoretical explanation of elevated rural suicide rates. Specifically this study finds rural county white male suicide rates are primarily explained by the older age structure of rural counties. Economic dependency on farming and mining were associated with higher rural suicide rates. Findings also indicate a significant reduction in rural suicide rates associated with elevated and rising levels of household income inequality.

CHAPTER 1: INTRODUCTION

Starting with the classic work of Emile Durkheim (1897), the social distribution and structural correlates of suicide have held a prominent position within sociological theory and research methods. This body of literature documents the relative stability and regularity of suicide rates across the social dimensions of gender, age, race, class, marital status, and religious denomination. This structural perspective has also addressed the spatial variation in suicide rates across rural and urban geographic context. Throughout classic and contemporary sociological theory, suicide rates are generally assumed to be the product of urbanization and a decline in the integrative and regulative function of society. In many advanced industrial countries, however, recent changes in the relative distribution of rural and urban suicide rates are starting to challenge this key theoretical assumption.

Within the United States, rural suicide rates surpassed urban rates starting in the late 1960's. Since this time, mortality statistics indicate a significant and continued widening of the rural-urban suicide differential. This relative change in the direction of the rural-urban suicide differential: a) marks one of the only major reversals of a primary suicide differential since Durkheim's writing; and b) theoretically and empirically contradicts one of the most basic assumptions of sociology's Integration-Regulation Hypothesis of Suicide (IRHS).

Dubbed sociology's "one law," social science researchers generally accept the underlying theoretical relationship between social Integration-Regulation (I-R) and suicide (Pope and Danigelis, 1981; Bankston, Allen, and Cunningham, 1983; Pescosolido and Georgianna, 1989; Bearman, 1991; Barnett and Mencken, 2002). Despite this overall acceptance very little sociological research has directly examined the phenomena of *rural* suicide. Within classic and

early modern social theory rural communities provided a comparative reference for the analysis of newly emerging urban social problems. Firmly established within an urban paradigm, contemporary I-R research has focused on the relationship between suicide rates and structural dimensions of specific social institutions such as religion, family, and the economy. Very little of this work has considered how these relationships vary across rural-urban geographic space. Where examined, research shows general empirical models of I-R are relatively well suited to explain urban suicide rates, but have little or no explanatory power when applied to rural locations (Kowalski, Faupel and Star, 1987). Existing literature, however, has not provided a systematic explanation for the recent rise in rural suicide rates, or why traditional theoretical and empirical models fail to explain this phenomena.

Combined, the recent rise in rural suicide rates, the subsequent reversal in the direction of the rural-urban suicide differential, and the apparent inability of existing research methods to explain this phenomena opens a significant gap in the sociological literature. My dissertation begins to address this gap by examining the social-structural determinants of suicide across the rural-urban county divide of the Gulf-States region (Alabama, Florida, Georgia, Louisiana, Mississippi and Texas) of the United States. Structured to minimize possible contamination of results associated with location specific variation in predictor variables, and regional differences in rural-urban composition; the results of this study begin to address the rural-urban generalizability of one of sociology's core theoretical frameworks.

This research theoretically and empirically adds to the existing literature in three ways. First, this study provides one of the only systematic empirical examinations of Integration-Regulation theory across the rural and urban divide within the sociological literature. Considered

as a separate and distinct social space, rural communities often vary greatly from urban areas in their cultural, familial, demographic and employment structures. These differences provide reason to believe that theoretical and empirical models developed to explain suicide rates may differ across rural-urban geographic context. The only major sociological study addressing the relative explanatory power of I-R models across rural-urban geographic space was performed using national-level data from the late 1970's. Because of recent changes in the rural-urban suicide differential, my research contributes to the existing body of knowledge by examining this phenomena using contemporary mortality (1997-2001) and community data (1990-2000).

Second this research contributes theoretically and empirically to the sociological literature by considering the contemporary implications of two relatively under studied Durkheimian suicide types, *Fatalism* and *Acute Anomie*. Drawing upon rural suicide research, primarily developed outside of the mainstream sociological literature, I argue unlike traditional urban based models of *Egoistic-Chronic Anomic* suicide, the social structural organization and patterns of change associated with rural communities theoretically corresponds with Durkheim's *Fatalistic* or *Acute Anomic* forces. The comparative structure of my research design adds to the existing body of literature by providing a systematic empirical test of these three alternative explanations for suicide rates. Specifically, the three empirical models employed within this study provide a direct comparative examination of: a) differential patterns of explanatory power; and b) independent variable association with rural and urban county-level white male suicide rates.

Third, this study contributes more generally to the small but growing body of rural suicide research. Similar to the attention and awareness of other rural social problems, the phenomena of

rural suicide largely remains overshadowed by the study of urban. As community health researchers and policy makers around the world begin to unpack, decipher, and react to the rising rates of rural suicide, it is imperative that this dialogue and action be informed from a wide range of perspectives. Consistent with the macro-based perspective of sociology, the overall uniformity in international, national, and county level statistics indicate the phenomena of elevated rates of rural suicide is not an individual-level problem. The majority of rural suicide research however is conceptually and methodologically micro and individual-based. This study adds to the existing body of rural suicide literature by extending this work to the macro-social level.

The remainder of this dissertation is organized in the following manner. **Chapter 2** outlines the historical development of the IRHS, highlighting the role of rural-urban location within this theoretical paradigm. **Chapter 3** reviews the rural suicide literature. In this chapter I provide a brief epidemiological overview of suicide rates within the United States, followed by the examination of rural based suicide research. **Chapter 4** outlines the data and methods of this study. **Chapter 5** presents empirical findings of analysis. Chapter 5 is divided into two sections, the first presents longitudinal and cross-sectional descriptive analyses of rural and urban suicide rates. The second presents the results from three OLS regression models for rural and urban counties. **Chapter 6** includes a discussion of results, conclusions, and recommendations for future research.

CHAPTER 2: THEORY

Introduction

In an attempt to explain the divergent patterns in the social distribution of suicide, Emile Durkheim ([1897] 1951) hypothesized a theoretical relationship between social Integration-Regulation and the adherence to social norms. According to Durkheim social attachments integrate individuals into the normative social structures of society providing a systematic regulation of individual-level behaviors. From this theoretical perspective suicide is not viewed as an individual-level phenomena; instead the social rate of suicide serves as an indicator of the relative organization and control of society over individuals (Giddens, 1965, 1971). Consistent with the sociological tradition of macro-social suicide research, this study examines the social-structural correlates of suicide rates. Informed by rural suicide literature developed within the micro-oriented disciplines of social psychology and community health, this study does not and cannot address individual-level motivations, mental states, or actions.

This chapter is organized in the following manner. Section 1 outlines the basic theoretical tenets of the Integration Regulation Hypothesis of Suicide (IRHS). Section 2 examines the historical development of contemporary I-R research, highlighting the role of rural-urban geographic space within this theoretical paradigm. For the purpose of clarity the following are used as working definitions of *Social Integration* and *Regulation* (Bearman, 1991, p 503):

Integration: The extent of social relations binding a person or a group to others such that they are exposed to the moral demands of the group.

Regulation: The normative or moral demands placed on the individual that come from membership in a group.

Section 1: The Integration-Regulation Hypothesis of Suicide

From its inception the IRHS was directly tied to rural-urban social differences. In *Suicide* ([1897] 1951) and *The Division of Labor In Society* ([1893] 1964) Durkheim developed the constructs of *Mechanical* and *Organic Solidarity* and *Integration-Regulation* to explain the social transformation from a rural-agrarian to an urban-industrial society. Within this framework, agrarian society was dominated by *Mechanical Solidarity* which is characterized by a highly closed and insulating social system based on similarity. Individuals within agrarian society were highly integrated into a social structure which provided a cohesive overlap of family, community, religion, and work. Within agrarian societies individual-level behaviors were regulated by the informal social control mechanisms of locally-based kinship relations. Characterized by high levels of social integration and regulation, Durkheim attributed suicide within early societies to *Altruistic* and *Fatalistic* causes. According to Durkheim, altruistic suicides are performed by highly integrated individuals out of willing obligation for society. Fatalistic suicides occur when individuals are powerless and unable to conform to the high levels of regulation imposed on them by society.

As society moved into the industrial era the mechanical bonds of agricultural society were displaced by *Organic Solidarity*. Created and maintained by a complex division of labor and occupational interdependence, organic solidarity and urban social organization freed individuals from the constrictions of traditional society. This transformation, however, fragmented the primary social attachments of family, work, and religious life into a more loosely connected social system weakening their collective power over individual-level behavior. In industrial society individual-level behaviors became increasingly regulated by formal social control

mechanisms. Characterized by low levels of social integration and regulation, Durkheim attributed suicide in industrial society to *Egoistic* and *Anomic* forces. Egoistic suicide is the product of increasing individualism and a lack of social integration. Anomic suicide is the product of reduced levels of social regulation or control over individual level behaviors.

According to the general theoretical specification of the I-R hypothesis the two independent variables *Social Integration* and *Social Regulation* are present at various levels in all societies. Taken from Johnson (1965, p 878), **Figure 2.1** provides a visual representation of this general thesis. The horizontal axis represents levels of *Social Integration*. The vertical axis represents *Social Regulation*. Each of the nine cells in Figure 2.1 represents the theoretical conditions contributing to the social rate of suicide¹. From Johnson (1965, p 877):

Cells 2, 4, 6, and 8... represent Durkheim's claim that any one of the four causes of suicide, occurring by itself, causes a higher rate of suicide. The figure also calls attention to his implicit view that in fact a low rate of suicide corresponds to only one social condition. Since he assumes that an extreme value of *either* independent variable is sufficient to cause a high rate, a low rate will occur only if a group is both moderately integrated and moderately regulated (Cell 5).

Cells 1, 7, 3, and 9 are considered "mixed types", and represent the logical completion of Durkheim's typology. Generally assumed to co-vary, cells 1 and 9 represent a "normal" state of covariance. Cells 7 and 3 represent abnormal social conditions where levels of Integration and Regulation diverge.

While modern social science researchers generally accept the underlying theoretical relationship between Integration-Regulation and suicide, considerable academic debate has been

¹Within the body of Durkheim's work he did not graphically represent his theory. Later interpretations and theoretical debates gave rise to several variants of this diagram intended to clarify the Integration-Regulation hypothesis.


R e g u l a t i o n	Integration 			
		Low	Moderate	High
	Low	Egoism and Anomie Suicide Rate Very High (1)	Anomie Suicide rate high (2)	Anomie and Altruism Suicide Rate Very High (3)
	Moderate	Egoism Suicide rate high (4)	Intermediate Suicide Rate Low (5)	Altruism Suicide rate high (6)
	High	Fatalism and Egoism Suicide Rate Very High (7)	Fatalism Suicide rate high (8)	Altruism and Fatalism Suicide Rate Very High (9)

Figure 2.1: Suicide Rate Within Varying Social Conditions²

generated over the precision and meaning of Durkheim's work. As later theoretical scrutiny demonstrates, Durkheim often interchanged the two independent concepts of Integration and Regulation (Johnson, 1965; Pope, 1975; Pope and Danigelis, 1981; Travis, 1990; Bearman, 1991). Related to these criticisms was also the inconsistent manner in which Durkheim's discussion of the relationship between I-R and suicide seems to fluidly change levels-of-analysis. Throughout his work Durkheim often jumps from macro-social comparisons of nation states or religious denominations down to the interpersonal life events of a newly married young man or childless wife. In the 200 years since the publication of *Suicide*, these problems have given rise to numerous competing interpretations and specifications of the IRHS.

²This figure is reproduced directly from Johnson (1965, p 878)

Throughout the body of I-R research the primary theoretical concession used to address the above criticisms and maintain consistency within the Integration-Regulation framework has been to narrow the scope of Durkheim's original typology to consider only Egoistic and Anomic forces. Represented in Figure 2.1, this truncated form includes cells 1, 2, 4, and 5. Supporting this alteration was Durkheim's implicit and explicit treatment of *Altruistic* and *Fatalistic* suicides within his work. Explicitly, Durkheim stated that "Egoistic and anomic suicide are the only forms.... whose development may be regarded as morbid, and so we have only to consider them" (1951, p. 373). Within *Suicide*, Fatalism was relegated to a footnote, included for "completeness' sake" (Durkheim, 1951; p. 276) and was restricted to the extreme example of over regulation within human slavery. The treatment of altruistic suicide, within modern society, was largely limited to the institutional context of military service; where extreme integration and self-sacrifice is required for the overall benefit of the group. The end result of this approach has been to largely ignore the examination of a potential link between elevated rates of suicide in modern society due to high levels of integration or regulation.

Section 2: Integration-Regulation and Rural-Urban Location

Starting with the work of Durkheim, I-R research has consistently been guided by the theoretical assumption that urbanization is the driving force behind elevated suicide rates in modern society. From this perspective higher rates of urban suicide were easily explained by *Egoism* and *Anomie*, concepts which addressed the impersonal and alienating character of city life. From the *Division of Labor* Durkheim states "Within each country the same kind of relationship is to be seen. Everywhere suicide is more prevalent in towns than in the countryside. Civilization is concentrated in the large towns, as is suicide" ([1893] 1964:191).

Sorokin and Zimmerman (1929) also used the egoistic-anomic explanation to account for the relative differences between rural and urban suicide rates within the United States. Consistent with this theoretical perspective, suicide rates and patterns of occupational, cultural and demographic structures provided clear empirical markers for making rural-urban social distinctions. Along with lower rates of suicide; domestically, rates of marriage and fertility were higher, and rates of divorce were lower in rural compared to urban communities. Rural populations were more homogeneous and stable than urban communities, and culturally more traditional in their value and belief structures. For Sorokin and Zimmerman, the early rural-urban suicide differential represented “the price which ‘free urbanites’ pay for their liberation from traditions, and other bonds which they style as ‘prejudices’ and ‘superstitions’; with these ties broken, the individual is left to his own reason.” (p. 179).

Building from the work of Durkheim and others like Tonnies (1887) many of the social science theories developed in the early 20th century applied the Egoistic-Anomic operationalization to explain rural-urban community differences; including aggregate patterns of suicide rates and social deviance. Researchers working from this perspective generated the theories of *Social Control* (Park and Burgess, 1924), *Anomie* (Merton, 1938), and *Social Disorganization* (Shaw and McKay, 1942). Central to these theories were the diminished ability of urban communities to integrate and regulate behavior. Based on an overall assumption that rural communities would eventually lose their distinctive character and become more like urban areas; many early sociological theories ignored rural communities completely (Newby and Buttel, 1979) or considered them the personification of community integration and regulation (Elliot and Merrill, 1961).

Starting in the early 1960's however, detailed examinations of rural and urban community structure began to raise serious concerns over the explicit use of traditional rural-urban typologies for explaining contemporary social phenomena. By mid-century the declining farm population and the development of mass communication and transportation technologies had started to blend away many of the well accepted rural-urban differences (Rogers, Burdge, Korsching, and Donnermeyer, 1988). Within urban based literature, critical essays by Dewey (1960) and Benet (1963) highlighted the contradictions between Wirth's (1938) depiction of a socially isolating urban environment and the presence of rich community based associations described in detailed ethnographic studies, such as Gans' *Urban Villagers* (1962). At the same time researchers within rural sociology were also challenging the idealized notion of bucolic rural communities and the underlying assumptions about the nature of rural social life (Pahl, 1966; Schnore, 1966; Willits and Bealer, 1967; Copp, 1972; Falk and Pinhey, 1978; Bealer, 1978; Picou, Wells and Nyberg, 1978). Central to these debates was the underlying question: Had the advances of industrialization eroded primary rural-urban social differences within the United States? (Kasarda and Janowitz, 1974; Bell, 1992).

Firmly established within the urban-based Egoistic-Anomic paradigm, contemporary I-R research continued to address the structural relationships contributing to suicide rates, but largely dropped the issue of rural-urban differences. In *Social Forces in Urban Suicide*, Marris (1969) applied a similar research approach to that used by Shaw and Mckay (1942) to examine the contextual variation of suicide rates within and across the urban neighborhoods of Chicago. Other applications of the IRHS narrowed the scope of analyses to examine particular aspects of social institutions such as: religious denomination (Bankston, Allen, and Cunningham, 1983;

Stack, 1985; Pescosolido and Georgianna, 1989; Van Poppel and Day, 1996); marital status and divorce (Stack, 1980, 1985); race (Burr, Hartman and Matteson, 1999; Willis and Drentea, 2003); migration (Kushner, 1984; Trovato and Jarvis, 1986, South, 1987); and the economy (Wasserman, 1984; Dooley, et. al. 1989; Austin, Bologna, and Dodge, 1992, Yang, 2001). Most of these contemporary studies still include some form of statistical control for rural-urban location such as, population size, density, or percent urban. Rarely however, are these measures accompanied by theoretical justifications or interpretations of their meaning, and conspicuously absent is the overall recognition that rural suicide rates now surpass those in urban areas.

Only one major sociological suicide study has applied an empirical model of I-R across the U.S. rural-urban county divide (Kowalski, Faupel and Star, 1987). Common within I-R based studies, independent variables were organized into the three broad categories of *Integration, Economic Well-Being, and Population*.³ For all US counties examined concurrently, those variables which produced a significant increase in suicide rates were: divorce rate, % living alone, net migration change, income inequality, and median education. Only median family income expressed a significant negative relationship with suicide rates. The overall explained variance for the national model was $R^2 = .093$. When the analysis was divided into three geographic components (most urban, middle urban, and rural counties) findings show this general model of social I-R does not hold consistent explanatory power across the rural-urban divide. For urban counties patterns of association were similar to those of the national model, but only one variable (females in the labor force) was significant in rural counties.

³**Integration:** % Catholic, % Protestant, Divorce rate, Birth rate, % female labor force, % living alone, net migration change, median age, sex ratio; **Economic Well-Being:** median family income, income inequality (GINI), % unemployment, occupational diversity, median education, education diversity, % black; **Population:** population size, % urban

Results indicate that this general model of I-R best explains patterns of suicide within the two urban categories ($R^2 = .81$ and $.41$ respectively) and has limited to no effect when applied to rural counties ($R^2=.02$).

While not definitive, the study by Kowalski, Faupel, and Starr (1987) and its conclusions are representative of the general problem with traditional I-R research and the contemporary study of rural suicide. As noted by the authors, “By every indicator, rural areas should have a higher variance explained, especially since there is more variation to explain” (p.93). Rather than question a potential urban bias within the I-R framework or methods of study, however, the authors conclude:

Given the very modest capacity of sociological variables to explain suicide rates in rural areas, we may take our speculation a further step and suggest that, hypothetically, rural suicide and other behavior may be better explained in such locales by psychological or personality variables. Structural sociological explanations for conduct, therefore, could largely be an enterprise best suited for urban environments.

Summary

Since the publication of Durkheim’s *Suicide*, sociological theory and research methods have focused on social structural distribution of suicide rates. Generally considered an urban based social problem, existing theory used to frame the sociological analysis of suicide rates is based on the assumption that elevated rates of suicide in contemporary society are the product of Egoistic and Anomic forces. The recent rise in rural suicide rates and the subsequent reversal in the direction of the rural-urban suicide differential, however, presents an interesting and unique theoretical dilemma for this well established paradigm. At its most basic, rural communities are generally not considered highly Egoistic and Anomic types of places, especially when compared to urban areas. While many of the social dimensions which once separated rural from urban

communities have narrowed significantly, research literature shows that rural communities continue to be more highly integrated than urban communities (Fisher, 1982; Beggs, Haines, and Hurlbert, 1996). Under traditional interpretations of the IRHS these characteristics should theoretically translate into lower rates of rural suicide. Even if the hypothesis of a rural-urban convergence were correct, suicide rates should still logically remain lower in the most rural places and gradually increase with levels of urbanization, both temporally and spatially. Current patterns and changes in the contemporary rural-urban suicide differential directly contradict these two predictions. Additionally, if the social forces contributing to suicide rates within rural and urban communities are of similar origin, the research by Kowalski, Faupel, and Starr (1987) does not corroborate this assumption.

Combined, the recent rise in rural suicide rates and the apparent inability of traditional theoretical models to explain this phenomena raise two primary theoretical and empirical questions. First, given the overall changes in rural communities and suicide rates in the past 30 years, *to what extent can traditional Egoistic and Anomic models of I-R be generalized to explain contemporary rural suicide rates?* Second, if these traditionally urban-based theoretical explanations are unfit for explaining rural suicide rates, *can alternative theoretical and empirical specifications be developed to better explain this phenomena?* To examine these questions the following chapter provides a review of rural suicide literature outlining: a) the historical trends in rural and urban suicide rates; and b) the primary theoretical perspectives and existing research which examines this phenomena.

CHAPTER 3: LITERATURE REVIEW

Introduction

Where contemporary I-R research has largely focused on urban suicide rates; a small but growing body of academic research generated outside of the mainstream sociological literature has started to investigate the phenomena of rural suicide. This literature can be divided into two relatively distinct strains of micro and macro based research. The first, provided by the micro-oriented disciplines of social psychology and community health purport that rural suicide is the product of *Social Isolation*. Social isolation research focuses primarily on the social and economic deprivation associated with patterns of rural community decline and persistent economic hardships. The second, informed by the macro-oriented theories of criminology and human ecology contends that rural suicide is the product of *Social Disruption*. Social disruption research focuses primarily on the deleterious impact of rapid demographic and economic expansion within rural communities.

Both social isolation and disruption based rural suicide research examines similar aspects of rural community demographic and economic structure (i.e. migration and farming), but have largely been developed in isolation from each other. Unlike traditional I-R approaches which focus on the inability of urban communities to sufficiently integrate and regulate behavior; social isolation and disruption based research suggests instead that rural suicide rates are the product of *high* levels of social integration and rigid patterns of normative regulation. Drawing this literature into the common conceptual framework of the IRHS, I argue that elevated rates of rural suicide theoretically and empirically can be better understood as the product of *Fatalistic* and *Acute Anomic* social forces.

This chapter is organized into three sections. To properly frame the analysis of contemporary rural suicide rates, Section 1 provides a brief overview of the epidemiology of suicide within the United States. Section 2 examines social isolation based rural suicide literature. Section 3 examines social disruption based literature.

Section 1: The Epidemiology of Rural Suicide

As an epidemiological phenomena suicide ranks as one of the leading causes of mortality within the United States. In the late 1990's the US National Center for Health Statistics ranked suicide as the eighth leading cause of mortality. In the past several years suicide has declined slightly in ranking and as of 2002 was the eleventh leading cause of mortality overall. Despite this decline, suicide continues to take significantly more US lives (30,646) annually than homicide (17,045) which ranks fifteenth (Kochanek and Smith, 2004).

Dissaggregated by age, suicide is more prevalent among younger age groups (15-24), drops for middle or working-aged groups and then rises into old-age (NCHS, 2001). Because of these significant aged-based differences researchers examining spatial patterns of suicide rates utilize a standardized age-adjusted rate which controls for skewed age-based population distributions (Feinleib and Zarate, 1992, Klein and Schoenborn, 2001). For multivariate regression analysis however, crude suicide rates and empirical controls for population age structure have been shown to produce better unbiased regression estimates (Rosenbaum and Rubin, 1984).

Historically, one of the most pronounced features of the suicide rate within the industrialized world is the overwhelming contribution from males. Within the United States, males are nearly four times more likely to commit suicide than females (NCHS, 2001). Racially

aggregate age-adjusted rates of suicide rank white males and Native Americans as the most susceptible to suicide mortality. Asians, Non-White Hispanics and African Americans trail significantly behind with rates at nearly one-half the previous two groups (NCHS, 2001). Similar to the age-adjustment procedure, studies which examine aggregate suicide rates generally control for differences in population race structure or compare very similar race-gender specific suicide rates.

Through the first half of the 20th century suicide rates were consistently higher in urban locations. The 1950's and 1960's served as a period of rough convergence between rural and urban suicide rates. According to the US Center for Disease Control rates of suicide mortality within the United States are now consistently higher in less urbanized and rural places. As demonstrated in **Figure 3.1**, the relationship between suicide and rurality holds regionally, with the highest rates of US suicide in the more rural and expansive regions of the West. Sub-regionally suicide rates are also higher in the more rural areas of all regions of the United States. Internationally, a very similar pattern in rural-urban suicide rates are present in many of the advanced industrial countries of the world (Gallagher and Sheehy 1994; Pesonen et. al, 2001; Clarke, Bannon and Denihan, 2003).

Analysis of the United States rural-urban suicide differential documents a significant and growing gap between rates of male suicide in rural and urban communities. Detailed in **Figure 3.2**, the research of Singh and Siahpush (2002) show from 1970-1997, rates of male suicide in the most rural counties of the US increased at an average annual rate of 1.08% (20.71 per 100,000 in 1970 to 26.88 in 1997). During the same time period, rates of male suicide in the most urban counties of the US declined at an average annual rate of .46% (19.84 per 100,000 in

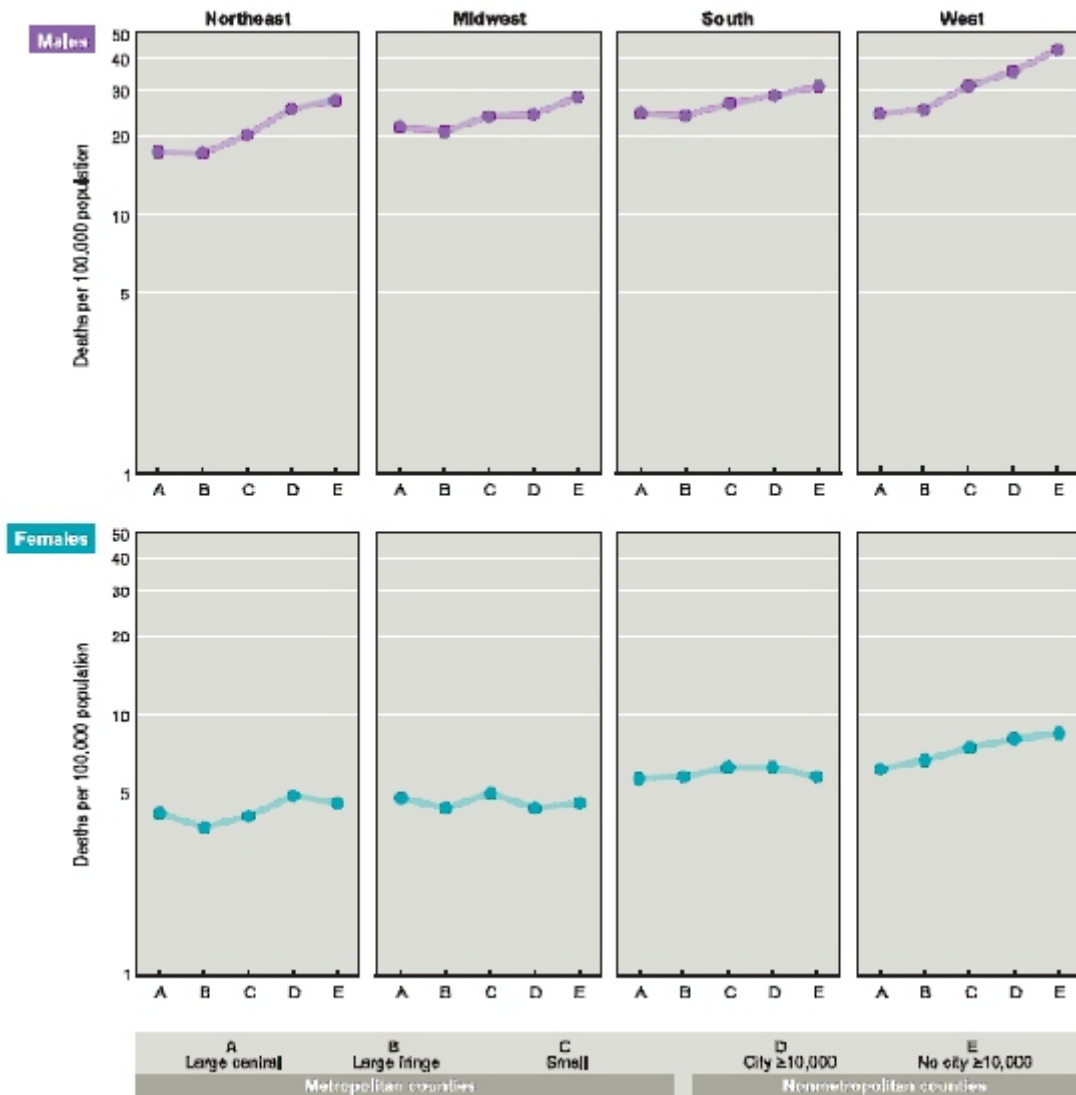


Figure 3.1: 1996-1998 Age-Adjusted Suicide Rates by Sex, Region and Urbanization⁴

1970 to 17.45 in 1997). When comparing rural-urban rates of female suicide, a near opposite pattern from that of males is demonstrated. Unlike the rural-urban male differential, in 1970 urban female suicide rates were significantly higher than rural female rates (8.7 per 100,000 and 4.13 respectively). Further, compared to the 30 year increase in rural male suicide, rates of rural

⁴ Taken from National Center For Health Statistics (2001)

female suicide remain the lowest of all male or female rates and have declined slightly to 4.01 per 100,000. Urban female suicide rates, similar to urban male rates, have declined significantly in the past 30 years bringing the 1997 urban female rate (4.05 per 100,000) in-line with that of rural females.

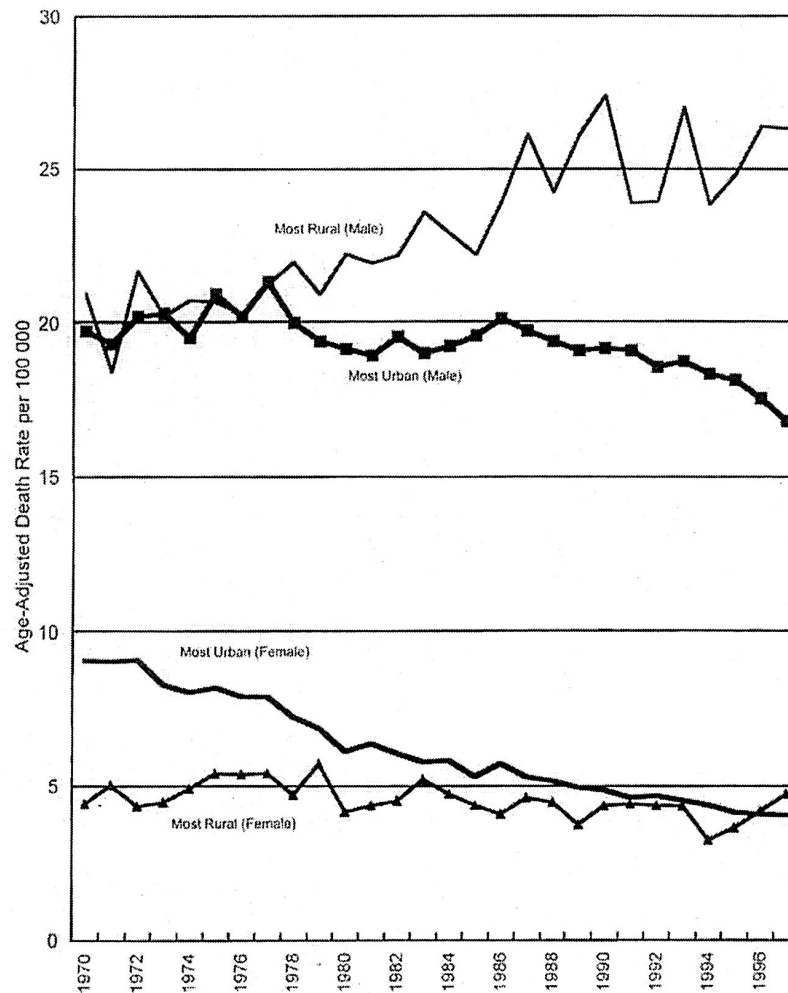


Figure 3.2: Age Adjusted Suicide Mortality: Most Rural and Most Urban 1979-1997⁵

⁵ Taken from Singh and Siahpush (2002)

These descriptive statistics provide evidence to document the size and direction of the contemporary rural-urban suicide differential within the United States. These studies also document the significant gender based component of this phenomena. Beginning as early as the late 1960's, National Vital Health Statistics publications demonstrated that the rural-urban suicide differential within the United States is primarily defined by the elevated rate of white male suicide in rural areas (Massey, 1967). Combined, these studies suggest that macro-social suicide research seeking to explain contemporary rural suicide rates focus specifically on the social-structural reality of rural white males.

Section 2: Social Isolation and Rural Male Suicide

Introduction

Traditionally, the sociological approach to suicide research does not consider individual psychological states or motivations for explaining suicidal behavior. Similarly this dissertation does not examine individual-level processes or outcomes. The relative uniformity in the macro-social correlation between rurality and suicide rates suggests a causative relationship beyond individual-level explanations. A large portion of existing rural suicide literature however is derived from a micro-based psychological perspective. Typically viewed as competing theoretical paradigms, this literature review instead draws together findings from both micro and macro based research into a complimentary perspective which helps build a more comprehensive academic understanding of the unique properties of rural suicide.

This section is organized into two parts. First, I outline the primary theoretical orientation of rural social isolation research and how this body of literature fits within the I-R

framework. Second, I provide a review of literature addressing the impact of farming, domestic isolation, and mental health services on rural suicide.

Part 2A: Social Isolation, Micro and Macro Conceptions

Within contemporary sociology the concept of social isolation is frequently associated with the residential and economic segregation of minority populations from mainstream institutions and resources (Wilson, 1987; Massey and Denton, 1993). Other work, such as Robert Putnam's (2000) *Bowling Alone*, equates social isolation with the fragmentation and decline of civic participation. From this perspective empirical measures such as income inequality, racial heterogeneity, occupational and educational diversity are often used to measure social distance within macro-social suicide research. General models of I-R, such as those employed by Kowalski, Faupel and Star (1987), reflect this sociological concept of isolation.

Within the body of rural suicide literature, however, *social isolation* is applied as a blended concept of social and psychological characteristics. The social isolation hypothesis of suicide is linked to Halbwachs (1930) reformulation of I-R theory which differentiates between structural conditions conducive to suicide and internal psychological sentiments required to produce the act (Giddens, 1965; Travis, 1990). From this perspective levels of social integration and regulation alone do not explain suicide; also required is the individual's recognition and interpretation of the social situation as being problematic or isolating which, "arouses feelings of solitude that seem without remedy" (Travis, 1990 p. 227). Widely accepted within the disciplines of social psychology and community health, social isolation research builds upon case studies and analyses which demonstrate a strong relationship between individual acts of suicide and alcohol and drug abuse, divorce, living alone, occupational isolation and unemployment,

depression and mental illness, and a lack of mental health counseling services (Gallagher and Sheehy, 1994).

Unlike traditional sociological interpretations which equate social isolation with the individuated and autonomous egoist, the social-psychological approach used within rural suicide literature theoretically aligns more closely with Durkheim's the concept of *fatalism*. As described by Durkheim (1951), *Egoism* is characterized by the individual "personality tending to surmount the collective personality" (p. 209). *Fatalism*, by comparison, is characterized by "persons with futures pitilessly blocked and passions violently choked by oppressive discipline" (p. 276). Micro-based rural isolation literature focuses primarily on the conflict between traditional gender role expectations and the diminished social and economic opportunity structure of rural males. Similar to the concept of *Social Strain* (Merton, 1957) it is not the absence of integration or regulation but the unobtainable and unavoidable social standards which theoretically lead to higher levels of rural social isolation and suicide.

Part 2B: Rural Fatalism Literature

Social Isolation and Farming

As a unique form of rural employment and multi-generational life-style, farming and the declining agricultural industry is one of the most salient themes found throughout the rural suicide literature (Gallagher and Sheehy, 1994). Multiple edited volumes have been published documenting the social and financial deterioration of rural communities following the "farm crisis" of the 1980's and 1990's (Barlett, 1993; Conger and Elder, 1994; Lasley, Leistriz, Lobao, and Meyer, 1995). Additionally research on farm families and workers have documented a relationship between financial hardships and depressive symptoms (Armstrong and Schulman,

1990, Belya and Lobao, 1990). Literature examining the connection between farming and suicide however shows mixed results between micro and macro based research.

Within the micro-based suicide literature, Page and Fragar (2002) cite the relatively isolating work conditions and availability of firearms among Australian farm populations as one potential cause for elevated rural suicide rates. Using an anthropological approach to investigate the dual themes of *masculinity* and *pride*, Ramirez-Ferrero (2005) provide a detailed account of the psychological, social, and economic isolation faced by many contemporary American farmers. In this work the author points to the cycle of diminishing economic returns and the use of increasing debt load to maintain the outward appearance of financial success. While focusing on the experiences of individual farmers, Ramirez-Ferrero (2005) stresses the role of external social pressures from family, neighbors, and other community members in perpetuating this cycle. Within the social context of small rural communities the high level of social familiarity and visibility fosters an expectation for behavior which is often difficult to avoid or escape.

Despite the focus on farm specific causes within micro-based suicide research, quantitative research fails to show a significant relationship between farming and suicide rates. After controlling for the demographic composition of farm employees and owners, quantitative studies examining occupational patterns of suicide in the United States (Stack, 2001) and Canada (Pickett et. al., 2000) show no significant increase in individual suicide risk associated with farm based employment. Similarly, macro-based quantitative research shows no significant relationship between the percent county agricultural workers and county suicide rates in Alabama (Zekeri and Wilkinson, 1995) or the North East region of the U.S. (Wilkinson and Israel, 1984). Focusing primarily on the occupational dimensions of the farm economy macro-based research

has not examined the relationship between rural suicide rates and residential measures of farm population, relative measures of farm population change, or county economic dependency on the agricultural industry.

Domestic Isolation and Rural Fatalism

Within the I-R framework, domestic social attachments are assumed to buffer against suicidal behavior. Early in the twentieth century rural families and households were larger and more stable compared to those in urban areas. In the past 30 years, rising rates of divorce, single-parent births, declining fertility, and rural-to-urban migration have worked to reduce many of these rural-urban family and household differences (MacTavis and Salamon, 2003).

Consistent with these changes macro-based suicide research has largely focused on the decline of domestic integration and the empirical relationship between divorce and living alone on suicide rates (Kposowa, Breault, and Singh, 1995; Stack, 1980). County level analysis by Wilkinson and Israel (1984) and Zekeri and Wilkinson (1995) find a significant positive effect associated with divorce rates and suicide; but this measure does not “explain away” the significant impact attributed to measures of rurality. Further, county-level rural-specific suicide research by Kowalski, Faupel, and Starr (1987) shows no significant relationship between rural suicide rates and divorce rates, or the percent of the population living alone.

Micro-based rural isolation research provides one possible explanation for this rural-urban difference in macro-social research findings. Citing patterns of selective out-migration stemming from shrinking local employment and the increased need for specialized education, Ni Laoire (2001) details the social pressures faced by rural Irish males “left behind”. For these males increasing financial instability, coupled with the declining number of eligible single young

women, creates formidable barriers to establishing and maintaining adult dyadic relationships. The social pressures to conform with traditional gender-role and familial expectations leave many rural adult males with few options for achieving these ideals. Supporting this fatalistic perspective, research examining rural-urban suicide mortality in Finland shows the relationship between living alone and suicide risk to generally be an urban phenomena (Pesonen et. al, 2001). Within the Finland study, rural individual suicide risk was considerably higher for rural adult males living with primary family members.

Isolation and Mental Health Services

The third cause for increasing rural suicide rates identified from micro-based rural suicide literature is the availability and utilization of mental health counseling services. Similar to studies which consider the relationship between farming and domestic relations, rural suicide research has produced a series of mixed empirical findings when examining the relationship mental health services and rural suicide.

Addressing the potential role of disproportionate health care availability in rural areas, Fiske, Garz and Hannell (2005) examine suicide rates among California county groups. Like national based statistics their analysis confirms the significantly higher rate of rural suicide specifically among older white European males. Descriptive level statistics also document the significantly lower per-capita presence of physician and mental health practitioners within rural counties. Regression analysis however fails to show a significant relationship between the number of health care providers and the ethnic-gender based suicide rates examined.

Research examining the *utilization* of mental health care however provides a more consistent set of research findings which support a fatalistic theoretical orientation. In the United

States, Hoyt et. al. (1997) demonstrates a higher level of depressive symptoms and social stigmas toward mental health services among rural and small-town residents. Similar to the work of Naples (1994), the more traditional ideological culture of rural communities coupled with higher levels of visibility and familiarity serve as a social impediment to help-seeking behavior among rural residents. Interestingly, Hoyt et. al (1997) also note once community members overcome this social stigma and access mental health care services, continued utilization is no longer considered problematic. Supporting this fatalistic explanation, quantitative individual-level analysis of rural-urban suicide differentials in Australia show a significant reduction in the excess of rural suicides after introducing mental health care *utilization* into research models (Taylor et. al., 2005).

Section 3: Social Disruption and Acute Anomie

Introduction

The second body of rural suicide literature informing this dissertation derives from macro-social theories of criminology and human ecology. The *social disruption* hypothesis purports that elevated rates of rural suicide are the product of large-scale changes in the social and economic structure of rural communities. While social disruption research has focused primarily on the impact of rural community demographic and economic growth, parallel arguments can also be made for examining processes of rural community decline. Overall social disruption literature suggests the need to examine elevated rates of rural suicide as the product of relative social change.

This section is divided into three parts. First I address the theoretical orientation of social disruption research situating this body of work into the I-R framework. Second I outline the

major changes in the demographic and economic structure of rural communities over the past 30 years. Third I provide a literature review addressing the relationship between social change and rural suicide.

Part 3A: Social Disruption and Integration-Regulation Theory

As outlined in Chapter 2 the IRHS has been subjected to a diverse set of theoretical interpretations and applications. One branch of this work examines the effects of social change on suicide rates. Theoretically based on the concept of Anomie, or a lack of normative social regulation, previous research differentiates between two specific types of anomic social conditions (Besnard, 1988; Hilbert, 1989). The first, *Chronic Anomie*, refers to a social condition where a perpetual state of social change prevents the establishment of normative social regulation. The second anomic social condition, *Acute Anomie*, refers to the social disruption associated with relatively abrupt, short-term changes such as war, economic boom and bust cycles, or natural disasters. During an acute anomic period the relative stability in normative regulation is temporarily suspended producing a deviation from expected patterns in suicide rates.

One defining difference between urban based I-R research and the rural disruption literature is the type of anomic condition generally considered. Urban based I-R research organized around traditional Egoistic-Anomic constructs are primarily directed toward the *Chronic* anomic state. In comparison, rural disruption literature tends to focus on periodic and often unidirectional patterns of *acute* social change. Empirical examples identified from the literature include the “farm crisis” of the 1980's and 1990's (Wilkinson and Israel, 1984; Zekeri and Wilkinson, 1995; Ramirez-Ferrero, 2005), rural boomtown growth (Albrecht 1978;

Freudenburg, 1981; Murdock and Leistritz 1979, Hoyman, 1997), and temporary “revival” periods of elevated in-migration (Wilkinson and Israel, 1984; Saenz 1989, Zekeri and Wilkinson, 1995). Within each disruptive situation, the temporal period of social anomie is relatively short-lived but often results in long-term or permanent alterations in rural community population and economic structure (Freudenburg, 1986).

The conceptual distinction between acute and chronic anomie provides one possible explanation why existing empirical measures of I-R may have limited explanatory power within the rural context. Approached from an urban perspective, measures of chronic social change such as population turnover and net-migration rates are consistently higher and more stable across time in urban areas (Schachter, Franklin, and Perry, 2003). Empirically, sporadic and localized patterns of acute rural change may not coincide temporally with any particular cross-sectional study period. Additionally, suicide research treating rural communities as a single homogenous group ignores the diversity of social and economic change occurring *across* rural communities. While some communities have experienced the disruptive impact of significant growth and expansion, at the same time, many have experienced declining population and economic opportunity (Flora and Flora, 2004; Falk and Lobao, 2003; Salamon, 2003). Each acute situation theoretically translates into a disruption of rural community I-R; however, the opposing direction and relatively narrow temporal periods of change may require more dynamic and disaggregated empirical measures to capture these effects.

Part 3B: Rural Community Social and Economic Change

Concurrent with changing patterns in rural and urban suicide rates the US experienced a dramatic period of “deindustrialization” characterized by a contraction in traditional

manufacturing sectors and the growth and expansion of the service sectors (Bluestone and Harrison, 1982). For non-metropolitan areas specifically, this period of deindustrialization has been compounded by the continual decline of employment in traditional agricultural and natural resource extraction sectors (Singelmann, 1978). For many areas of the country this has meant the significant decline of employment in previously well-paying core sectors and an increase in employment in lower-wage periphery sectors (Tolbert et.al 1980, Tigges, 1987).

In addition to industrial-level changes, the U.S. economy has also experienced a transition in the location of economic activity. Within all regions of the country, employment opportunities have continued to migrate away from traditional central city locations into the outer rings of suburban development seeking the benefits of cheaper land and transportation costs (Kasarda, 1995; Gordon, Richardson, and Yu, 1998). Many times this decentralization has been into the adjacent counties of major metropolitan areas, but has also extend into non-adjacent rural areas. Along with inter-regional shifts, the larger pattern of sun-belt migration facilitated a job migration stream from traditional northern manufacturing centers toward the reduced labor and land cost of southern right-to-work states. While much of the original sun-belt migration was directed toward metropolitan areas, patterns of decentralization served to relocate many new job opportunities and population into adjacent and non-adjacent areas of the rural south (Bluestone and Harrison, 1982).

The overall transition in the location of work served to temporarily reverse a century long pattern of rural out-migration and population loss. Labeled as periods of “rural revival” the early 1970's and to a lesser extent the early 1990's, produced significant and unprecedented growth in the U.S. rural population. Demographic research has shown however, numerically most of this

growth was experienced in rural counties contiguous to existing metropolitan centers, and that each period of in-migration was relatively short lived (Fuguitt, 1985; Richter, 1985; Johnson, 2003).

Part 3C: Rural Disruption and Suicide

Opposite of the general orientation of rural social isolation literature, social disruption research focuses primarily on the deleterious impact of community growth. According to the disruption thesis, elevated rural suicide rates result from strain placed on the local community when established patterns of social structure are quickly and drastically altered. While this process is not exclusively a rural phenomena the highly integrated social structure of rural communities theoretically makes them more susceptible to these disruptive forces.

Research by Hoyman (1997) provides a detailed contextual analysis of the almost complete transformation in local community structure when large-scale automobile-plants locate in rural areas. In an analysis of five rural communities Hoyman documents each community's struggle with the realities of economic opportunity. These struggles include: 1) an in-migration of outsiders with different religions, ethnicities, education and cultural preferences; 2) increases in the cost of rent and land attributed largely to economic speculation; 3) non-plant employees and other local employers competing with new-plant wages; 4) larger than expected employment sheds, which reduce localized employment gains and draw outside workers into the community; and 5) the expansion and professionalization of local government and community personnel and infrastructure.

In the late 1970's and early 1980's researchers also applied the disruption thesis to examine the social impact of rapid growth and development in energy-producing boomtowns of

the rural western United States. This research generally shows the rapid economic and demographic expansion of rural communities is often accompanied by increased demand on public services such as law enforcement, schools and hospitals; higher reported incidences of crime, juvenile delinquency, marital instability, alcohol and drug dependency, cases of mental illness, and suicide (Albrecht, 1978; Murdock and Leistritz, 1979, 1982; Freudenburg, 1981). Despite supporting evidence provided by local ethnographic-based research, macro-statistical methodologies have been unable to verify or corroborate the boom-town disruption thesis (Wilkinson, et. al., 1982; Albrecht, 1982; Finsterbusch, 1982; Freudenburg, 1982; Gale, 1982; Gold, 1982; Murdock and Leistritz, 1982).

Research examining the relationship between migration and rural suicide rates offer some explanation for the disjuncture between qualitative and quantitative rural boom-town studies. Examining the impact of in-migration and population growth on county suicide rates, Wilkinson and Israel (1984) and Zekeri and Wilkinson (1995) find no significant relationship with gross in-migration rates. Both studies do however find a significant positive relationship associated with rates of long distance or interstate in-migration, suggesting that total volume of change may be less important than considering where migration streams originate from. Similarly, examining 20 year patterns in migration and suicide rates within Texas counties, Saenz (1989) finds a significant positive relationship between net-migration rates in rural-revival counties during 1970, but no relationship in 1980. Additionally, the interstate migration rate in 1980 was a significant positive predictor of non-metro suicide rates, but only for non-revival rural counties. Together these studies suggest that macro-based rural suicide research should consider specific components of migration change, as well as, the relative context in which they occur.

In conjunction with changes in the industrial structure and migration patterns, one of the most significant transformations in the US economy in the past 30 years has been the substantial increase in female labor force participation. I-R research has largely examined this phenomena from a social disruption perspective focusing on the impact of changing gender role expectations and familial adjustments to the movement of mothers and wives into the formal labor market (Kessler and McRae, 1982). Early predictions assumed that female suicide rates would eventually increase to similar levels of males as they achieved a more equal economic position within society. Cross national research by Pampel (1989) however suggests a more subtle form of “institutional adjustment” where female labor force participation rates increase suicide rates temporarily but after a brief period of adjustment return to previous levels.

In the U.S., Stack (1987) finds a significant increase in both male and female suicide rates associated with female labor force participation during the years 1948-1963. During the later “emancipation era” of 1964-1980 female labor force participation produced no effect on female suicide rates but still contributed to an increase in male suicide rates. Similarly, Trovato and Vos (1992) examine patterns of Canadian married female labor force participation finding significant positive effects in 1971 for both male and female suicide rates but significant negative effects in 1981. Only one study examined the relationship between female labor force participation and suicide across rural-urban county groups (Kowalski, Faupel and Starr, 1987). In this analysis female labor force participation expressed a significant negative effect on middle-urban and most-urban county suicide rates. For rural counties no significant relationship between female labor force participation and suicide was noted.

Rural economic research suggests two contextual differences in rural and urban female labor force participation which may help to explain these mixed patterns of association. First, while rural and urban female labor force participation has increased at similar rates, rural female job growth represented almost all of the rural employment gains during the 1980's (Parker, 1993). Second, rural female labor force participation is characterized as being more unsteady, lower paying, and realized primarily within secondary service sector occupations (Bokemeier and Tickamyer, 1985). Together these studies suggest that the additional economic benefits gained from dual earning urban households may not be equally realized in rural communities where rising female labor force participation rates in part signify a decline in male employment opportunities (Jones, El-Osta, and Green, 2006).

Section 4: Summary and Statement of Research Questions

Starting with the classic work of Durkheim, the social distribution and structural correlates of suicide have held a prominent position within sociological theory and research methods. Focused primarily on the impact of urban social organization very little research within sociology has considered the social structural correlates of rural suicide. Drawing upon the theoretical concepts of Egoism and Chronic Anomie, academic sociologists have become rather adept in predicting and explaining urban suicide rates. These traditional explanatory models however, have shown to be relatively poor predictors of rural suicide rates. Until recently the implications of an urban bias within this framework has been of relatively little consequence for sociological theory and research methods. Now however, the contemporary rise in rural suicide rates and the subsequent reversal in the direction of the rural-urban suicide differential raises the

theoretical and empirical question: **what sociological factors explain elevated rural suicide rates?**

The extant literature suggests three primary theoretical explanations for the phenomena of elevated rural suicide rates. The first explanation provided by the urban based Integration-Regulation research of sociology postulates that as primary rural-urban social differences erode rural and urban suicide rates should increasingly co-vary in relation to similar social forces. To test this theoretical prediction *I-R Model-One* of this study examines how a traditional *Egoistic-Chronic Anomic* research model performs across the rural-urban county divide.

The second theoretical explanation, provided by the micro-oriented research of social psychology and community health, suggests the small, highly integrated social structure of rural communities is accompanied by an excessive level of social regulation. Consistent with Durkheim's theoretical concept of *Fatalism*, this perspective postulates it is not a lack of social integration in rural areas which leads to higher levels of suicide. Instead the fatalistic perspective hypothesizes that rural male suicide rates stem from social strain created by more rigid social expectations and the social structural inability to achieve them. To test this theoretical assumption, *I-R Model-Two* examines how an alternative *Fatalistic* research model performs within rural and urban counties.

The third and final theoretical explanation examined within this study, derives from the macro-based community disruption literature of human ecology and criminology. Similar to the fatalistic perspective, social disruption research purports that elevated rural suicide rates result from high levels of community I-R. Focusing on social processes of rapid localized community growth and decline, this perspective hypothesizes that the smaller more integrated social

structure of rural communities are more susceptible to the disruptive effects of *Acute Anomic* change. To test this hypothesis *I-R Model-Three* examines the relative impact of longitudinal community change on rural and urban suicide rates.

Each of the three theoretical explanations provided from the literature examine similar aspects of rural community economic, domestic and demographic factors. The small body of rural suicide literature, however, is fragmented across academic disciplines, a diverse set of international locations and time periods. Largely examined through descriptive and bi-variate methodologies these alternative explanations have not been extended to include multivariate causal models (Kposowa, Breault, and Singh, 1995; Gessert, 2001). To date the available literature has not provided a systematic evaluation of these three alternative explanations for explaining elevated rates of rural suicide in the same geographic and temporal setting. My dissertation begins to fill this gap in the literature by examining two related yet distinct empirical research questions.

First, To what extent can traditional measures of Egoism and Chronic Anomie explain contemporary rural suicide rates? As outlined above sociological theory and research methods developed around the concepts of *Egoism* and *Chronic Anomie* are highly effective for explaining urban suicide rates. These same approaches have proven relatively ineffective for explaining rural suicide rates. While the contemporary rural-urban suicide differential is counterintuitive to traditional theoretical assumptions the prominence of the Egoistic-Anomic framework within sociology cannot be disregarded on the basis of a single study. The relative changes in rural suicide rates over the past 30 years, suggest the need to first reexamine how traditional measures of I-R conform to contemporary rural and urban suicide rates.

The second research question addressed by my dissertation logically extends from this line of reasoning by asking: **Can alternative empirical models developed around the concepts of Fatalism, and Acute Anomie provide a better explanation for rural suicide rates than the traditional and accepted I-R Model?** Given the comparative and general nature of these research questions it is important to recognize this work has been guided by the single overarching working hypothesis that: the unique social and demographic properties of rural and urban communities require the use of distinct theoretical and empirical considerations within scientific research.

To address these two questions the remainder of this dissertation is organized in the following manner. **Chapter 4** outlines the methodology of this study featuring, the overall structure of analyses, data sources, and variable specification. **Chapter 5** presents comparative research findings, including descriptive and predictive models applied within both rural and urban settings. **Chapter 6** presents a discussion of results and conclusions including recommendations for future research.

CHAPTER 4: DATA AND METHODS OF ANALYSIS

Introduction

Given the overall lack of comparative rural-urban suicide research within the contemporary literature; the purpose of this research design is to provide a consistent and coherent systematic examination of three predictive models of I-R in both the rural and urban setting. Each of the three linear regression models employed within this study have been developed to reflect the theoretical orientations of *Egoism-Chronic Anomie*, *Fatalism*, and *Acute Anomie* respectively. Each model employs five blocks of independent variables measuring patterns of county: economic integration, domestic integration, migration, rural-urban structure, demographic composition and religious adherence. The dependent variable for each model in this study is the county five year average (1997-2001) crude white male suicide rate.

This study was developed as part of a larger research project examining social and economic trends in the Southern Gulf States region of the United States including: Alabama, Florida, Georgia, Louisiana, Mississippi, and Texas. Procedures for gaining access to county-level suicide mortality data, and restrictions imposed on their use, limit the geographic scope of this dissertation research to this study region. The rural counties of the Southern Gulf States share a common social and economic history shaped by natural resource extraction in mining, farming, fishing, and timber industries. Equally represented within the Southern Gulf States are several of the nations largest and fastest growing metropolitan centers. Demographically the Southern Gulf States provide one of the only regions within the United States with a significantly large racial minority population living in both rural and urban areas.

While the overall focus of my research is on rural suicide rates this study also includes the comparative analyses of urban rates as well. By including separate analyses for rural and urban counties this study design permits the examination of relative patterns of association and explanatory power of each model across the rural-urban divide under the same temporal and regional context of study.

This chapter of my dissertation is organized into three sections. First I outline the criteria for defining and selecting rural and urban counties. Second I outline procedures and data sources used to calculating dependent variables and the selection of final research samples. Third I describe the data sources and measurement of independent variables.

Section 1: Rural and Urban County Definitions

Rural and urban counties are defined using the United States Department of Agriculture, Economic Research Service (ERS) 2003 Rural-Urban Continuum Codes⁶. ERS Rural-Urban Continuum Codes are derived from a three step process and are designed to examine research issues related to population size. The US Census Bureau first defines the US rural population as those living in open country and settlements with fewer than 2,500 residents. Using 2000 Decennial Census data the Office of Management and Budget (OMB) officially designates *Metropolitan* counties as those containing an urbanized area greater than 50,000 population and the adjacent economically dependent counties⁷. *Non-metropolitan* counties are classified as: a) containing an urban cluster ranging from 2,500 to 49,999 population; or b) completely rural

⁶ERS Rural Urban Continuum Codes available at <http://www.ers.usda.gov/Data/RuralUrbanContinuumCodes/> (Last Accessed 9/ 4/ 2006)

⁷Economic dependency is determined using a threshold criteria of commuter flow between counties (Federal Register, 2000).

territory located outside of an urban cluster or urban area. ERS transforms the OMB county designations into a nine category rural-urban hierarchy based on urban population size and adjacency to a metropolitan area.

For the purpose of this study urban and rural county classifications are defined to retain the overall structure of the ERS coding system. The original urban sample included the 259 counties containing a metropolitan population of 50,000 or more residents. The rural sample included the 373 non-metropolitan counties with urban populations of 20,000 or less.

Section 2: Data Sources

Part 2A: Dependent Variables

County level suicide rates are derived from the United States National Center for Health Statistics, Compressed Mortality Files. These data were obtained through a special request from U.S. Center for Disease Control and must be used within the specified guidelines of confidentiality. All descriptive suicide rates are presented as age-adjusted values and reflect the newly adopted CDC Standard Population for mortality age-adjustment (Anderson and Rosenberg, 1998)⁸. For OLS regression analyses the dependent variable for each model is the county-level five-year average (1997-2001) crude white-male suicide rate. Using CDC provided annual Census Bureau population estimates, all suicide rates are calculated annually for base populations 10 years and older, averaged over a five year time period and expressed as a rate per 100,000 population.

⁸Starting in 1999 all CDC age-adjusted mortality statistics are calculated using the US Census Bureau Estimated Year 2000 Population (Day, 1996: Table 2, Page 42).

Part 2B: Independent Variables

Population and family/household data were obtained from the 1990 and 2000, US Decennial Census Summary File 3a. For the year 2000, county- level gross and net migration data were obtained from the US Census Bureau *Migration for the Population 5 Years and Over for the United States, Regions, States, Counties, New England Minor Civil Divisions, Metropolitan Areas, and Puerto Rico: 2000 (PHC-T-22)*⁹. 1990 out-migration data were obtained from the 1990 US Census Bureau County-to-County Migration Flow files. All migration data represent county-level totals of the population five years and older who report living in a different place of residence five years prior to the collection of the decennial census.

County employment volatility data are obtained from US Bureau of Economic Analysis, Regional Economic Information Systems (REIS). These data are collected from quarterly employer tax records and provide annual county farm, non-farm, and proprietor employment totals for the years 1990-2000. Unlike employment figures derived from the Decennial Census which are based on worker place-of-residence, REIS data are collected from employers based on the location of work. County economic dependency and social policy codes were obtained from the USDA, Economic Research Service¹⁰. Religious denomination data are taken from the Glenmary Research Center, 2000 Religious Congregations and Membership Data. This data set provides one of the most comprehensive county-level sources for estimating religious denomination composition including church membership and attendance rates.

⁹2000 Migration tables available at <http://www.census.gov/population/www/cen2000/phc-t22.html> last accessed (8/25/2006)

¹⁰ERS county typology codes obtained from <http://www.ers.usda.gov/Briefing/Rurality/Typology/> Last accessed 9/9/2006

Section 3: Model and Variable Specification

Part 3A: Model One Egoism and Chronic Anomie

Model One of my dissertation research adds to the existing literature by replicating and refining the research methodology used by Kowalski, Faupel and Star (1987). This set of predictor variables represents the traditional urban-based explanatory framework of *Egoistic* and *Chronic Anomic* suicide. This model generally reflects patterns of social attachment to primary social institutions and the relative fragmentation and heterogeneity within local community social structure. **Table 4.1** outlines variables used within Model-One including data sources and brief measurement details. **Appendix 1A** provides a detailed explanation of variable construction.

Economic Integration

Economic integration is measured using three general categories of variables: labor force attachment, composition, and well-being. As a primary form of social integration, higher levels of labor force attachment are expected to significantly reduce suicide rates (Platt, 1984; Austin, Bologna and Dodge, 1992; Pampel, 1998; Stack, 2000; Yang, 2001). Within Model One, the *White Male Civilian Unemployment Rate* is expected to have a significant positive relationship with suicide rates and the *Female Labor Force Participation Rate* is expected to reduce suicide rates. Higher levels of social distance, indicated by *Occupational Diversity*, and *Household Income Inequality*, are expected to produce significant positive effects on suicide rates. While early theoretical work suggested lower levels of *Median Family Income* served as a social buffer against suicidal behavior, contemporary work predicts higher levels of economic resources will significantly reduce suicide rates (Stack, 2000).

Table 4.1: Model One Egoism and Chronic Anomie Variables

Variables	Data Sources	Measurement Details
Dependent Variable		
Crude White Male Suicide Rate	Compressed Mortality Files	Ave 5 Year (1997-2001) Per 100,000
Independent Variables		
Block One: Economic Integration		
White Male Civilian Unemployment Rate	2000 U.S. Census	% White. Male Pop. 16+ No Work/Looking Past Month
Female Labor Force Participation Rate		% Fem. Pop 16+ In Labor Force
Occupational Diversity		IQV: 0-1: 1= Max Diversity
Household Income Inequality Index		Gini Coefficient: 0-100: 0=Equality 100=Max Diversity
Median Family Income		Dollar Amount
Block Two: Domestic Integration		
% Male Single Person Households	2000 U.S. Census	% Of Total Households
% Population Divorced		% Population 15+ Years Divorced
Male:Female Sex Ratio		Values Greater Than One = Excess Males
Birth Rate	CDC: Population Estimates	Live Births Per 1000 Population
Block Three: Migration		
% Net Migration Change	2000 Census: Mig. Files	+/- Value: In - Out / 2000 Population 5 Plus Years
Block Four: Rural-Urban Structure		
Population Size	2000 U.S. Census SF3	Total Population
% Urban		% Living in Area of 2,500 Plus Population
Block Five: Demographic Composition		
Median White Male Age		Median Years: Calculated Using Group Data
% Total Population Black		% Total Population African-American Alone
Block Six: Religious Composition		
Evangelical Protestant Adherence Rate	2000 Glenmary	Adherence Rate per 1000 population
Main-Stream Protestant Adherence Rate		
Catholic Adherence Rate		

Domestic Integration

Domestic integration and familial social attachments are expected to reduce suicide rates (Stack, 1980; Wilkinson and Israel, 1984; Kowalski, Faupel, and Star, 1987; Kposowa, Breault, and Singh, 1995; Zekeri and Wilkinson, 1995). Included within model one, are four measures of domestic integration. The percent of the *Male Population Living Alone* and percent population *Divorced* are expected to have a significant positive relationship with county suicide rates. *Male-to-Female Sex Ratio* is included to measure an imbalance in local area marriage markets (Fossett and Kiecott, 1991) and is expected to produce a significant positive effect on suicide rates. The county *Birth Rate* is included as a control variable to maintain methodological consistency with Kowalski, Faupel, and Starr (1987).

Migration

Migration is hypothesized to weaken or impede the social I-R process in two ways. First from the perspective of the migrant, migration is viewed as a significant and disruptive life event separating individuals from their existing social and familial support structures (Wechsler, 1961; Trovato and Jarvis, 1986; Kushner, 1986). Second, from a macro-social perspective high rates of migration disrupt existing social relationships and reduce the ability of local communities to establish normative social stability (South, 1987; Stack, 2000 b). Replicating the methods of Kowalski, Faupel, and Starr (1987), model one includes a single measure of county migration, *Percent Net Migration Change*.

Rural-Urban Structure

Model One includes two measures of county rural-urban structure. Traditionally both *Population Size* and *% Urban* would be expected to have a significant positive relationship with

county suicide rates. Given the changes in the direction of the rural-urban suicide differential, I expect these relationships to be significant and negative.

Demographic Composition

As outlined in Chapter 3 suicide rates vary significantly by age and race. Because this study specifically examines white male suicide rates Model One includes *White Male Median Age*. Median age is expected to have a significant positive relationship with suicide rates. Typically macro-based research examining mixed-race rates of suicide include measures of minority population structure to control for disproportionately low rates of minority suicide (Burr, Hartman and Matteson, 1999; Willis and Drentea, 2003). Because the dependent variable of this study is race specific, *Percent African-American* is included as a measure of social heterogeneity within the community. Research literature predicts a significant and positive relationship between minority population and white male suicide rates.

Religious Integration

The final block of variables included within Model One are rates of religious adherence. Classic social theory suggests that collectively oriented religions such as Catholicism and Judaism work to buffer suicidal behaviors while more individualistic Protestant religions do not (Durkheim, 1951). Contemporary research examining the relationship between religious denomination and suicide demonstrates this effect varies by location (Bankston, Allen, and Cunningham, 1983) and is potentially explained or moderated by the institutional and network resources available through religious participation (Pescosolido and Georgianna, 1989). At an individual level Stack and Wasserman (1992) find lower levels of suicide ideology among members of more conservative, nonecumenical religions. Three measures of county religious

composition are included within each of the three models of this study. Based on extant literature adherence rates of *Catholic* and *Evangelical Protestant* denominations are expected to produce a significant reduction in suicide rates, and *Main-Stream Protestant* rates are expected to produce a significant positive effect on suicide rates.

Part 3B: Model Two Fatalism

Model Two of my dissertation adds to the existing literature by examining an alternative set of cross-sectional I-R measures developed from the literature to measure *Rural Fatalism*.

Unlike the general measures of I-R applied within Model One, Model Two focuses on structural factors related to the social and economic deprivation faced within rural communities. **Table 4.2** outlines variables used within Model Two including data sources and brief measurement details.

Appendix 1B provides a detailed explanation of variable construction.

Economic Integration

Model two includes eight measures of economic integration. As outlined in Chapter 3, contemporary female labor force participation rates are similar across rural and urban locations. The two primary difference between rural and urban female labor force participation are: a) the relatively limited economic returns to female labor in rural areas; and b) the potential displacement of males from the rural labor-force as traditionally male employment sources decline and are replaced by secondary sector female-oriented sectors. From a rural male fatalistic perspective the *Percent Labor Force Female* is expected to produce a significant positive effect on white male suicide rates.

Rural communities often rely on a narrow employment base within one or two select industries (McGranahan, 2003). Dependent on these industrial niches, local rural populations

Table 4.2 Model Two Rural Fatalism Variables

Variables	Data Sources	Measurement Details
Dependent Variable		
Crude White Male Suicide Rate	Compressed Mortality Files	Average Five Year (1997-2001) Per 100,000
Independent Variables		
Block One: Economic Integration		
% Labor Force Female	2000 U.S. Census SF3	% of total labor force
Farming Dependent County	2004 ERS County Typology	1= Dependent
Mining Dependent County		
Manufacturing Dependent County		
Government Dependent County		
Service Dependent County		
Persistent Poverty County		1= Persistent Poverty County
Low Education County		1= Low Education County
Block Two: Domestic Integration		
% Male Pop. 25+ Divorced, Separated, or Widowed	2000 U.S. Census SF3	% Male Population 25+ Years
% Male Pop. 25+ Never Married		% Male Population 25+ Years
Male:Female Sex Ratio 15-44 Years		Greater than one = excess males
Block Three: Migration		
% Out-Migration	2000 Census: Mig. Files	% 2000 Population 5+ Years
% In-Migration Long Distance Out of State/Foreign		% 2000 Population 5+ Years
% In-Migration From Same State		% 2000 Population 5+ Years
Block Four: Rural-Urban Structure		
% Farm Population	2000 U.S. Census SF3	% Living on Farm
Metro Adjacency	2003: ERS R-U Continuum	1= Adjacent
Block Five: Demographic Composition		
% White Male Population 15-24 Years	2000 U.S. Census SF3	% of White Male Population
% White Male Population 65+ Years		% of White Male Population
% Male White Non-Hispanic		% of Male Population
% Male Native American		% of Male Population

often share a common cultural heritage, specific knowledge and skill base, and vulnerability to market fluctuations particular to these industries. To examine the role of industrial concentration Model Two includes five mutually exclusive, dichotomous variables indicating economic dependency on: *Farming, Mining, Manufacturing, Government, and Service* industry employment. The reference group for these variables are counties with non-specialized industrial composition. The final economic integration variables *Persistent Poverty* and *Low Education*, also included as dichotomous variables, test the relationship between suicide rates and extreme financial hardship and low levels of human capital. Each measure is expected to produce a significant and positive impact on suicide rates.

Domestic Integration

Rural suicide literature suggests that the social and economic changes in rural communities have reduced the ability of rural males to establish and maintain adult dyadic relationships (Pesonen et. al., 2001). Unlike urban areas however, rural domestic isolation and suicide may not be correlated with traditional measures such as the percent of the population living alone (Ni Laoire, 2001). Model Two includes three alternative measures of domestic isolation, *% Male Population 25+ Years: Divorced, Separated, or Widowed*, *% Male Population 25+ Years: Never Married*, and *Male to Female Sex Ratio Population 15-44*. Each measure is expected to have a significant and positive relationship between rural suicide rates.

Migration

Model two includes three measure of county migration: *% Out-Migration*, *% In-Migration Long Distance Out-of-State*, and *% In-Migration Same State*. Many rural communities have experienced elevated rates of in-migration associated with suburbanization

and boom-town expansion, but a significant portion of rural counties also continue to face the deleterious impacts of out-migration and population decline. Each measure represents a significant alteration in existing community population structure which potentially contributes to levels of rural fatalism. I expect all three variables will have a significant and positive relationship with rural suicide rates.

Rural-Urban Structure

Model Two includes two measures of rural-urban county structure. Rural suicide literature examining the relationship between farm employment and suicide finds no association at the individual-level (Pickett et.al., 2000; Stack, 2001) and no relationship between farm employment and suicide rates at the county level (Wilkinson and Israel, 1984; Zekeri, and Wilkinson, 1995). The changing nature of the agricultural industry over the past 30 years suggests that residential measures of *Farm Population* may better capture the effects of economic strain and isolation associated with farm ownership. The second measure of rural-urban composition includes a dichotomous variable indicating *Metropolitan Adjacency*. Existing literature has primarily examined rural suicide rates in relation to population size, but has not examined how proximity to urban resources impacts suicide rates.

Demographic Composition

Given the bi-modal age distribution of suicide rates Model Two controls for the age structure of county male population using the two measures: *Percent White male population 14-24 years*, and *Percent White male population 65 years and older*. To control for county race structure Model Two includes: *Percent Male Population White Non-Hispanic*, and *Percent Male Population Native American*. In addition to controlling for the proportion of the county

population most susceptible to suicide risk, these age and race composition variables allow for a more detailed examination of how rural county demographic structure may disproportionately contribute to rural suicide rates.

Section 3C: Model Three Acute Anomie

The third theoretical explanation for elevated rates of rural suicide examined within my dissertation is *Acute Anomie*. Rural suicide literature suggests that rural community change often occurs in more sporadic and abrupt forms. As such standard cross-sectional measures typically employed within macro-social models of I-R may not capture the relative changes occurring within rural communities across time. Model Three includes a set of longitudinal variables developed specifically to measure the impact of *relative change* in the social and economic structure of rural communities on suicide rates. **Table 4.3** outlines variables used within Model Three including data sources and brief measurement details. **Appendix 1C** provides a detailed explanation of variable construction.

Economic Integration

Model three includes three measures of changing labor force attachment. *Change in Percent Male Population 16 Years and Over Not Working* and *Change in Percent Labor Force Female* from 1990 to 2000 measure a relative diminished economic social position of rural males. These variables are expected to have a significant positive relationship with rural white male suicide rates. *10 Year Average Employment Volatility* measures instability in the local labor market. The absolute value of annual positive and negative changes in Farm, Non-farm, and Proprietor employment are averaged across the 10 years between 1990 and 2000. This measure is intended to identify communities which have experienced significant periods of

Table 4.3: Model Three Acute Anomie Variables

Variables	Data Sources	Measurement Details
Dependent Variable		
Crude White Male Suicide Rate	Compressed Mortality Files	Ave 5 Year (1997-2001) Per 100,000
Independent Variables		
Block One: Economic Integration		
Change % White Male 16+ Not Working	1990 and 2000 Census SF3	+/- value: %2000 - %1990
Change % Labor Force Female		+/- value: %1990-%2000
10 Year Ave. Employment Volatility	BEA: REIS 1990-2000	Absolute: Ave % Change
Change Median Family Income	1990 and 2000 Census SF3	+/- :2000-1990 Constant 2000 \$
Change Household Income Inequality		2000 Gini - 1990 Gini
Block Two: Domestic Integration		
Change % Male 15 + Years Married	1990 and 2000 Census SF3	+/- value: % 2000 - %1990
Block Three: Migration		
Change % Out-Migration	1990 and 2000 Census SF3	+/- Value: % 1990 - % 2000
Change % In-Migration	1990 and 2000 Census: Mig. Files	+/- Value: % 1990 - % 2000
Block Four: Rural-Urban Structure		
Metro Adjacency	2003: ERS R-U Continuum	1= Adjacent
Change % Farm Population	1990 and 2000 Census SF3	+/- value: % 2000-% 1990
Block Five: Demographic Composition		
% White Male Pop. 14-24 Years	2000 U.S. Census SF3	% of White Male Population
% Male Pop. 65+ Years		% of White Male Population
% Male White Non-Hispanic		% of Male Population
% Male Native American		% of Male Population
Change % Hispanic Population	1990 and 2000 Census SF3	+/- value: % 2000 - % 1990

employment growth or decline. I expect a significant positive relationship between employment volatility and the rural male suicide rate. The final two measures of economic integration expected to have a significant negative relationship with suicide rates, are the *Change in Median Family Income* and *Change in Income Inequality*.

Domestic Integration

Model Three includes one measure of changing domestic integration: *Percent Change in Male Population 15+ Years Married*. This measure is utilized to capture the relative changes in the pattern of male domestic integration at the county level. Overall rural and urban areas are expected to both have a decline in the percent of the population married. Extant literature suggests that changes in rural domestic integration may stem from demographic imbalances in the marriage market. I expect a significant negative relationship between change in percent male married and county white male suicide rates.

Migration

Two measures of changing migration patterns are included within Model Three: *Percent Change Out-Migration*, and *Percent Change In-Migration*. Each variable is included as a directional +/- value to identify counties which have experienced overall changes in the pattern of migration between 1990 and 2000. Consistent with the concept of Acute Anomic change, I expect a significant positive relationship between each variable and rural male suicide rates.

Rural-Urban Structure

Model Three includes two measures of rural-urban structure. *Metro Adjacency* is included to control for potential impacts of proximity to metropolitan areas. *Change in Percent Farm Population* is included to measure the impact of a contracting agricultural economy and the

displacement of farm population. Consistent with the dual concepts of fatalism and acute anomie, a change in the farm population is expected to have a significant negative impact on suicide rates.

Demographic Composition

Model Three controls for the age structure of county male population using the two measures: *Percent White Male Population 15-24 years*, and *Percent White Male Population 65 Years and Older*. To control for county race structure Model Three includes: *Percent Male Population White Non-Hispanic*, and *Percent Male Population Native American*.

One of the most significant changes in non-metropolitan racial and ethnic composition in last 20 years has been the rapid increase in the rural Hispanic population (USDA/ERS, 2005). Hispanics are the fastest growing population group in rural America, with significantly higher rates of growth in the Southeastern and Midwestern regions of the United States. The increased proportion of rural Hispanics and the supply of low skill labor has been linked to a declining wage rate for rural males with a high school diploma (Newman, 2003). To examine the potential impact of changing population ethnic structure, Model Three includes *Change in the % County Hispanic Population*. I expect a significant positive relationship between white male suicide rates and the increase in the proportion of the county population Hispanic.

Section 4: Empirical Procedures of Analysis

Preliminary analysis of the original full county sample verifies a significantly higher five-year average (1997-2001) crude white male suicide rate in rural counties (29.00 per 100,000) compared to urban counties (26.16 per 100,000). While rural county rates are significantly higher, a larger proportion of rural (5.36%) compared to urban counties (0.77%) reported no

white male suicides within the five year study period. The examination of extreme outliers and influential cases at the upper end of the distribution were similar for rural and urban counties. To ensure the comparability of research finding across the rural and urban context, original samples were trimmed by eliminating counties with no white male suicides and those with rates above 82 per 100,000. This selection criteria resulted in a final sample size of 250 urban counties and 350 rural counties.

Due to systematic differences between rural and urban community structure; each dependent variable and set of predictor variables employed within this study are empirically adjusted to reflect the unique properties of each location. Through a series of preliminary analyses the most significant empirical difference identified between rural and urban counties was the linearity of independent and dependent variable distributions.

Examining values of Skewness, Kurtosis, and the Shapiro-Wilk test for normality; Box-Cox procedures were utilized to determine appropriate transformations of variables within each context independently. The use of Box-Cox transformations systematically corrects for the unequal distribution of error associated with skewed variable distribution within each county group, and empirically normalizes the variation in distributions across rural and urban counties. The purpose in using these location specific power transformations is to more accurately approximate a normal distribution for rural and urban models, as well as, ensure an overall level of comparability across all models of this study.

Appendices 2A-2C details transformation values used for each of the three models included within this study. Because of these differences some caution must be used in making direct comparisons and interpretations of rural and urban regression coefficients. To facilitate

these comparisons in the presentation and discussion of results within **Chapter 5** and **6**, the sign of the direction of each relationship has been corrected to reflect a meaningful association between independent and dependent variables. Each table of results includes standardized regression coefficients and partial correlation coefficients where indicated for comparative purposes. Similarly, the examination of inter-correlation and multicollinearity of independent variables within rural and urban counties resulted in minor variations in the specification of final research models. To facilitate the straightforward examination and comparison of rural and urban community structure descriptive-level statistics presented within each section of **Chapter 5** and **6** represent unadjusted real values.

CHAPTER 5: FINDINGS

Introduction

This research is guided by the overarching hypothesis that rural and urban white male suicide rates are the product of distinct location specific social processes. Research literature suggests urban suicide rates are the product of Egoistic and Chronic Anomic forces. Conversely rural specific literature suggests that rural suicide rates are the product of Fatalistic or Acute Anomic forces. Specifically this study examines two primary empirical questions. First, to what extent can traditional measures of Egoism and Chronic Anomie explain contemporary rural suicide rates? Second, Can alternative empirical models developed around the concepts of Fatalism, and Acute Anomie provide a better explanation of rural suicide rates than the traditional and accepted I-R Model? In this chapter I present empirical results of descriptive and OLS regression analyses performed to examine these two questions.

This chapter is divided into two sections. Section One presents cross-sectional and longitudinal descriptive statistics detailing trends in rural and urban suicide rates within the Gulf States region from 1968-2001. Section Two is divided into three parts detailing results from: Model One: *Egoism and Chronic Anomie*; Model Two: *Fatalism*, and Model Three: *Acute Anomie*. Results of each model are divided into descriptive analysis of independent variables and urban and rural regression analyses.

Section 1: Gulf States Rural-Urban Suicide Differentials, 1968-2001

Addressing the issue of disproportionate rates of rural and urban suicide, descriptive analyses presented within this section show that county suicide rates systematically vary by rural and urban location within the Gulf States Region. Consistent with extant literature, the Gulf

States rural-urban suicide differential is primarily the result of differences in male and white-male suicide rates specifically.

Table 5.1 details results from descriptive and ANOVA analyses of rural and urban five-year average (1997-2001) age-adjusted suicide rates. Consistent with extant literature these findings demonstrate the *Total*, *Male*, and *White Male* age-adjusted suicide rates are significantly higher in the rural counties of the Gulf States region. The age-adjusted rate of female suicide is not significantly different for rural and urban counties. Examination of standard deviations, also consistent with previous research, indicates a higher level of variability in rural compared to urban suicide rates.

Table 5.1 Five Year (1997-2001) Age Adjusted County Suicide Rates Per 100,000

Suicide Rate	Urban (n = 255)		Rural (n = 350)	
	Mean	Std. Dev.	Mean	Std. Dev
Total Age-Adjusted Suicide Rate *	14.00	4.02	15.22	6.57
Female Age-Adjusted Suicide Rate	5.33	2.84	4.65	5.35
Male Age Adjusted Suicide Rate *	23.21	6.96	26.30	12.07
White Male Age-Adjusted Suicide	26.15	7.89	30.55	13.59

*Significant Difference $p < .05$

Figures 5.1 - 5.4 detail longitudinal patterns of change in rural and urban five-year rolling average age-adjusted county suicide rates from 1968-2001. Unlike the rather dramatic national-level divergence outlined in Chapter 3¹¹, the more inclusive definition of rural and urban used within this study show a fairly similar pattern of change in rural and urban suicide rates within

¹¹National-Level trends from Chapter 3 examined and compared only the smallest rural counties with the largest metropolitan counties.

the Gulf States Region. While not as pronounced as national level trends, **Figures 5.1, 5.3 and 5.4** confirm a reversal and divergence of rural and urban suicide rates within the Gulf States region. According to these findings the transition occurred in the mid-1990's and was the combined result of a decrease in urban white male suicide rate and a stable and elevated rate of rural white males suicide.

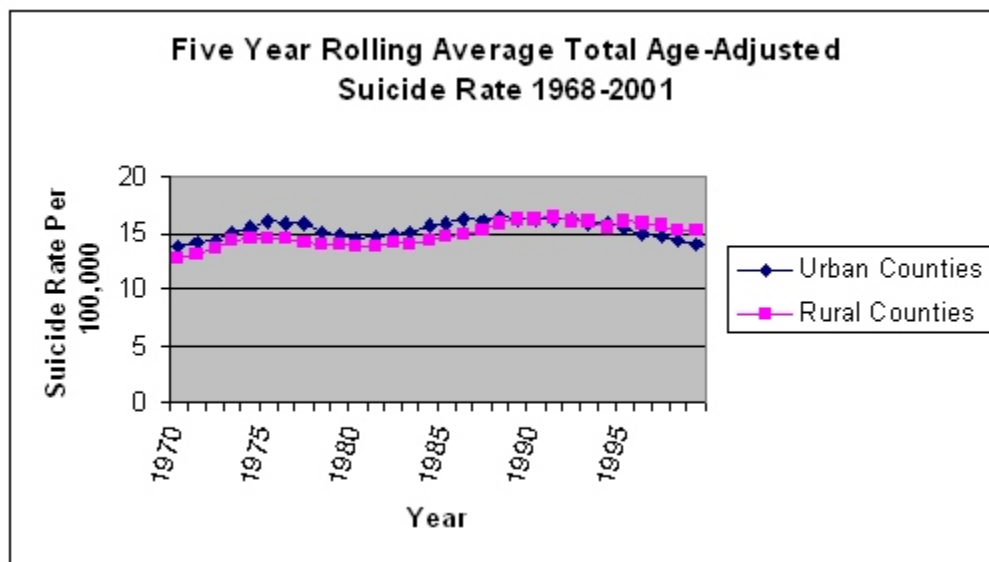


Figure 5.1 Five Year Rolling Average Total Age-Adjusted Suicide Rate 1968-2001

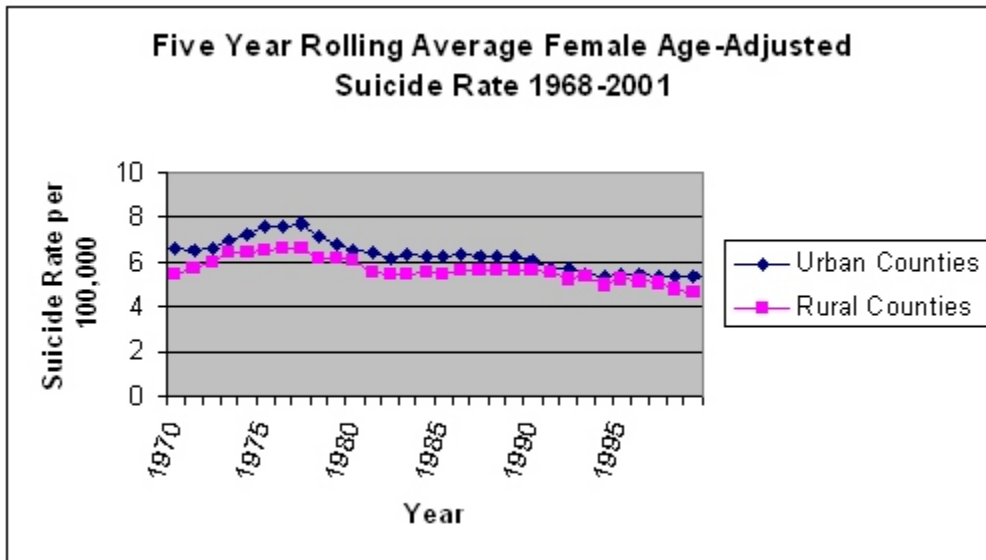


Figure 5.2 Five Year Rolling Average Female Age-Adjusted Suicide Rate 1968-2001

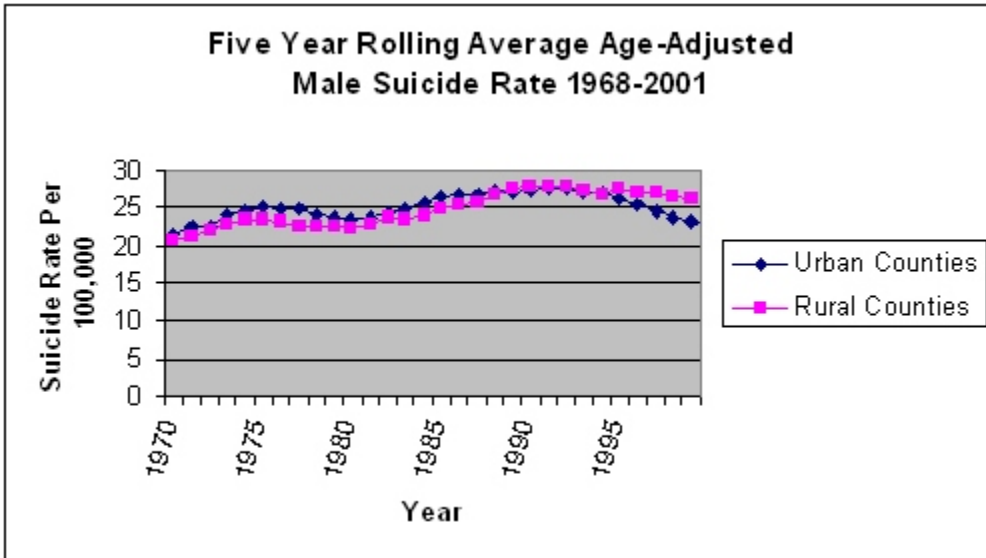


Figure 5.3 Five Year Rolling Average Age-Adjusted Male Suicide Rate 1968-2001

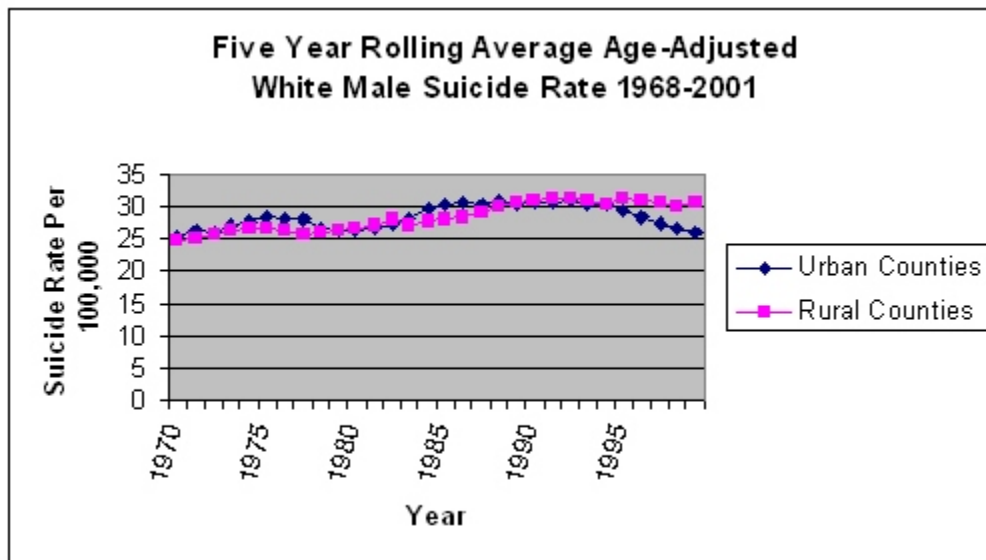


Figure 5.4 Five Year Rolling Average White Male Age-Adjusted Suicide Rate 1968-2001

Section 2: OLS Regression Analyses

Introduction

In this section of my dissertation I present results of OLS regression analyses from each of the three empirical models of this study. The dependent variable for each of the following regression equations is the transformed five-year average (1997-2001) crude white male suicide rate. Each section of this chapter is organized into two parts. The first provides descriptive statistics and ANOVA based comparisons of predictor variables across rural and urban counties. Part two presents results from OLS regression analyses for each block of independent variables for urban and rural counties separately. Individual block analyses are followed by the results of full urban and rural models.

Section 2A: Model-One Egoism and Chronic Anomie

Introduction

As outlined in Chapter 2 the theoretical orientation of suicide research within sociology derives from the work of Emile Durkheim. Overwhelmingly this work has considered contemporary suicide rates to be the product of urban social organization and *Egoistic* and *Chronic Anomic* forces. I-R Model-One has been developed to reflect this general theoretical orientation. Extant literature (Kowalski, Faupel, and Starr, 1987) demonstrates traditional variables used to measure these social conditions are highly effective in explaining urban suicide rates and have little to no explanatory power when applied to rural rates.

Model-One Descriptive Statistics

One potential empirical reason for the disproportionate pattern of explanation in rural and urban suicide rates is that rural and urban communities often vary significantly from each other along the primary empirical dimensions included within traditional I-R research models. As demonstrated in **Table 5.2**, along with differences in rural-urban suicide rates, descriptive analysis show significant differences in 15 of the 17 independent variables included within Model-One. **Appendix 3A** and **3B** presents Pearson correlation matrices of Model-One variables for urban and rural counties separately.

Economically rural counties express statistically significant lower levels of labor force attachment than urban counties. The rural white male unemployment rate (4.36%) is higher and the female labor force participation rate (48.57%) is lower, compared to urban counties (4.01% and 54.69%, respectively). Urban median family income on average is \$10,250 higher than rural family income, and household income inequality is slightly higher in rural counties.

Table 5.2: Model-One Descriptive Statistics

Variables	Urban (n=255)		Rural (n=350)		Sig Diff
	Mean	Std. Dev	Mean	Std. Dev	< .05
Crude White Male Suicide Rate	25.70	7.85	30.08	12.80	*
White Male Unemployment Rate	4.01	1.56	4.36	2.40	*
Female L-F Participation Rate	54.69	5.49	48.57	4.13	*
Male Occupational Diversity	0.93	0.02	0.94	0.03	
Household Income Inequality	44.25	3.74	46.25	2.96	*
Median Family Income	44,705.24	9063.12	34454.71	4868.80	*
% Male Single Person Household	9.73	1.77	10.30	1.51	*
% Divorced	10.17	1.56	9.17	1.79	*
Male:Female Sex Ratio	0.97	0.09	0.99	0.13	
Birth Rate	14.79	3.09	14.06	2.76	*
% Net Migration Change	6.76	7.88	1.23	7.83	*
Population Size	184656.87	361364.88	17689.58	11758.13	*
% Urban	55.72	32.42	29.54	24.23	*
Median White Male Age	36.37	4.06	38.47	3.40	*
% Black	18.11	15.49	21.23	19.85	*
Evangelical Protestant Rate	282.90	141.57	406.11	159.84	*
Mainstream Protestant Rate	78.84	35.00	94.93	52.39	*
Catholic Rate	116.06	144.97	87.95	156.36	*

Domestically, the rural and urban counties examined within this study demonstrate several significant differences, but in absolute terms are relatively minor. Rural counties have a slightly smaller percent of the population divorced (9.17% - 10.17%), but also have a slightly higher percentage of male single-person households than urban counties (10.30% - 9.73%). This

study finds no significant difference in the total male-to-female sex ratio, but urban county birth rates are slightly higher than rural birth rates (14.79 - 14.06 per 1000 population).

Generally, differences in the demographic composition and migration patterns of rural and urban counties are consistent with extant literature and in the expected directions. By definition urban counties demonstrate a significantly higher total population and percent of the population living in urbanized areas than rural counties. Total net-migration rates are also significantly higher in urban (6.76 %) compared to rural counties (1.23%). Median age of the county white male population is significantly higher in rural (38.47 years) compared to urban (36.37 years) counties. The only counter-intuitive rural-urban difference, indicative of this study region, is the significantly larger Black rural population (21.23% and 18.11% respectively).

The final area of descriptive comparison considered within research Model 1 are rates of religious adherence. As detailed in Table 5.2, rates of both Mainstream and Evangelical Protestant adherence are significantly higher in rural compared to urban counties. Rates of Catholic adherence are significantly higher in urban counties. Religion variables are included in each of the following regression models. To eliminate redundancy descriptive differences and individual block OLS analysis of religion variables will not be repeated in the following sections of this chapter.

Model-One Regression Analyses

Table 5.3 presents results from individual block OLS regression analyses for urban counties. Within each analyses each block of independent variables are regressed against the transformed crude white male suicide rate. As indicated by the values of the f-statistic and significance level, three of the four blocks of independent variables provide a significant

Table 5.3 Model One Urban Counties Individual Blocks

Variables	Block 1: Economic		Block 2: Domestic		Block 3: Demographic		Block 4: Religious	
	B (Std. Err)	Std. b	B (Std Err)	Std. b	B (Std. Err)	Std. b	B (Std. Err)	Std. b
Intercept	8.264 (2.104)		4.229** (.621)		-.346 (.877)		4.925** (.322)	
White Male Unemployment rate (t)	-1.835 (1.380)	-.093						
Female L-F Participation Rate	-.033** (.012)	-.236						
Male Occupational Diversity (t)	1.221 (1.185)	.071						
Household Income Inequality	.004 (.014)	.020						
Median Family Income (t)	117.185	.069						
% Male Single Person Households			.018 (.029)	.042				
% Divorced (t)			.020** (.005)	.252				
Male:Female Sex Ratio (t)			-.944* (.364)	-.156				
Birth Rate (t)			-.321** (.116)	-.166				
% Net Migration Change (t)					.000 (.004)	-.008		
% Urban (t)					-.003 (.004)	-.044		
Median White Male Age (t)					.836** (.134)	.362		
% Population Black (t)					.188* (.074)	.155		
Evangelical Protestant Adherence Rate (t)							.005 (.006)	.060
Main Stream Protestant Adherence Rate (t)							.003 (.008)	.031
Catholic Adherence Rate (t)							-.060 (.079)	-.056
Adjusted R-Square	.0285		.1299		.1486		.0007	
F-Value	2.49		10.48		12.08		1.06	
p-value	.0320		< .0001		<.0001		.3662	
(N= 255)								

(t) = Transformed Value Included Within Model

** = p < .01, * = p < .05

improvement of model fit. Ordered by the magnitude of explained variation table 5.3 indicates: Block 3: Demographic Composition ($r^2 = .1486$), and Block 2: Domestic Integration ($r^2=.1299$) provide a significantly better fit between urban white male suicide rates than Block 1: Economic Integration ($r^2= .0285$). Block 4: Religious Integration variables were non-significant predictors when examined individually.

Within Block 1, female labor force participation rates, as expected, are associated with lower levels of urban white male suicide rates. Within Block 2, an increase in the percent of the population divorced significantly increases, while higher birthrates significantly reduce white male suicide rates. The only counterintuitive relationship noted within table 5.3 is the significant negative relationship with male-to-female sex ratio. Block 3: Demographic Composition indicates expected and significant relationships between urban white male suicide rates and median age of the white male population, and percent of the population Black.

Table 5.4 presents results of individual blocks of OLS regression analyses for rural counties. Within each analyses the transformed crude white male suicide rate is regressed against each block of independent variables. As indicated by the values of f-statistics, three of the four blocks of independent variables provide a significant improvement of model fit. Unlike urban individual block analyses, Block 1: Economic Integration variables are not significantly related to rural county white male suicide rates. Within Block 2: Domestic Integration ($r^2= .0340$), the percent male single person households expresses a significant positive relationship with crude white male suicide rates. Similar to urban models, the male-to-female sex ratio produces a counterintuitive significant negative relationship with rural white male suicide rates. Similar to urban counties, Block 3: Demographic Composition ($r^2= .0734$) explains the largest

Table 5.4: Model One Rural County Block Analysis

Variables	Block 1: Economic		Block 2: Domestic		Block 3: Demographic		Block 4: Religious	
	B (Std. Err)	Std. b	B (Std Err)	Std. b	B (Std. Err)	Std. b	B (Std. Err)	Std. b
Intercept	6.304 (1.252)		2.814** (.621)		-.262 (1.123)		3.726** (.209)	
White Male Unemployment Rate (t)	-1.626 (.733)	-.129						
Female L-F Participation Rate	-.002 (.010)	-.014						
Male Occupational Diversity (t)	-.498 (.713)	-.038						
Household Income Inequality (t)	-.76.402	-.047						
Median Family Income (t)	.000 (.000)	.272						
% Male Single Person Households (t)			.141* (.070)	.111				
% Divorced (t)			.013 (.039)	.018				
Male:Female Sex Ratio (t)			-.558** (.177)	-.172				
Birth Rate (t)			-.103 (.103)	-.057				
% Net Migration Change (t)					-.003 (.003)	-.050		
Population Size (t)					-.006 (.010)	-.035		
% Urban					-.003 (.002)	-.093		
Median White Male Age (t)					1.024** (.245)	.233		
Evangelical Protestant Adherence Rate (t)							.000 (.000)	-.021
Main Stream Protestant Adherence Rate (t)							.070* (.027)	.137
Catholic Adherence Rate (t)							-.147** (.048)	-.166
Adjusted R-Square	.0022		.0340		.0734		.0353	
F-Value	1.16		4.07		7.91		5.26	
p-value	.3305		.0031		<.0001		.0015	
(N=350)								

(t) = Transformed Value Included Within Model

** = p < .01, * = p < .05

proportion of variation in rural county white male suicide rates, with median white male age as the sole significant positive predictor. Unlike urban analyses, Block 4: Religious Integration variables indicate expected significant relationships between Mainstream Protestant adherence rates (positive direction) and Catholic adherence rates (negative direction).

Table 5.5 presents results of full urban and rural research models. Consistent with the research of Kowalski, Faupel, and Starr (1987) the overall explained variation attributed to the Egoistic-Chronic Anomic model is more than twice as large for urban ($r^2 = .1816$) compared to rural counties ($r^2 = .0753$). Within both rural and urban counties, as expected, median age of the white male population is a significant positive predictor of crude white male suicide rates. As indicated by the partial correlation coefficient, the effect of median white male age constitutes the largest proportion of overall explained variance in rural suicide rates (2.7% rural and 1.8% urban). Other significant positive predictors of urban suicide rates are: a) the percent of the population divorced (partial correlation = 4.9%); and percent population black¹² (partial correlation = 1.8%). For rural counties the only other significant predictor of crude white male suicide rates is household income inequality. Contrary to the traditional theoretical assumptions of the egoistic-chronic anomic model, higher levels of rural household income inequality produce a significant *negative* effect on rural suicide rates contributing 1.1% of total explained variation.

Summary

Collectively the results of I-R Model One support the general hypothesis that rural and urban white male suicide rates result from distinct social processes and structural community

¹²As a result of preliminary analysis % Black was removed from rural county models due to high levels of multi-collinearity and was consistently non-significant in all models.

Table 5.5 Model One Urban and Rural Full Model

Variables	Urban Counties			Rural Counties		
	B (Std. Err)	Std. b	Partial	B (Std. Err)	Std. b	Partial
Intercept	1.435 (3.413)	0		-2.433 (2.240)		
White Male Unemployment Rate (t)	.939 (1.524)	.048		-.140 (.784)	-.011	
Female L-F Participation Rate	-.023 (.016)	-.164		.010 (.012)	.062	
Male Occupational Diversity (t)	.433 (1.262)	.025		.309 (.802)	.023	
Household Income Inequality (t)	-.025 (.017)	-.119		-222.625* (108.161)	-.136	.011
Median Family Income (t)	208.760	.124		.000 (.000)	-.088	
% Male Single Person Households (t)	.040 (.038)	.091		.057 (.081)	.045	
% Divorced (t)	.015** (.006)	.198	.049	.007 (.048)	.010	
Male:Female Sex Ratio (t)	-.546 (.430)	-.090		-.298 (.223)	-.092	
Birth Rate (t)	.019 (.152)	.010		.095 (.128)	.052	
% Net Migration Change (t)	.002 (.005)	.037		-.001 (.004)	-.017	
Population Size (t)	NA			-.012 (.012)	-.069	
% Urban	-.004 (.006)	-.060		-.001 (.002)	-.052	
Median White Male Age (t)	.543** (.239)	.235	.018	1.050** (.326)	.239	.027
% Population Black (t)	.198** (.090)	.163	.018	NA		
Evangelical Protestant Adherence Rate (t)	.006 (.007)	.076		.000 (.000)	-.020	
Main Stream Protestant Adherence Rate (t)	-.004 (.008)	-.037		.006 (.035)	.012	
Catholic Adherence Rate (t)	-.033 (.101)	-.031		-.076 (.065)	-.086	
Adjusted R-Square	.1816			.0753		
F-Value	4.52			2.78		
p-value	<.0001			.0003		
	(N=250)			(N=350)		

(t) = Transformed Value Included Within Model

** = p < .01, * = p < .05

characteristics. As indicated by patterns of explained variation the traditional variables used to explain Egoistic-Chronic Anomic suicide provide a better overall fit with urban suicide rates. This pattern however is not as clearly defined as the early national-level research by Kowalski, Faupel, and Starr (1987) suggest. Two possible reasons may explain this difference. The first pertains to the difference in time periods examined. General trends in rural community change in the past 30 years suggest a potential narrowing of rural-urban social differences. The second potential explanation is that the empirical methods used for this study create a more commensurable rural-urban comparison. In addition to the restricted geographic scope of analysis and the race-gender specific outcome measures examined, the standardization of predictor and outcome variables may work to normalize empirical rural-urban differences. These procedures however, have not fully eliminated the disproportionate explanatory power and relative fit of existing research models across rural-urban geographic space.

Of the variables examined here, the age structure of the rural white male population is the single most significant predictor of rural suicide rates. As descriptive age-adjusted suicide rates presented at the beginning of this chapter indicate, age structure alone does not fully explain the rural-urban suicide differential within this study region. Contradicting the general theoretical assumptions of the Egoistic-Chronic Anomic framework, the significant negative relationship between household income inequality and rural suicide rates does suggest a potential link between higher suicide rates and economic *homogeneity* in rural counties.

Section 2B: Model Two Fatalism

Introduction

The second theoretical explanation for elevated rural suicide rates examined within this dissertation derives from the micro-based research of social psychology and community health. This body of literature suggests that rural suicide rates result from high levels of social I-R coupled with patterns of social and economic deprivation. Specifically this literature highlights the role of diminishing social and economic opportunity for rural males. Situated within the general theoretical framework of the I-R Hypothesis of Suicide, I argue this line of inquiry aligns closely with Durkheim's concept of *Fatalism*. I-R Model-Two has been developed to reflect this general theoretical orientation.

Part one provides descriptive statistics and presents ANOVA comparisons of predictor variables across rural and urban counties. Part two presents results from OLS regression analyses for each block of independent variables for urban and rural counties separately. Individual block analyses are followed by the results of full urban and rural models.

Model Two Descriptive Statistics

Similar to descriptive comparison of Model-One variables, **Table 5.6** demonstrates a high level of significant difference in predictor variables across rural and urban counties (19 of 22 examined). Among economic variables only the percent of the labor force female is not significantly different between rural and urban counties. Patterns of economic industrial dependency show a significantly higher percent of rural counties (73%) are specialized compared to urban counties (64%). A significantly higher percent of rural counties are designated as dependent on each industrial category included within this study, with the exception of higher

Table 5.6: Model Two Descriptive Statistics

Variables	Urban (n=255)		Rural (n=350)		Sig. Diff < .05
	Mean	Std. Dev	Mean	Std. Dev	
% Labor Force Female	45.68	2.51	45.51	2.62	
Farming Dependent	4.31%		21.14%		*
Mining Dependent	2.35%		7.43%		*
Manufacturing Dependent	21.57%		32.00%		*
Government Dependent	16.47%		10.57%		*
Service Dependent	19.61%		2.29%		*
Persistent Poverty County	12.55%		39.71%		*
Low Education County	22.35%		63.14%		*
% Male 25+ Div/Sep/Widow	16.74	2.69	17.49	3.21	*
% Male 25+ Never Married	12.41	4.46	11.61	4.86	*
Male:Female Sex Ratio 15-44 Years	1.02	.16	1.11	.29	*
% Out Migration	18.75	7.77	18.46	6.03	
% In Migration Long Distance	10.80	7.34	6.52	3.15	*
% In Migration Same State	14.71	6.72	13.18	5.32	*
Metro Adjacency	NA		65.71%		
% Farm Population	1.52	1.82	3.66	2.78	*
% White Male 15-24 Years	13.83	4.16	13.10	2.46	*
% White Male 65 + Years	11.92	4.96	14.93	3.47	*
% Male White Non-Hispanic	69.63	17.13	64.23	18.79	*
% Male Native American	.47	.52	.54	.94	
Evangelical Protestant Rate	282.90	141.57	406.11	159.84	*
Mainstream Protestant Rate	78.84	35.00	94.93	52.39	*
Catholic Rate	116.06	144.97	87.95	156.36	*

levels of urban dependency on government and service industries. In addition, a higher percent of rural counties are designated Persistent Poverty (39.71%) and Low Education (63.14%) counties compared to urban counties (12.55% and 22.35% respectively).

Each domestic integration measure included within I-R Model-Two demonstrates significant differences between rural and urban counties. Similar to Model-One, while significant these differences in absolute terms are relatively minor. Model-Two descriptive statistics indicate rural county percent of the male population 25 + years divorced, separated, or widowed (17.49%) is significantly higher than urban counties (16.74%). Unlike the higher total percent urban population divorced detailed in Model-One, this more inclusive measure of marital dissolution suggests that rural county adult males on average have lower levels of domestic integration. Conversely, the percent rural county male population 25 + years never married (11.61%) is significantly lower than urban (12.41%). Consistent with extant research (Albrecht and Albrecht, 2004) these findings indicate a higher propensity of rural males to enter marital relationships. Collectively descriptive domestic integration statistics from Model-One and Two, suggests that divorce may not be the best measure of marital dissolution for rural counties. Lastly, the comparison of the male-to-female sex ratio 15-44 years is significantly higher in rural compared to urban counties (1.11 and 1.02) suggesting a more competitive marriage market for rural county males.

Migration and demographic structural variables examined within Model-Two indicate several significant and expected differences between rural and urban counties. Comparisons of rural and urban county out-migration rates indicate no significant difference between rural and urban counties. Rates of in-migration however, indicate significantly higher levels of long-

distance (10.80%) and same-state (14.71%) migration into urban compared to rural counties (6.52% and 13.18%). As expected rural counties have significantly larger farm populations than urban counties (3.66% and 1.52%). Where Model-One indicates rural white males are significantly older than urban white males; the more detailed examination of white male population age structure employed within in Model-Two shows both a significantly lower percent of white males 15-24 years and a higher percent 65 years and over in rural compare to urban counties.

Model Two Regression Analyses

Table 5.7 presents results of individual block OLS regression analyses for urban counties. Within each analysis the block of independent variables are regressed against the transformed crude white male suicide rate. As indicated by the values of the f-statistic and significance level all three blocks of independent variables provide a significant improvement of model fit. Ordered by the magnitude of explained variation, Table 5.7 ranks Block 2: Domestic Integration ($r^2 = .1543$) followed by, Block 3: Demographic Composition ($r^2=.1062$), and Block 1: Economic Integration ($r^2= .0886$).

Within Block 1, four variables express a significant relationship with the urban white male suicide rates. An increase in the percent of the labor market female and being designated a low education and service dependent county predicts a significant increase in suicide rates. Conversely, the designation of being a persistent poverty county is associated with a significant reduction in urban white male suicide rates. Among Block 2 Domestic Integration variables, the percent of the male population 25 years and over divorced/separated/widowed significantly increases urban suicide rates. Both an increase in the male:female sex ratio 15-44 years and the

Table 5.7: Model Two Urban Individual Blocks

Variables	Block 1: Economic		Block 2: Domestic		Block 3: Demographic	
	B (Std. Err)	Std. b	B (Std Err)	Std. b	B (Std. Err)	Std. b
Intercept	2.799** (.480)		.808 (.915)		-1.055 (1.951)	
% Labor Force Female (t)	.001** (.000)	.275				
Farm Dependent	.042 (.242)	.011				
Mining Dependent	.247 (.314)	.048				
Manufacturing Dependent	.115 (.128)	.061				
Government Dependent	.168 (.140)	.080				
Service Dependent	.230 ⁺ (.135)	.118				
Persistent Poverty County	-.510** (.156)	-.218				
Low Education County	.312* (.127)	.168				
% Male 25+ Div/Sep/Widow (t)			.174** (.026)	.411		
% Male 25+ Never Married (t)			-2.085 ⁺ (1.139)	-.111		
Male:Female Sex Ratio 15-44 (t)			-.737* (.289)	-.148		
% Out Migration (t)					.531 (3.307)	.012
% In Migration Long Distance (t)					-1.747 (1.276)	-.107
% In Migration Same State (t)					-.075 (.113)	-.052
% Farm Population (t)					-.129 (.311)	-.033
% White Male 15-24 Years (t)					-9.707* (4.873)	-.166
% White Male 65+ Years (t)					3.118* (1.334)	.193
% Male White Non-Hispanic (t)					.000 (.000)	.064
% Male Native American (t)					-.120 (.167)	-.043
Adjusted R-Square	.0886		.1543		.1062	
F-Value	4.09		16.44		4.77	
p-value	.0001		<.0001		<.0001	

(N= 255)

** = $p < .01$, * = $p < .05$, + = $p < .05$ (1-tail)

(t) = Transformed Value Included Within Model

percent male population 25 years and older are significantly associated with a reduction in urban white male rates. For Block 3 Demographic Composition variables, two significant independent relationships with county age structure are noted. A higher percent of white male population 15-24 years reduces, while the percent of the white male population 65 years and older increases urban white male suicide rates.

Table 5.8 presents results of individual block OLS regression analyses for rural counties. Within each analysis the block of independent variables are regressed against the transformed crude white male suicide rate. As indicated by the values of the f-statistic and significance level all three blocks of independent variables provide a significant improvement of model fit. Ordered by the magnitude of explained variation, Table 5.8 ranks Block 3: Demographic Composition ($r^2=.0515$) followed by, Block 1: Economic Integration ($r^2= .0389$), and Block 2: Domestic Integration ($r^2 = .0185$).

Within Block 1 two variables are positively associated with rural county white male suicide rates. Similar to urban individual block analysis, as expected, the percent of the labor force female significantly predicts an increase in rural male suicide rates. Additionally, counties designated as mining dependent predict a significant increase in rural white male suicide rates over non-specialized counties. Among Block 2 Domestic Integration variables the male:female sex ratio 15-44 years, contrary to expectation, expresses a significant and negative relationship with rural suicide rates. Consistent with urban demographic block analysis, rural Block 3 demonstrates the percent of the white male population 65 years and older is a significant positive predictor of white male suicide rates. The final significant relationship noted within Block 3 is the negative association between the percent of the male population Native American.

Table 5.8 Model Two Rural Individual Blocks

Variables	Block 1: Economic		Block 2: Domestic		Block 3: Demographic	
	B (Std. Err)	Std. b	B (Std Err)	Std. b	B (Std. Err)	Std. b
Intercept	2.485** (.394)		3.029** (.352)		4.925** (1.344)	
% Labor Force Female (t)	.001** (.000)	.204				
Farm Dependent	.160 (.107)	.098				
Mining Dependent	.346* (.149)	.136				
Manufacturing Dependent	.051 (.094)	.036				
Government Dependent	-.233 (.128)	-.107				
Service Dependent	.115 (.245)	.026				
Persistent Poverty County	-.053 (.086)	-.039				
Low Education County	-.041 (.081)	-.030				
% Male 25+ Div/Sep/Widow (t)			.097 (.065)	.089		
% Male 25+ Never Married			-.006 (.008)	-.041		
Male:Female Sex Ratio 15-44 (t)			-.341** (.124)	-.145		
% Out Migration (t)					.907 (1.850)	.030
% In Migration Long Distance (t)					.511 (.694)	.042
% In Migration Same State (t)					.109 (.794)	.008
Metro Adjacent County					.064 (.076)	.046
% Farm Population					.005 (.014)	.022
% White Male 15-24 Years					-.015 (.016)	-.056
% White Male 65+ Years (t)					4.437** (1.366)	.199
% Male White Non-Hispanic (t)					.000 (.000)	.072
% Male Native American (t)					-.209* (.095)	-.124
Adjusted R-Square	.0389		.0185		.0515	
F-Value	2.77		3.19		3.11	
p-value	.0056		.0239		.0013	
(N= 350)						

(t) = Transformed Value Included Within Model; ** = $p < .01$, * = $p < .05$

Table 5.9 presents the results of full urban and rural research models. Similar to the results of Model-One, the overall fit of Model-Two indicates a significantly higher level of explained variation for urban ($r^2 = .2011$) compared to rural ($r^2 = .1002$) equations. Overall Model-Two predictor variables provide a very slight improvement in model fit over Model-One for both rural and urban counties. Patterns of significant association across county context further underscore the need to examine rural and urban suicide rates as unique phenomena.

Consistent with the theoretical orientation of fatalism and the diminishing social and economic position of rural males; results of Model-Two indicate a significant positive relationship between the percent of the labor force female and rural white male suicide rates. Within the full rural model the percent labor force female is one of the single most important contributing factors, accounting for 2% of overall explained variation. While not significant in the rural model, 2.4% of urban explained variation is attributed to the significant negative relationship between suicide rates and being designated as a persistent poverty county.

Both urban and rural models indicate a unique pattern of association with economic industrial dependency and elevated white male suicide rates. Within urban analysis the designation of being federal and state government dependent shows a significant increase in suicide rates compared with non-specialized counties. While significant the relative contribution of government dependency, as indicated by the partial correlation coefficient, is relatively small (.01%). Consistent with extant literature the rural analysis indicates counties designated as mining and farming dependent show a significant increase in white male suicide rates compared with non-specialized counties. Combined mining and farm dependency account for 2.3% of the

Table 5.9 Model Two Urban and Rural Full Model

Variables	Urban Counties			Rural Counties		
	B (Std. Err)	Std. b	Partial	B (Std Err)	Std. b	Partial
Intercept	.187 (2.413)			3.115 (1.921)		
% Labor Force Female (t)	.000 (.000)	.051		.001* (.000)	.151	.020
Farm Dependent	-.162 (.243)	-.043		.200 ⁺ (.115)	.122	.004
Mining Dependent	.236 (.304)	.046		.532** (.158)	.209	.019
Manufacturing Dependent	-.033 (.127)	-.017		.104 (.097)	.072	
Government Dependent	.347* (.161)	.166	.0001	-.032 (.139)	-.015	
Service Dependent	.160 (.156)	.082		-.064 (.254)	-.014	
Persistent Poverty County	-.391* (.165)	-.167	.024	.078 (.104)	.057	
Low Education County	.158 (.135)	.085		.134 (.089)	.097	
% Male 25+ Div/Sep/Widow (t)	.117** (.035)	.277	.073	.045 (.072)	.041	
% Male 25+ Never Married (t)	.885 (1.985)	.047		-.006 (.011)	-.042	
Male:Female Sex Ratio 15-44 (t)	-.754 (.393)	-.151		-.172 (.151)	-.073	
% Out Migration (t)	-1.693 (3.500)	-.037		1.721 (2.070)	.057	
% In Migration Long Distance (t)	-1.021 (1.505)	-.063		.422 (.744)	.035	
% In Migration Same State (t)	.055 (.128)	.038		.675 (.952)	.053	
Metro Adjacent County	NA			.068 (.079)	.048	
% Farm Population (t)	-.009 (.419)	-.002		.016 (.017)	.067	
% White Male 15-24 Years (t)	-13.304* (5.210)	-.228	.024	-.001 (.016)	-.005	
% White Male 65+ Years (t)	.345 (1.758)	.021		4.647** (1.555)	.209	.020
% Male White Non-Hispanic (t)	.000 (.000)	.061		.0004* (.0002)	.193	.014
% Male Native American (t)	-.090 (.185)	-.033		-.058 (.100)	-.034	
Evangelical Protestant Rate(t)	.010 (.007)	.119		-.001 (.001)	-.099	
Mainstream Protestant Rate (t)	-.004 (.009)	-.033		.001 (.033)	.002	
Catholic Rate (t)	-.037 (.101)	-.035		-.122 ⁺ (.071)	-.138	.008
Adjusted R-Square	.2011			.1002		
F-Value	3.91			2.69		
p-value	<.0001			<.0001		

(N= 350)

(t) = Transformed Value Included Within Model

** = p < .01, * = p < .05, + = p < .05 (1-tail)

total rural explained variation. It should be noted the percent of the county population living on farms however is not a significant predictor of rural suicide rates.

The remainder of explained variation in urban suicide rates results from a combination of domestic and demographic characteristics. Consistent with the results of Model-One, the single

most important positive predictor of urban white male suicide rates is the percent of the male population 25 years and older divorced/separated/widowed. As indicated by the partial correlation coefficient this variable accounts for 7.3% of the total explained urban variation. The only other significant predictor of urban suicide rates is the percent of the white male population 15-24 years (2.4% of total variation). Contrary to the expected direction, a higher percent of young white males is significantly related to an overall reduction in urban county suicide rates. The non-significant relationship between the percent white males 65 and over, and the significant positive relationship with median white male age from Model-One, suggests a potential indirect effect of urban age structure on suicide rates. Specifically, the higher proportion of young white males may increase overall levels of familial social attachment in urban counties, reducing suicide rates among older males.

For rural counties two demographic factors, the percent of the white male population 65 years and older and the percent of the male population White Non-Hispanic, are significantly related to elevated rural suicide rates. These variables account for 3.4% of the total rural explained variation, suggesting that a significant proportion of rural suicide rates can be attributed to factors associated with demographic structure.

The final significant relationship within Model-Two rural analysis is the beneficial impact of Catholic adherence rates. Consistent with classic sociological theory higher rates of Catholic adherence are related to a significant reduction in rural white male suicide rates. Some caution however must be noted when interpreting this effect. As noted above, the Catholic adherence rate was a non-significant predictor within Model-One. Preliminary analysis also indicates a moderately strong relationship between Catholic adherence rates and percent urban population

($r = .49$). Together these results suggest when percent urban is removed from Model-Two equations the significant impact of Catholic adherence may reflect a more generalized impact of urbanization.

Summary

Combined, the results of I-R Model-Two provide further empirical evidence supporting the overall hypothesis that rural and urban suicide rates are the result of unique location specific characteristics. The slight improvement in model fit over Model-One equations along with mixed patterns of significant association in both rural and urban counties, however, provides only limited support for the hypothesis that rural suicide rates result from a clearly defined fatalistic theoretical explanation. Supporting the fatalistic perspective are the significant associations between the feminization of the rural labor force and economic dependency on farm and mining activity. When combined these three significant variables account for 4.3% of the total explained variation in rural white male suicide rates. Neither directly contradicting or supporting the fatalistic perspective is the consistent association and explanatory power (3.4% total) associated with the rural male demographic factors of age and race structure .

Section 2C: Model 3 Acute Anomie

Introduction

The third theoretical and empirical explanation for the elevated rural suicide rates examined within this dissertation derives from the macro-based community research of human ecology and criminology. Largely focused on patterns of boom-town growth, this body of literature suggests the smaller and more integrated social structure of rural communities are highly susceptible to periods of acute social disruption. While patterns of boom-town growth

hardly seems representative of the rural community experience overall, the disruption thesis suggests the need to examine rural suicide rates as the product of relative social change. *I-R Model Three*, has been developed to reflect this general theoretical orientation and consists of a series of community change measures calculated between the years 1990 and 2000.

This section of my dissertation is organized into two parts. The first provides descriptive statistics and presents ANOVA comparisons of predictor variables across rural and urban counties. Part two presents results from OLS regression analyses for each block of independent variables for urban and rural counties separately. Individual block analyses are followed by the results of full urban and rural models.

Model Three Descriptive Statistics

Table 5.10 presents descriptive statistics and rural-urban comparisons of Model-Three predictor variables. Descriptive statistics indicate that both rural and urban counties experienced similar patterns of community change from 1990 to 2000. Consistent with the previous models, overall these changes vary significantly in magnitude across geographic context but are relatively small in absolute terms.

Each of the five economic change variables included within Model-Three are significantly different for rural and urban counties. From 1990 to 2000, the percent of county white males not working increased in both rural and urban settings (3.86% and 2.03%, respectively). During this same time period the average percent of the labor force female declined in both rural (-1.79%) and urban (-1.43%) counties. Descriptive statistics also indicate that urban county employment was relatively more unstable than rural employment during the ten year study period. Ten year employment volatility measures show a slightly higher average

change in urban (3.99%) compared to rural (3.54%) labor markets. Overall median family income increased during this ten year period for both rural and urban counties, but grew significantly more for urban counties. Similarly, the examination of change in household income inequality shows a significantly higher increase in urban inequality.

Table 5.10 Model 3 Descriptive Statistics

Variables	Urban (n=255)		Rural (n=350)		Sig. Diff
	Mean	Std. Dev	Mean	Std. Dev	< .05
Change % White Male No Work	2.03	3.25	3.86	5.87	*
Change % Labor Force Female	-1.43	1.54	-1.79	2.19	*
10 Year Ave. Employment Volatility	3.99	1.74	3.54	1.18	*
Change Median Family Income	4504.33	3556.46	3341.10	2999.75	*
Change Household Income Inequality	.73	2.16	.09	2.71	*
Change % Male 15+ Years Married	-3.84	3.21	-5.99	5.79	*
Change % Out-Migration	.44	4.93	1.11	5.07	
Change % In-Migration	-.49	4.46	-2.52	3.87	*
Metro Adjacency	NA		65.71%		
Change % Farm Population	-.41	.82	-.90	1.77	*
% White Male 15-24 Years	13.83	4.16	13.10	2.46	*
% White Male 65 + Years	11.92	4.96	14.93	3.47	*
% Male White Non-Hispanic	69.63	17.13	64.23	18.79	*
% Male Native American	.47	.52	.54	.94	
Change % Hispanic Population	2.58	3.12	2.62	3.11	
Evangelical Protestant Rate	282.90	141.57	406.11	159.84	*
Mainstream Protestant Rate	78.84	35.00	94.93	52.39	*
Catholic Rate	116.06	144.97	87.95	156.36	*

Domestically, the percent of rural and urban county white males married declined from 1990 to 2000. On average this change was significantly larger for rural (-5.99%) compared to urban (-3.84%) counties. For both rural and urban counties out-migration rates increased slightly and is not significantly different across location. Conversely, in-migration rates declined for both county groups but this change was significantly larger for rural counties (-2.52% compared to -.49%). As expected, the percent of the farm population declined significantly more for rural (-.9%) compared to urban counties (-.41%). Finally, both county groups had statistically similar increases in the percent population Hispanic.

Model Three Regression Analyses

Table 5.11 and **5.12** presents results from individual block OLS regression analyses for urban and rural counties separately. Within each analyses the block of independent variables are regressed against the transformed crude white male suicide rate. As indicated by the values of the f-statistic, adjusted R-square, and significance levels, models of social change provide very little improvement of model fit for either urban or rural block analyses. Within urban models, Block One: Economic variables show only one significant negative relationship between ten year average employment volatility and white male suicide rates. The only remaining significant relationships within urban analyses are attributed to previously noted age structure variables. Among rural block analyses, the percent of the white male population 65+ years and over is the only significant relationship indicated within Block 3 Demographic variables.

Finally **Table 5.13** presents results of full Model-Three analyses for urban and rural counties. Similar to the results of Models One and Two, overall levels of explained variation are slightly more than double for urban ($r^2 = .1614$) compared to rural ($r^2 = .0732$) counties. Patterns

Table 5.11 Model 3 Urban Individual Blocks

	Block 1: Economic		Block 2: Domestic and		Block 3: Demographic	
Variables	B (Std. Err)	Std. b	B (Std Err)	Std. b	B (Std. Err)	Std. b
Intercept	.035 (1.4881)		5.615** (.546)		-.603 (1.381)	
Change % White Male No Work (t)	.001 (.036)	.001				
Change % Labor Force Female (t)	-.004 (.006)	-.041				
10 Year Ave. Employment Vol. (t)	-5.654** (1.538)	-.264				
Change Median Family Income	.000 (.000)	.102				
Change H.H. Income Inequality (t)	.001 (.009)	.006				
Change % Male 15+ Married (t)			-.000 (.000)	-.105		
Change % Out-Migration (t)			-.000 (.000)	-.026		
Change % In-Migration (t)			.000 (.011)	.000		
Change % Farm Population (t)					.003 (.004)	.048
% White Male 15-24 Years (t)					-9.558* (4.443)	-.164
% White Male 65+ Years (t)					3.534** (1.180)	.219
% Male White Non-Hispanic (t)					.000 (.000)	.020
% Male Native American (t)					-.104 (.165)	-.038
Change % Hispanic Population (t)					-6.861 (4.270)	-.097
Adjusted R-Square	.0385		-.0011		.1173	
F-Value	3.04		.91		6.62	
p-value	.0112		.4381		<.0001	
(N= 255)						

(t) = Transformed Value Included Within Model

* = p < .05 ** = p < .01

Table 5.12 Model 3 Rural Individual Blocks

	Block 1: Economic		Block 2: Domestic and		Block 3: Demographic	
Variables	B (Std. Err)	Std. b	B (Std Err)	Std. b	B (Std. Err)	Std. b
Intercept	4.503** (1.215)		3.704** (.265)		6.101** (.725)	
Change % White Male No Work (t)	-.130 (.088)	-.085				
Change % Labor Force Female (t)	-.001 (.013)	-.004				
10 Year Ave. Employment Vol. (t)	.149 (1.288)	.006				
Change Median Family Income	-.000 (.000)	-.022				
Change H.H. Income Inequality (t)	-.019 (.018)	-.057				
Change % Male 15+ Married (t)			.000 (.000)	.061		
Change % Out-Migration (t)			-.001 (.007)	-.011		
Change % In-Migration (t)			.000 (.001)	.008		
Metro Adjacency					.061 (.074)	.043
Change % Farm Population (t)					-.001 (.009)	-.009
% White Male 15-24 Years					-.013 (.016)	-.049
% White Male 65+ Years (t)					4.617** (1.284)	.207
% Male White Non-Hispanic (t)					.000 (.000)	.076
% Male Native American (t)					-.157 (.095)	-.093
Change % Hispanic Population (t)					-.188 (.203)	-.051
Adjusted R-Square	-.0038		-.0041		.0564	
F-Value	.74		.52		3.98	
p-value	.5966		.6669		.0003	

(N= 255)

(t) = Transformed Value Included Within Model

* = p < .05 ** = p < .01

Table 5.13 Model 3 Urban and Rural Full Model

Variables	Urban Counties (n=255)			Rural Counties (n=350)		
	B (Std. Err)	Std. b	Partial	B (Std Err)	Std. b	Partial
Intercept	-2.595 (2.209)			7.279 (1.439)		
Change % White Male No Work (t)	.001 (.038)	.002		-.036 (.110)	-.023	
Change % Labor Force Female (t)	-.010 (.006)	-.118		-.012 (.014)	-.054	
10 Year Ave. Employment Vol. (t)	-6.174** (1.744)	-.288	.046	.437 (1.354)	.018	
Change Median Family Income (t)	.000 (.000)	.138		-.000 (.000)	-.090	
Change H.H. Income Inequality (t)	.002 (.010)	.015		-.035 ⁺ (.019)	-.104	.003
Change % Male 15+ Married (t)	-.000 (.000)	-.086		-.000 (.000)	-.016	
Change % Out-Migration (t)	.000 (.000)	.027		.005 (.007)	.036	
Change % In-Migration (t)	-.008 (.013)	-.047		.001 (.001)	.042	
Metro Adjacency (t)	NA			.076 (.079)	.054	
Change % Farm Population (t)	.004 (.004)	.056		-.000 (.010)	-.003	
% White Male 15-24 Years (t)	-17.247** (5.307)	-.295	.113	-.009 (.016)	-.032	
% White Male 65+ Years (t)	1.573 (1.620)	.098		5.216** (1.449)	.234	.032
% Male White Non-Hispanic (t)	.000 (.000)	.031		.000 (.000)	.076	
% Male Native American (t)	.002 (.174)	.001		-.075 (.099)	-.044	
Change % Hispanic Population (t)	-.761 (4.819)	-.011		-.0131 (.225)	-.035	
Evangelical Protestant Adherence Rate (t)	-.000 (.008)	-.002		-.001 (.001)	-.078	
Mainstream Protestant Adherence Rate (t)	-.006 (.008)	-.048		.041 (.031)	.080	
Catholic Adherence Rate (t)	-.0216* (.097)	-.202	.016	-.185** (.062)	-.208	.023
Adjusted R-Square	.1614			.0732		
F-Value	3.87			2.53		
p-value	<.0001			.0006		

(t) = Transformed Value Included Within Model

* = p < .05 ** = p < .01

of significant association generally show social change variables explain relatively little variation in either rural or urban white male suicide rates. As indicated by partial correlation coefficients, the most significant predictors of suicide rates considered here are the demographic age structure of white male population in each geographic context. Within the urban analysis the percent white male population 15-24 years accounts for 11.3% of the roughly 16% total explained variation of Model-Three. For rural counties, the percent white male population 65 years and over accounts for nearly half of all total rural explained variation (3.2% of 7.3%).

The rate of Catholic adherence is a significant negative predictors of both urban and rural white male suicide rates within Model-Three equations. Catholic adherence rates account for 1.6% of urban and 2.3% of rural total explained variation. Similar to Model-Two rural analysis, however, these results should be interpreted with some level of caution. While Catholic adherence is significant, the collective results of this study and preliminary analysis suggest these associations reflect more general cross-sectional effects from urbanization and economic structure not included within this model.

Of the relative social change measures included within Model-Three analysis, results from the urban equation show a significant negative association between average ten year employment volatility and white male suicide rates. From the sociological perspective the negative direction of this relationship is contrary to traditional theoretical assumptions. Within economics literature however, employment volatility is generally considered as an indicator of a vibrant and transforming local economy. According to Davis, Haltiwanger, and Schuh.(1996) rates of employment volatility are expected to rise as older outdated technology and industry die away and are replaced by the birth of new and innovative economic forms. It should be noted

that the measure of employment volatility used within this study represents a net measure of aggregate change and does not allow for the examination of the directional measures of growth and decline. One avenue identified for future research will be to partial-out gross measures of job birth and death rates within local communities to examine possible independent effects of these changes.

Lastly, results from full Model-Three equations show only one measure of relative social change is significantly related to white male rural suicide rates. Generally associated in the literature with negative social outcomes, rising rural household income inequality is significantly associated with a reduction in white male suicide rates. While significant, however, the change in household income inequality accounts for less than 1% of the total rural explained variation in Model-Three. Contrary to the predictions of traditional sociological theory, but consistent with the findings of Model-One in this dissertation, the effect of rising levels of income inequality suggest a potential benefit from economic *heterogeneity* and change within rural counties.

Summary

Consistent with the results of Models One and Two, results from Model Three do not indicate clear support for any single theoretical explanation for elevated rural suicide rates. Overall results from Model-Three indicate measures of social change and acute anomie are collectively the weakest predictors of rural and urban suicide rates considered within this study. While not completely negating the disruption perspective, results from rural county analysis suggest that cross-sectional measures of community structure, specifically the older demographic age structure of rural white males, provide the most significant explanation for elevated rates of rural suicide.

In the following chapter, I provide an overall synthesis of the significant findings from this research. **Chapter 6**, is organized into two sections. The first outlines a summary of major research findings. The second section address the specific benefits and limitations of this study.

CHAPTER 6: DISCUSSION AND CONCLUSIONS

Introduction

This dissertation is an examination of the social structural determinants of rural suicide. In the 100 years since the publication of Durkheim's *Suicide*, sociological theory and research methods have been developed primarily around the analysis of urban suicide rates. The recent rise in rural suicide rates, the subsequent reversal in the direction of the rural-urban suicide differential, and the apparent inability of exiting research methods to explain this phenomena opens a significant gap in the sociological literature. This dissertation begins to address this gap by examining the theoretical and empirical implications of rural-urban location within sociology's Integration-Regulation Hypothesis of Suicide.

Examining rates of white male suicide in rural and urban counties of the U.S. Gulf States Region this study specifically tests the differential explanatory power of three alternative theoretical and empirical predictor models of suicide rates. Overall, findings from this study do not lend empirical support to any single theoretical explanation for rural or urban suicide rates. Differential levels of explained variation and alternative patterns of variable association across rural and urban counties does suggest however, that the unique structural properties of rural and urban locations require special consideration within macro-social suicide research.

In this chapter I present a synthesis of research findings from this dissertation. This chapter is divided into two sections. Section one presents a summary of major research findings. Section two addresses the limitations and benefits of this work. Recommendations for future research are noted throughout this chapter.

Section 1: Summary of Major Findings

First, addressing the issue of disproportionate rates of rural and urban suicide, this study finds that county suicide rates systematically vary by rural and urban location within the Gulf States Region. Consistent with extant literature, rural suicide rates are significantly higher than urban rates within the study region. This rural-urban suicide differential is primarily defined by elevated rural male and specifically white-male suicide rates. Longitudinal trends however, show very similar long-term patterns of change in both rural and urban suicide rates. Given these overall patterns of co-variation and the relatively recent changes in the rural-urban suicide differential, rural and urban suicide rates should be monitored into the future. Examining national and regional trends future research will work to determine if these rural-urban changes have universal properties, and if so are they characteristic of short or long-term trajectories.

Second, analysis of independent variables used throughout this study demonstrate rural and urban counties systematically vary along the empirical dimensions typically used to measure social Integration-Regulation. Overall rural-urban community variations within this study region were anticipated and in expected directions. Preliminary and working analysis indicate several unique patterns of independent variable inter-correlation within rural and urban counties¹³. Coupled with the results of regression analyses, this study suggests that macro-social suicide research models which include single or composite measures of rural-urban location may not be sufficient to control for contextual variations occurring across geographic space. While not clearly defined by the three theoretical perspectives examined in this study, findings overall

¹³Factor analytic techniques were performed but did not result in statistically valid factor loadings or cohesive eigenvalue scores, and were eliminated from consideration.

demonstrate the importance of considering rural and urban communities as separate and distinct research categories rather than unidimensional control variables.

Third, despite empirical procedures used to normalize rural-urban community variation and the specification of rural specific predictor variables, this study did not eliminate the disproportionate explanatory power of research models across rural-urban space. As detailed in **Table 6.1**, levels of explained variance for each model included within this study are consistently twice as large for urban compared to rural counties. This overall pattern suggests the disproportionate ability of macro-social research models to explain rural suicide rates may stem from underlying empirical and methodological sources. As a statistically rare event, suicide rates in counties with larger populations have a more stable overall distribution and reflect a relatively higher absolute number of suicide events occurring within any given year. In this study empirical procedures were utilized to address differences in the distribution of rural and urban suicide rates, and not frequency of events. The relatively constant ratio of rural and urban explained variation suggests the need for future research to examine how alternative count-based procedures such as Negative Binomial or Poisson regression may be used to improve model fit for rural counties.

Forth, empirical results of this study do not support any single theoretical explanation for elevated rural suicide rates. As detailed in Table 6.1 each of the three models examined in this dissertation provide insight into the underlying social-structural correlates of suicide rates and how these factors differ across rural-urban geographic space. To systematically discuss these patterns the remainder of this section is divided into three parts which address demographic, domestic, and economic integration.

Table 6.1 Rural and Urban Final Model Comparisons

	Urban Counties	Rural Counties
	Direction and Partial	Direction and Partial
Model One: Egoism-Chronic Anomie Explained Variance	18.16%	7.53%
Household Income Inequality		Negative 1.1%
% Divorced	Positive 4.9%	
Median White Male Age	Positive 1.8%	Positive 2.7%
% Population Black	Positive 1.8%	
Model Two: Fatalism Explained Variance	20.11%	10.02%
% Labor Force Female		Positive 2.0%
Farming Dependent		Positive 0.4%
Mining Dependent		Positive 1.9%
Government Dependent	Positive 0.01%	
Persistent Poverty County	Negative 2.4%	
% Males Divorced/Sep./Widowed	Positive 7.3%	
% White Males 15-24 Years	Negative 2.4%	
% White Males 65+ Years		Positive 2.0%
% Male Population White Non-Hispanic		Positive 1.4%
Catholic Adherence Rate		Negative .8%
Model Three: Acute Anomie Explained Variance	16.14%	7.32%
10-year Average Employment Volatility	Negative 4.6%	
Change Household Income Inequality		Negative .03%
% White Males 15-25	Negative 11.3%	
% White Males 65+ Years		Positive 3.2%
Catholic Adherence Rate	Negative 2.3%	Negative 1.6%

Demographic Factors

Throughout this study demographic composition was one of the single most significant and consistent predictors of white male suicide rates in both rural and urban counties. Findings from this study show a differential pattern of association between county age and race structure and suicide rates in rural and urban counties. When controlling for county age structure with the single measure *median age*, a significant and positive effect on both rural and urban suicide rates is noted within Model One. When age structure is controlled using the two component categories of young (15-24) and old (65+ years) male age structure, results indicate two distinct patterns of association within rural and urban counties. Specifically this study finds that rural suicide rates significantly increase in proportion to the relative size of the male population 65 years and over. Conversely, urban suicide rates significantly decline in relation to the relative size of the percent male population 15-24 years. Generally these two relationships demonstrate an overall and expected association between older age structure and suicide rates.

The second demographic factor differentially associated with white male suicide rates in rural and urban counties is racial composition. For urban counties the percent of the population Black is a significant and positive predictor of urban white male suicide rates. Several alternative interpretations exist for this association. One suggesting that high levels of racial minorities indicate social distance and heterogeneity within the community. Others suggest that this effect represents a residual effect of low county socioeconomic status, which was independently controlled within each model. Regardless of the theoretical interpretation, this study finds this relationship is primarily an urban phenomena. While the percent of the

population Black on average was higher for rural counties, this measure was not significantly related to rural white male suicide rates.

For rural counties white male suicide rates significantly co-vary in relation to the proportion of the male population white non-Hispanic. As a demographic control variable, this statistically significant relationship corresponds directly with overall patterns of suicide mortality within the United States. Interpreted from an epidemiological perspective these results suggest one key reason for elevated rural suicide rates is the relative concentration of white males, who are more prone to suicidal behavior, within rural county populations. This demographic based interpretation however, does not explain why this relationship was not significant within urban county analysis. Further, by default this interpretation contradicts the overall urban-based assumptions of traditional Integration-Regulation theory concerning the relationship between social heterogeneity and suicide rates. In essence, for rural counties the more racially homogeneous (i.e more white) the male population is, the higher suicide rates are expected to be.

To advance the academic understanding of the underlying causes of rural suicide rates it is important that these age and race distinctions are not dismissed as simple demographic anomalies. On the contrary, micro-based research has provided a great deal of insight into the gendered nature of rural suicide. Given the overwhelming and consistent association between older white male age structure and rural suicide rates, future research should focus considerable attention on the age specific nature of this phenomena. One line of research in this area could examine the impact of senior-specific community infrastructure such as, availability and access to community centers, hospital programs, and home health related care.

Domestic Social Integration

Throughout the sociological literature declining rates of marriage and rising rates of divorce are central themes within suicide research. Overall one of the clearest patterns of association detailed within this study is the significant relationship between marital dissolution and urban white male suicide rates. Both percent divorced and the more inclusive measure of percent males divorced/separated/widowed are significant and positive predictors of urban suicide rates. Within this study however, the relationship between marital dissolution and white male suicide rates appears to be primarily an urban based association.

None of the domestic integration measures employed within this study were significantly related to rural white male suicide rates. Despite predictions derived from the micro-based rural suicide literature, the percent of males never married, sex-ratio based measures of the marriage market opportunity, and percent male single person households were non-significant predictors of rural suicide rates. Based on extant literature this study originally intended to examine the impact of households containing adult children living with primary family members, but measures were unavailable from 2000 Census data. Given the clear pattern of association between rural suicide and older male age structure, one potential avenue for future research may consider how measures of multi-generational households including older adults, and specific measures of the widowed populations impact rural suicide rates.

Economic Integration

Similar to demographic and domestic integration measures, economic predictor variables included within this study demonstrate several location specific patterns of association with rural and urban suicide rates. Specifically, measures of economic industrial dependency and the

feminization of the rural labor-force both exert significant positive effects on rural white male suicide rates. Despite micro-based predictions, residential measures of farm and declining farm population were not significantly related to rural suicide rates. Being designated a farming or mining dependent community however, is significantly associated with higher rural suicide rates. Consistent with extant literature presented in Chapter 3 which shows no significant relationship between individual suicide risk and farming, this study also suggests the relationship between farming and suicide is a contextual relationship stemming from economic concentration and dependency rather than individual or occupational specific risk factors.

These findings specifically highlight the need within rural suicide research to continually challenge the assumptions concerning the nature of rural social life. Overwhelmingly rural suicide literature is framed within the context of the “farm crisis”. While clearly not irrelevant, the 1970-1980 decline of the family farm represents only one of many rural social changes in the past 30 years. As researchers continue to study the relationship between farming and suicide, it will become increasingly important to investigate this issue with a contemporary understanding of American farm structure.

The base line dependency measures of this study indicate those counties with 15% or more total annual earnings from farm employment, have higher rates of suicide compared to non-specialized counties. What this study cannot clarify and future research will have to address is what types of farm dependent economies these are. Specifically are these counties thriving modern agricultural centers, geographically isolated and depressed economies, or something in between? Given the region of study considered here the impact of gulf-shore fishing industries

may also play a role in this effect. Conceptually and empirically these same recommendations and observations hold for the impact of mining dependent communities as well.

Empirically and theoretically one of the most interesting and unexpected results from this study is the consistent relationship between income inequality and rural suicide rates. Typically viewed as a negative social characteristic, findings from this study consistently show a significant social benefit from higher levels of income inequality in rural counties. Originally considered a data anomaly, throughout this research project results have indicated a small, yet significant *negative* relationship between household income inequality and rural suicide rates. The findings from Model Three, also show a significant *negative* relationship between rural suicide rates and *rising* inequality. Considering the persistent levels of economic deprivation characteristic of many rural communities in this study region, rising levels of income inequality potentially indicate a relative improvement in local economic conditions.

Section 2: Benefits and Limitations Of This Study

Throughout the iterative process of deriving final research models the role of theory and method have been equally considered within this study. Striking a balancing between these two areas was not as difficult as originally predicted. Empirically the differences between rural and urban community structure were less pronounced than national level statistics would suggest. I attribute this difference primarily to the restricted geographic scope of this study region. Descriptive statistics presented in Chapter 5 however, demonstrate that suicide rates and community structural characteristics used to predict them systematically and significantly vary by rural-urban location.

Some degree of this variation is of course the product of the definition of rural and urban counties used within this study. As a multifaceted ecologically and geographically based concept, no single standard exists to define rural and urban counties. The criteria for defining rural and urban counties used within this study were selected to maintain, as much as possible, consistency with official government metro/non-metro designations and still provide meaningful comparative rural-urban groups. Far beyond the scope of this dissertation, one avenue identified for future research will be to examine more specifically, how alternative definitions of *rural* and *urban* may impact research outcomes. As with any rural-urban research, all conclusions drawn from this study reflect the working definitions of rural and urban used.

The use of Box-Cox transformation procedures benefit this study by allowing for a more direct examination of research findings across county groups. In light of the systematic differences between rural and urban counties, the loss of the ability to calculate a “meaningful” regression coefficient, in this case, is outweighed by the ability to examine the larger patterns of relative association and explanation across rural and urban models.

The final empirical and theoretical consideration addressed here is the extent to which the groups of independent variables and model summary statistics represent truly distinct and alternative theoretical processes. Theoretically the overall absence of research addressing macro social implications of fatalistic suicide drastically hinder the ability to specify research models using standardized and accepted measures. Conversely, while significantly more theoretical attention has been afforded to the processes of Acute and Chronic Anomie, rural community data typically derived from Decennial Census figures drastically hinder the ability to examine detailed temporal trends. The research methods and models used within this study were developed to

reflect the same level of theoretical understanding and empirical standards which exist throughout the contemporary suicide literature.

Given these limitations model summary statistics presented within this work are not intended to be stand-alone empirical tests of the three theoretical explanations. Instead results from each of the equations applied within this dissertation should be interpreted within the comparative context of the overall study. The use of model summary statistics provide a standardized comparative tool and represent only one portion of the evidence used to support the conclusions of this study.

Closing Statements

This study originally began in reaction to a popular media article which suggested a potential “social isolation epidemic” in rural America. This article presented a mix of statistical facts, interpersonal-based discussions, images of lonely wide-open spaces, and the reactions of family, fellow church members, and the schoolmates of several recent suicide victims. Reading this article the single largest contradiction I noticed was despite the continued reference to ecological and interpersonal “isolation” the suicide victims being discussed did not seem to be alone. This dissertation represents my pursuit to gain a better understanding of this seeming contradiction.

In undertaking this study one of the largest barriers to collecting and synthesizing information on rural suicide was the almost complete academic segregation of social and psychological based suicide research. These unique and specialized approaches to suicide research can provide valuable information about both individual and structural-level processes only to the extent that they inform each other. In addition to the academic benefits,

melding micro and macro based rural suicide research also ensures a more balanced and informed public policy and community health discussion of rural suicide in the future.

Finally the overall design of this study was developed to address the specific issue of rural suicide rates. The extension of this work to the urban setting: a) adds a natural compliment and comparative reference for rural analysis; and b) further highlights the importance of considering the unique impact of rural-urban geographic space within macro-social suicide research.

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APPENDIX

Appendix 1: Variable Construction Detail

Appendix 1A: Model One Variable Construction Detail

Economic Integration

Civilian Labor Force Unemployment Rate

Defined as the percent of the population 16+ years in the labor force, not working but actively seeking employment in the past four weeks

$$[(\text{Male Unemployed} + \text{Female Unemployed}) / (\text{Male} + \text{Female in Labor Force})] * 100]$$

Female Labor Force Participation Rate

Percent Female Population 16+ years in the labor force (Civilian and Armed Services)

$$[(\text{Female in labor force} / \text{Female Population 16+ years}) * 100]$$

Occupational Diversity

Included as an Index of Qualitative Variation (IQV) ranging from 0 (no diversity) to 1 (maximum diversity) and is calculated from SF3 Table P50 using the following six occupational classifications: 1) Management, Professional and Related Occupations; 2) Service Occupations; 3) Sales and Office Occupations; 4) Farming, Fishing, and Forestry Occupations; 5) Construction, Extraction and Maintenance Occupations; 6) Production, Transportation and Material Moving

Educational Diversity

IQV ranges from 0 (no diversity) to 1 (maximum diversity) and is calculated using SF3 Table P37 using the following eight categories of educational attainment. Educational Attainment Categories: 1) Less than high school; 2) High school diploma; 3) Some college; 4) Associate degree; 5) Bachelors degree; 6) Master's degree; 7) Professional degree; 8) Doctorate degree

Median Family Income

Taken Directly from the SF3 [P77_1]

Household Income Inequality

Included as a Gini coefficient¹⁴ ranging from 0 (Perfect equality) to 1 (perfect inequality) and is calculated from SF3 table P52 using 16 income categories.

Median Education

Calculated using SF3 Table P37: Educational Attainment for the population 25+ years and over. Male and Female tabulations are combined into 16 ordinal categories of educational attainment ranging from 1 (no schooling completed) through 16 (doctorate degree).

¹⁴ Income Inequality is calculated using an executable program developed by Dr. Francois Nielsen, University of North Carolina Chapel Hill, available at <http://www.unc.edu/~nielsen/data/data.htm>. Last accessed 9/9/2006.

Domestic Integration

% Population Living Alone

$[(\text{Single Person Households} / \text{Total Population}) * 100]$

% Population Divorced¹⁵

$[(\text{Male and Female Population 15+ years Divorced}) / (\text{Total population 15+ years}) * 100]$

Sex Ratio

$[(\text{Total male population} / \text{Total female population})]$

Birth Rate

Number of Live Births are obtained from population tables included with the CDC Compressed Mortality Files

$[(\text{Live Births} / \text{Total Population}) * 1000]$

Migration

Net % Migration Change¹⁶

$[(\text{In Migration} - \text{Out-Migration}) / \text{2000 population 5+ Years}] * 100$.

Rural-Urban Structure

Population Size

Taken directly from the 2000 Decennial Census SF3 [P1_1].

% Urban

Percent of the county population living in an urbanized area of 2,500 population or more.

$[(\text{Urban Population} / \text{Total Population}) * 100]$

Demographic Composition

Median Age

Calculated using median from group data equation and 2000 SF3 Table P8.

¹⁵Beginning in 1996 the National Center for Health Statistics Vital Statistics program stopped the collection and reporting of detailed marriage and divorce data, consequently within this study percent divorced population 15 years and older will be used as an alternative measure.

¹⁶Within the Kowalski, Faupel, and Starr (1987) study the this measures was taken directly from the 1977 *County and City Databook*. Examination of the 1977 codebook indicates this measure represents the percent change in population size from 1970-1975. Since the original study does not include descriptive statistics, I assume this measure was included as a +/- value.

Percent Black

Is derived from SF3 Table P6.

$[(\text{Population Black or African American Alone} / \text{Total Population}) * 100]$.

Religious Composition:

Catholic, Main Stream Protestant, and Evangelical Protestant adherence rates taken directly from Glenmary research data

Appendix 1B: Model Two Variable Construction Detail

Economic Integration

Percent Male Population 16+ years Not Working

Defined as Males Unemployed or Not In The Labor Force

$[(\text{Unemployed Males} + \text{Males Out of Labor Force}) / \text{Male Population 16+ Years}] * 100$.

Percent Labor Force Female

$[(\text{Females In Labor Force} / (\text{Males in Labor Force} + \text{Females In Labor Force})) * 100]$

Industrial Dependency

Codes are taken directly from ERS data, included as dichotomous variables and defined as:

Farming Dependent

15 % or more average annual labor and proprietors earnings derived from farming industries from 1998-2000

Mining Dependent

15 % or more average annual labor and proprietors earnings derived from mining industries from 1998-2000

Manufacturing Dependent

25% or more average annual labor and proprietors earnings derived from manufacturing industries from 1998-2000

Federal/State Government Dependent

15 % or more average annual labor and proprietors earnings derived from government industries from 1998-2000

Service Dependent

45% or more average annual labor and proprietors earnings derived from service industries from 1998-2000

Persistent Poverty County

Included as a dichotomous variable defined as having 20% or more of the resident population living in poverty from 1970-2000.

Low Education County

Included as a dichotomous variable defined as having 25% or more of the population 25-64 years old without a high school diploma.

Domestic Integration

% Male Population 25+ Years: Divorced, Separated, or Widowed

$[(\text{Male 25+ Divorced} + \text{Male 25+ Separated} + \text{Male 25+ Widowed}) / \text{Male Pop 25+}] * 100$;

% Male Population 25+ Years: Never Married

$[(\text{Male Pop 25+ Never Married} / \text{Male Pop. 25+P8_26_40}) * 100]$

Sex Ratio Population 15-44

$[(\text{Male Population 15-44 Years} / \text{Female Pop. 15-44 Years})]$.

Migration

% Out-Migration

[(Former residents 5+ years living in different county in 1995 / 2000 Pop. 5+ years)*100];

% In-Migration Out-of-State

[(Pop 5+ years different State or Foreign Country 1995 / 2000 Pop 5+ years)*100];

% In-Migration Same State

[(Pop 5+ years different county same state 1995 / 2000 Pop 5+ years)*100].

Rural-Urban Structure

Population Size

Taken directly from the 2000 Decennial Census SF3 [P1_1].

% Urban

Percent of the county population living in an urbanized area of 2,500 population or more.

[(Urban Population/Total Population)*100]

% Farm Population

[Farm Population/ Total Population)*100]

Metro Adjacency

Included as a dichotomous variable (1= Adjacent) derived from ERS rural-urban continuum codes.

Demographic Composition

% Male population 14-24 years

[(Male Population 14-24 / Male Population)*100]

% Male population 65 years and older

[(Male Population 65+/Male Population)*100].

% Male Population White Non-Hispanic

[(Male Population White Non-Hispanic/ Male population)*100]

% Male Population American Indian (P145C_2/P8_2).

[(Male Population American Indian/Male Population)*100]

Appendix 1C: Model Three Variable Construction Detail

Economic Integration

Change % Male 16+ Not working: 2000-1990

$[(\% \text{ Male Pop } 16+ \text{ years, unemployed or out of labor force in 2000}) - (\% \text{ Male Pop } 16+ \text{ years, unemployed or out of labor force in 1990})]$

Change in Percent Labor Force Female: 2000-1990

$[\% \text{ Labor Force Female 2000}) - (\% \text{ Labor Force Female 1990})]$

Employment Volatility

Calculated using REIS employment data and represents the ten year average percent change in Farm, Non-Farm and Proprietary employment between 1990 and 2000.

Change in Median Family Income¹⁷

$[(\text{Median Income 2000}/.97) - (\text{Median Income 1990}/.72)]$

Change in Household Income Inequality

$|\text{Gini 2000} - \text{Gini 1990}|$

Domestic Integration

Change % Male Population 15+ Years Married 2000-1990

$[\% \text{ Male pop. } 15+ \text{ years married 2000}) - (\% \text{ Male pop. } 15+ \text{ years Married 1990})]$

Change Male:Female Sex Ratio 15-44 Years 2000-1990

$[\text{Sex Ratio 15-44 Years 2000} - \text{Sex Ratio 15-44 Years 1990}]$

Migration

Change % Out-Migration: $|\% \text{ Out Migration 1990} - \% \text{ Out-Migration 2000}|$

Change % In-Migration: $|\% \text{ In-Migration 1990} - \% \text{ In-Migration 2000}|$

Rural-Urban Structure

Population Size

Taken directly from the 2000 Decennial Census SF3 [P1_1].

% Urban

Percent of the county population living in an urbanized area of 2,500 population or more.

$[(\text{Urban Population}/\text{Total Population}) * 100]$

¹⁷. Median family income is based on annual income reported for the year prior to each Decennial Census. To compare dollar amounts across time, median incomes are adjusted using the consumer price index to constant 2000 dollars.

Change % Farm Population

[% Farm Population 2000 - % Farm Population 1990}

Demographic Structure

% Male population 14-24 years

$[(\text{Male Population 14-24} / \text{Male Population}) * 100]$

% Male population 65 years and older

$[(\text{Male Population 65+} / \text{Male Population}) * 100]$.

% Male Population White Non-Hispanic

$[(\text{Male Population White Non-Hispanic} / \text{Male population}) * 100]$

% Male Population American Indian (P145C_2/P8_2).

$[(\text{Male Population American Indian} / \text{Male Population}) * 100]$

Change% Hispanic Population 2000-1990

[Percent Pop Hispanic 2000 - Percent Pop. Hispanic 1990]

Appendix 2: Data Transformation Values

Appendix 2A: Model One Data Transformation Values

Variable	Urban Counties Transformation	Rural Counties Transformation
Crude White Male Suicide Rate	$^{.5}$	$^{.4}$
% White Male Unemployment Rate	$+.5 ^{.1}$	$+.5 ^{.1}$
Occupational Diversity	2	2
Household Income Inequality		$^{-1.4}$
Median Family Income	$^{-.5}$	$^{.9}$
% Male Single Person Household		$^{.7}$
% Divorced	$^{1.6}$	$^{.8}$
Male:Female Sex Ratio	$^{-2}$	$^{-.2}$
Birth Rate	$^{.5}$	$^{.5}$
% Net Migration Change	$+35 ^{1.1}$	$+35 ^{1.1}$
Population Size		$^{.3}$
% Urban	$+.5 ^{.8}$	
Median White Male Age	$^{.5}$	$^{.4}$
% Black	$+.5 ^{.3}$	
Evangelical Protestant Rate	$^{.6}$	$^{.9}$
Mainstream Protestant Rate	$^{.7}$	$^{.4}$
Catholic Rate	$+.5 ^{.2}$	$+.5 ^{.2}$

Appendix 2B: Model Two Data Transformation Values

	Urban Counties	Rural Counties
Variable	Transformation	Transformation
% Labor Force Female	2	$^{1.8}$
% Male 25+ Div/Sep/Widow	9	6
% Male 25+ Never Married	$^{-.2}$	
Male:Female Sex Ratio 15-44 Years	$^{-2}$	$^{-2}$
% Out Migration	$^{-.9}$	$^{-.8}$
% In Migration Long Distance	$^{-.1}$	1
% In Migration Same State	4	1
% Farm Population	$^{-.3}$	
% White Male 15-24 Years	$^{-1.1}$	
% White Male 65 + Years	1	$^{-.3}$
% Male White Non-Hispanic	$+ .5 ^2$	$+ .5 ^{1.6}$
% Male Native American	$+ .5 ^{-.9}$	$+ .5 ^{-.9}$
Evangelical Protestant Rate	6	9
Mainstream Protestant Rate	7	4
Catholic Rate	$+ .5 ^2$	$+ .5 ^2$

Appendix 2C: Model Three Data Transformation Values

	Urban Counties	Rural Counties
Variable	Transformation	Transformation
Change % White Male No Work	+12 $^{\wedge}.8$	+12 $^{\wedge}.4$
Change % Labor Force Female	+10 $^{\wedge}1.6$	+10 $^{\wedge}1.1$
10 Year Ave. Employment Volatility	$^{\wedge}-.1$	$^{\wedge}-.1$
Change Household Income Inequality	+9 $^{\wedge}1.3$	+9 $^{\wedge}.9$
Change % Male 15+ Years Married	+37 $^{\wedge}2$	+37 $^{\wedge}2$
Change % Out-Migration	+52 $^{\wedge}2$	+27 $^{\wedge}1$
Change % In-Migration	+19 $^{\wedge}1$	+22 $^{\wedge}1.6$
Change % Farm Population	+8 $^{\wedge}2$	+8 $^{\wedge}1.3$
% White Male 15-24 Years	$^{\wedge}-1.1$	NA
% White Male 65 + Years	$^{\wedge}.1$	$^{\wedge}-.3$
% Male White Non-Hispanic	+ .5 $^{\wedge}2$	+ .5 $^{\wedge}1.6$
% Male Native American	+ .5 $^{\wedge}-.9$	+ .5 $^{\wedge}-.9$
% Change Hispanic Population	+7 $^{\wedge}-1.6$	+7 $^{\wedge}.3$
Evangelical Protestant Rate	$^{\wedge}.6$	$^{\wedge}.9$
Mainstream Protestant Rate	$^{\wedge}.7$	$^{\wedge}.4$
Catholic Rate	+ .5 $^{\wedge}.2$	+ .5 $^{\wedge}.2$

Appendix 3: Pearson Correlation Coefficients

Appendix 3A: Model One Urban Pearson Correlations

Variables	1	2	3	4	5	6	7	8	9
1. Crude White Male Suicide Rate	1.00								
2. % White Male Unemployed (t)	-.016	1.00							
3. Female L-F Participation Rate	-.186**	-.358**	1.00						
4. Male Occupational Diversity (t)	.101	.187**	-.323**	1.00					
5. Household Income Inequality	.038	.320**	-.277**	.027	1.00				
6. Median Family Income (t)	.084	.400**	-.653**	.430**	.283**	1.00			
7. % Male Single Person Households	.199**	.239**	-.054	-.014	.550**	.209**	1.00		
8. % Divorced (t)	.304**	.041	.057	.134*	.054	.007	.409**	1.00	
9. Male:Female Sex Ratio (t)	.170**	.063	-.179**	.032	.331**	.154*	.201**	.080	1.00
10. Birth Rate (t)	-.193**	.074	.231**	-.088	-.009	.031	-.136*	-.137*	.087
11. % Net Migration Change (t)	-.041	-.319**	.267**	.203**	-.303**	-.453**	-.230**	-.044	-.338*
12. % Urban (t)	-.069	.172	.272**	.0222	.202**	-.354**	.119	.207**	.212**
13. Median White Male Age (t)	.369**	-.144*	-.442**	.212**	.189**	.022	.186**	.267**	.309**
14. % Population Black (t)	.162**	-.060	.074	.030	.272**	.222**	.398**	.127*	.174**
15. Evangelical Protestant Rate (t)	.098	-.065	-.008	-.050	-.132*	.122	-.025	.067	.076
16. Main Stream Protestant Rate (t)	.053	-.110	.185**	-.122	.192**	-.253**	.188**	.025	.224**
17. Catholic Rate (t)	-.089	.305**	-.088	.133*	.263**	-.166**	.076	-.025	.107
	10	11	12	13	14	15	16	17	
10. Birth Rate (t)	1.00								
11. % Net Migration Change (t)	-.202**	1.00							
12. % Urban (t)	.316**	-.130*	1.00						
13. Median White Male Age (t)	-.517**	.020	-.089	1.00					
14. % Population Black (t)	.144*	-.300**	.039	.016	1.00				
15. Evangelical Protestant Rate (t)	-.046	-.157*	-.352**	-.052	-.008	1.00			
16. Main Stream Protestant Rate (t)	-.073	.005	.084	.211**	.052	.297**	1.00		
17. Catholic Rate (t)	.189**	-.115	.576**	.066	-.206**	-.518**	-.072	1.00	

* = $p < .05$, ** = $p < .01$

Appendix 3B: Model One Rural Pearson Correlations

Variables	1	2	3	4	5	6	7	8	9
1. Crude White Male Suicide Rate	1.00								
2. White Male Unemployment Rate (t)	-.103	1.00							
3. Female L-F Participation Rate	-.002	-.264**	1.00						
4. Male Occupational Diversity (t)	-.041	.075	-.084	1.00					
5. Household Income Inequality (t)	.012	-.030	.342**	-.144**	1.00				
6. Median Family Income (t)	-.014	-.334**	.529**	-.151**	.500**	1.00			
7. % Male Single Person Households (t)	.130*	-.058	.099	.011	-.299**	-.182**	1.00		
8. % Divorced (t)	.038	-.010	.234**	-.117*	.096	.096	.175**	1.00	
9. Male:Female Sex Ratio (t)	.158**	-.044	-.075	-.246**	-.206**	-.082	.003	-.043	1.00
10. Birth Rate (t)	-.048	.045	.025	-.032	-.113*	-.268**	-.273**	-.137*	.242**
11. % Net Migration Change (t)	-.027	-.127*	.238**	.051	.129*	.314**	.082	.375**	-.361**
12. Population Size (t)	-.119*	.118*	.137*	-.123*	.049	.150*	-.194**	.355*	.107*
13. % Urban	-.164**	.190**	.098	.238**	.063	-.028	-.291**	-.126*	-.079
14. Median White Male Age (t)	.271**	-.239**	-.226**	.026	-.198**	.059	.353**	.050	.287**
15. Evangelical Protestant Rate (t)	.046	-.049	.039	-.127*	.219**	.186**	-.188**	.002	.132*
16. Main Stream Protestant Rate (t)	.132*	-.335**	.263**	.001	.060	.284**	.033	-.170**	.262**
17. Catholic Rate (t)	-.160**	.253**	-.141**	.368**	.019	-.015	-.141**	-.340**	-.144**

	10	11	12	13	14	15	16	17
10. Birth Rate (t)	1.00							
11. % Net Migration Change (t)	-.299**	1.00						
12. Population Size (t)	.238**	.212**	1.00					
13. % Urban	.338**	-.284**	.194**	1.00				
14. Median White Male Age (t)	-.364**	.017	-.240**	-.335**	1.00			
15. Evangelical Protestant Rate (t)	-.178**	-.115*	-.033	-.122*	.103	1.00		
16. Main Stream Protestant Rate (t)	-.149**	-.174**	-.241**	-.083	.336**	.202**	1.00	
17. Catholic Rate (t)	.034	-.230**	-.102*	.482**	-.187**	.242**	.004	1.00

* = $p < .05$, ** = $p < .01$

Appendix 3C: Model Two Urban Pearson Correlations

Variables	1	2	3	4	5	6	7	8	9	10	11	12
1. Crude White Male Suicide Rate	1.00											
2. % Labor Force Female (t)	.237**	1.00										
3. Farm Dependent	-.012	.013	1.00									
4. Mining Dependent	.043	.005	-.033	1.00								
5. Manufacturing Dependent	.022	-.041	-.111	-.081	1.00							
6. Government Dependent	.007	.037	-.094	-.069	-.233**	1.00						
7. Service Dependent	.122	.164**	-.105	-.077	-.259**	-.219**	1.00					
8. Persistent Poverty County	-.111	.215**	.153*	.019	.032	.055	-.157*	1.00				
9. Low Education County	.056	-.070	.210**	.103	.199**	-.162*	-.217**	.337**	1.00			
10. % Male 25+ Div/Sep/Widow (t)	.363**	.323**	.043	.043	.122	.140*	.015	.098	.189**	1.00		
11. % Male 25+ Never Married (t)	-.012	-.420**	.044	-.063	.064	-.279**	-.087	-.302**	-.099	-.308**	1.00	
12. Male:Female Sex Ratio 15-44 (t)	.112	.452**	-.006	.077	.057	-.273**	.092	.196**	.048	.093	.022	1.00
13. % Out Migration (t)	.126*	.025	.089	.022	.227**	-.379**	-.078	.069	.351**	.098	.116	.076
14. % In Migration Long Distance (t)	.099	.130*	.191**	.128*	.174**	-.236**	-.348**	.245**	.356**	.177**	.152*	.160*
15. % In Migration Same State (t)	-.089	-.147*	.040	-.058	-.053	-.071	-.116	-.105	-.127*	-.247**	.340**	-.233**
16. % Farm Population (t)	-.019	.169**	-.311**	.058	-.201**	.124*	.385**	-.153*	-.282**	-.035	-.433**	.085
17. % White Male 15-24 Years (t)	.297**	.197**	-.007	-.049	-.012	-.363**	.423**	-.175**	-.017	.114	.206**	.152*
18. % White Male 65+ Years (t)	.322**	.418**	.070	-.026	-.083	-.113	.349**	.050	.007	.451**	.042	.213**
19. % Male White Non-Hispanic (t)	.086	-.310**	.019	-.062	.088	-.210**	.037	-.398**	-.215**	-.169**	.663**	-.046
20. % Male Native American (t)	.089	.267**	.156*	-.132*	.074	-.101	.057	.208**	.128*	.031	-.125*	.121
21. Evangelical Protestant Rate (t)	.098	-.057	.165**	-.067	.181**	.003	-.288**	-.052	.025	.078	.341**	.015
22. Main Stream Protestant Rate (t)	.053	.258**	-.091	-.128*	-.001	.081	.084	-.083	-.232**	-.045	.001	.145*
23. Catholic Rate (t)	-.089	.059	-.226**	.114	-.219**	.017	.274**	-.022	-.165**	-.123*	-.137*	.141*

* = $p < .05$, ** = $p < .01$

Continued Appendix 3C

Variables	13	14	15	16	17	18	19	20	21	22	23
13. % Out Migration (t)	1.00										
14. % In Migration Long Distance (t)	.338**	1.00									
15. % In Migration Same State (t)	-.153*	.211**	1.00								
16. % Farm Population (t)	-.193**	-.539**	-.431**	1.00							
17. % White Male 15-24 Years (t)	.315**	-.024	-.053	.037	1.00						
18. % White Male 65+ Years (t)	.167**	.137*	-.294**	-.051	.575**	1.00					
19. % Male White Non-Hispanic (t)	.140*	-.058	.256**	-.190**	.253**	.044	1.00				
20. % Male Native American (t)	.141*	.140*	.048	-.085	.131*	.092	-.031	1.00			
21. Evangelical Protestant Rate (t)	-.047	.199**	.071	-.403**	-.179**	-.021	.299**	.056	1.00		
22. Main Stream Protestant Rate (t)	-.320**	.138*	.096	-.054	.105	.199**	-.030	.091	.296**	1.00	
23. Catholic Rate (t)	-.108	-.036	-.197**	.460**	.042	.180**	-.261**	-.310**	-.518**	-.072	1.00

* = $p < .05$, ** = $p < .01$

Appendix 3D: Model Two Rural Pearson Correlations

Variables	1	2	3	4	5	6	7	8	9	10	11	12
1. Crude White Male Suicide Rate	1.00											
2. % Labor Force Female (t)	.142**	1.00										
3. Farm Dependent	.019	-.285**	1.00									
4. Mining Dependent	.108*	-.106*	-.147**	1.00								
5. Manufacturing Dependent	.024	.140**	-.355**	-.194**	1.00							
6. Government Dependent	-.124*	.105	-.178**	.097	-.236**	1.00						
7. Service Dependent	.025	.010	-.079	-.043	-.105*	-.053	1.00					
8. Persistent Poverty County	.006	.348**	.052	-.141**	-.018	-.032	-.124*	1.00				
9. Low Education County	-.029	.013	.105*	-.009	.092	-.045	-.160**	.378**	1.00			
10. % Male 25+ Div/Sep/Widow (t)	.066	.365**	-.199**	-.190**	.145**	.176**	-.010	.235**	.096	1.00		
11. % Male 25+ Never Married	-.004	.541**	-.056	-.174**	.073	.181**	-.046	.479**	.273**	.457**	1.00	
12. Male:Female Sex Ratio 15-44 (t)	.143**	.231**	-.157**	-.015	.185**	-.284**	.016	.192*	-.078	-.033	-.025	1.00
13. % Out Migration (t)	-.038	.309**	-.232**	-.239**	.254**	-.007	.065	.120*	.105*	.247**	.259**	.033
14. % In Migration Long Distance (t)	-.011	-.012	.053	-.146**	-.018	.057	.201**	-.179**	-.041	.046	-.004	-.165**
15. % In Migration Same State (t)	.057	-.231**	.145	.092	-.326**	.180**	.070	-.377**	-.382**	-.054	-.266**	-.353**
16. Metro Adjacent County	.019	.003	-.098	-.025	.044	.052	-.010	-.127*	-.115*	.205**	.0890	-.052
17. % Farm Population	.095	-.284**	.374**	-.030	-.244**	.159**	-.046	-.180**	-.0179**	-.303**	-.243**	.015
18. % White Male 15-24 Years	-.154**	-.056	-.017	.063	-.107	.190**	-.139**	.008	.068	-.122*	-.022	-.197**
19. % White Male 65+ Years (t)	-.226**	-.120*	.005	.000	.147**	.096	-.170**	-.001	.301**	.012	.099	-.223**
20. % Male White Non-Hispanic (t)	.092	-.247**	-.116*	-.115*	.102*	-.129*	.207**	-.600**	-.407**	-.080	-.512**	.015
21. % Male Native American (t)	.092	.244**	-.090	.006	.175**	-.084	.007	.184**	.164**	.072	.196**	.175**
22. Evangelical Protestant Rate (t)	.047	-.163**	.102	.028	.053	-.218**	-.067	-.279**	-.107*	-.166**	-.419**	.072
23. Main Stream Protestant Rate (t)	.132*	.014	.112*	.025	.005	-.199**	.018	-.156**	-.174**	-.252**	-.159**	.190**
24. Catholic Rate (t)	-.160**	-.407**	.075	.215**	-.299**	.108	.018	-.088	-.107*	-.357**	-.276**	-.110*

* = p < .05, ** = p < .01

Continued Appendix 3D

Variables	13	14	15	16	17	18	19	20	21	22	23	24
13. % Out Migration (t)	1.00											
14. % In Migration Long Distance (t)	.034	1.00										
15. % In Migration Same State (t)	-.330**	.087	1.00									
16. Metro Adjacent County	.036	.005	.133*	1.00								
17. % Farm Population	-.266**	-.229**	.314**	-.066	1.00							
18. % White Male 15-24 Years	-.065	.090	-.007	-.034	.140**	1.00						
19. % White Male 65+ Years (t)	.235**	.206**	-.123*	.075	-.321**	.377**	1.00					
20. % Male White Non-Hispanic (t)	.136*	.211**	.304**	.055	.135*	-.119*	-.087	1.00				
21. % Male Native American (t)	.249**	-.134*	-.204**	-.132*	-.056	-.120*	.034	-.130*	1.00			
22. Evangelical Protestant Rate (t)	-.062	-.010	-.020	-.150**	.094	-.056	-.135*	.481**	-.071	1.00		
23. Main Stream Protestant Rate (t)	-.258**	-.061	.138**	-.210**	.441**	-.099	-.358**	.138**	.008	.202**	1.00	
24. Catholic Rate (t)	-.398**	-.208*	.177**	.024	.215**	.195**	-.115*	-.210**	-.344**	.242**	.004	1.00

* = $p < .05$, ** = $p < .01$

Appendix 3E: Model Three Urban Pearson Correlations

Variables	1	2	3	4	5	6	7	8	9	10	11	12
1. Crude White Male Suicide Rate	1.00											
2. Change % White Male No Work (t)	.027	1.00										
3. Change % Labor Force Female (t)	-.070	-.204**	1.00									
4. 10 Year Ave. Employment Vol. (t)	.220**	.242**	-.136*	1.00								
5. Change Median Family Income (t)	-.033	-.465**	.060	-.492**	1.00							
6. Change H.H. Income Inequality (t)	-.022	.212**	.158*	.039	-.316**	1.00						
7. Change % Male 15+ Married (t)	-.100	-.390**	-.037	-.265**	.431**	-.154*	1.00					
8. Change % Out-Migration (t)	-.006	.036	.033	.020	.011	-.143*	-.195**	1.00				
9. Change % In-Migration (t)	-.008	.131*	-.075	.117	-.308**	.351**	.151*	-.268**	1.00			
10. Change % Farm Population (t)	.061	.054	-.048	.253**	-.160*	.076	.040	-.157*	.261**	1.00		
11. % White Male 15-24 Years (t)	.297**	-.098	.128*	-.144*	.132*	.069	.041	-.004	.109	-.048	1.00	
12. % White Male 65+ Years (t)	.322**	.029	-.061	.380**	-.298**	.049	-.301**	.047	.172**	.068	.575**	1.00
13. % Male White Non-Hispanic (t)	.086	-.315**	.115	-.291**	.236**	-.001	.099	-.066	.081	-.002	.253**	.044
14. % Male Native American (t)	.089	.010	.147*	.040	-.075	.070	-.031	-.146*	-.023	-.008	.130*	.092
15. Change % Hispanic Population (t)	.110	-.072	-.261**	.008	.195**	-.114	.120	-.156*	-.071	.074	-.003	.013
16. Evangelical Protestant Rate (t)	.098	.034	.041	.176**	-.079	-.123*	-.113	.010	-.188**	.061	-.179**	-.021
17. Mainstream Protestant Rate (t)	.053	-.020	.226**	.180**	.031	.062	-.033	-.047	-.073	.061	.105	.199**
18. Catholic Rate (t)	-.089	.012	-.245**	.128*	.016	.027	-.113	.280**	.079	.111	.042	.180**
	13	14	15	16	17	18						
13. % Male White Non-Hispanic (t)	1.00											
14. % Male Native American (t)	-.031	1.00										
15. Change % Hispanic Population (t)	.166**	.109	1.00									
16. Evangelical Protestant Rate (t)	.299**	.056	.018	1.00								
17. Mainstream Protestant Rate (t)	-.030	.091	-.110	.297**	1.00							
18. Catholic Rate (t)	-.261**	-.310**	-.188**	-.518**	-.072	1.00						

* = $p < .05$, ** = $p < .01$

Appendix 3F: Model Three Rural Pearson Correlations

Variables	1	2	3	4	5	6	7	8	9	10	11	12
1. Crude White Male Suicide Rate	1.00											
2. Change % White Male No Work (t)	-.083	1.00										
3. Change % Labor Force Female (t)	.009	-.253**	1.00									
4. 10 Year Ave. Employment Vol. (t)	-.000	-.063	.032	1.00								
5. Change Median Family Income (t)	-.000	-.198**	.007	-.139**	1.00							
6. Change H.H. Income Inequality (t)	-.063	.071	.139**	.043	-.066	1.00						
7. Change % Male 15+ Married (t)	.066	-.538**	-.002	.154**	.001	.040	1.00					
8. Change % Out-Migration (t)	-.020	.044	-.104	-.014	.050	-.127*	-.125*	1.00				
9. Change % In-Migration (t)	.033	-.115*	-.053	.121*	-.221**	-.039	.393**	-.100	1.00			
10. Metro Adjacent County	.019	-.072	-.000	.022	-.040	.065	-.059	-.087	-.031	1.00		
11. Change % Farm Population (t)	.032	-.060	-.130*	.240**	.005	.097	.110*	.129*	.159**	.006	1.00	
12. % White Male 15-24 Years (t)	-.154**	.054	-.076	-.010	-.068	-.129*	-.151**	.061	.025	-.034	-.064	1.00
13. % White Male 65+ Years (t)	-.226**	.197**	.085	-.093	-.223**	.023	-.137*	.078	.031	.075	-.199**	.377**
14. % Male White Non-Hispanic (t)	.092	-.373**	.233*	.004	.144**	.030	.189*	.032	-.035	.055	.032	-.119*
15. % Male Native American (t)	.092	.058	.062	-.017	.068	.060	.037	-.046	-.006	-.132*	-.065	-.120*
16. Change % Hispanic Population (t)	-.092	.061	.062	.052	-.215**	-.074	-.137*	.141**	-.065	.041	-.003	.104
17. Evangelical Protestant Rate (t)	.046	-.130*	.103	.237**	-.123*	.021	.079	.039	.028	-.150**	.021	-.056
18. Mainstream Protestant Rate (t)	.132*	-.111*	.022	.204**	.065	.015	.167**	.023	-.037	-.210**	.254**	-.099
19. Catholic Rate (t)	-.160**	.058	-.409**	.049	.026	-.209**	-.013	.175**	.047	.024	.172**	.185**
	13	14	15	16	17	18	19					
13. % White Male 65+ Years (t)	1.00											
14. % Male White Non-Hispanic (t)	-.087	1.00										
15. % Male Native American (t)	.034	-.130*	1.00									
16. Change % Hispanic Population (t)	.031	-.051	-.296**	1.00								
17. Evangelical Protestant Rate (t)	-.135*	.481**	-.071	.102	1.00							
18. Mainstream Protestant Rate (t)	-.358**	.138**	.008	.128*	.202**	1.00						
19. Catholic Rate (t)	-.115*	-.210**	-.344**	.288**	-.242**	.004	1.00					

* = $p < .05$, ** = $p < .01$

VITA

Russell Davis received the degree of Bachelor of Science in agriculture and Master of Science in rural sociology from The Ohio State University. He will receive his Doctor of Philosophy degree from Louisiana State University during the Spring 2007 commencement.