SOCIAL STRUCTURE, SOCIAL CONTROL, AND CRIME IN RURAL COMMUNITIES: A TEST OF SOCIAL DISORGANIZATION THEORY

DISSESION

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By

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ABSTRACT

This study examines the role of a community or place in the social control of crime. The objectives of this study are to answer questions of the where, the why and the how of crime rate variations in rural communities, and if these are associated with different degrees or levels of social control. For the purpose of this dissertation, a community or place is defined as a locality where people interact with each other and share, at least to some extent, a common identity.

This study uses a macro-level perspective to study rural community and crime. The unit of analysis is the county, which serves as a proxy for community. It is assumed that county-level social structural and socioeconomic characteristics determine its social integration and social control. Following the tradition of social disorganization theory originating from Shaw and McKay, five macro-level social structural and socioeconomic status characteristics are employed and tested. Social disorganization theory argues that crime is associated with social structural and socioeconomic characteristics that negate or reduce the ability of local groups and individuals to control criminal behavior. This study focuses both on the spatial and
temporal differences of nonmetropolitan counties and its consequence for variations in crime rates.

A sample of 1,541 nonmetropolitan counties is used in this study. Data of county crime rates is obtained from the Uniform Crime Report (UCR) of FBI. Data of county social structural and socioeconomic characteristics is obtained from the 1990 and 2000 Census of the Population. The Rural-Urban Continuum Codes come from the Economic Research Service (ERS) of the United States of Department of Agriculture, which provides information for the classification of metropolitan and nonmetropolitan counties. This study adopts multiple regression and structural equation model analyses to test various hypotheses.

There are several findings:

(1) We confirmed that social disorganization perspective to some extent is useful for explaining variations in the crime rates of nonmetropolitan counties.

(2) The variation in crime rates among nonmetropolitan counties varies with the differences in their social structural and socioeconomic dimensions.

(3) Temporal changes in social structure and socioeconomic characteristics can explain variations in crime rates among nonmetropolitan counties.

(4) The consequence of spatial geographical influence of metropolitan counties on the social integration or social control of crime in nonmetropolitan counties varies by the latter’s degree of rurality. The crime rates of more rural
nonmetropolitan counties are affected to a greater degree by proximity to a
metropolitan area than the crime rates of micropolitan counties proximate to metro
areas.

(5) Social structural characteristics, such as family disruption, have a larger
effect on the control of crime than socioeconomic status factors of nonmetropolitan
counties.
Dedicated to My Parents
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VITA

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FIELD OF STUDY

Rural Sociology
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CHAPTER 1

INTRODUCTION

One of the best known, if frequently inaccurate generalizations about crime and place, is that it varies inversely with population size. As well, for smaller places, it is commonly assumed that their rates of crime decrease with their distance from a large city. Both generalizations have been part of criminological lore since sociologists with the Chicago School pioneered the empirical study of crime in American society during the first half of the 20th century (Vold, 1941; Van Dijk, 1999).

In one sense, these less than accurate images are founded in fact. For example, a decades-long rural-urban differential in official rates of crime continues into this new century. Weisheit and Donnermeyer (2000) examined rural and urban crime differences utilizing the FBI’s Uniform Crime Report over a 30 plus year period (1966-1997). They found city to rural ratios for rates of violent crime to be between five and ten to one; and the city to rural ratios for rates of property crime to be between four and five to one. Yet,
even though rural rates are normally lower than rates in the city, it is also true that some rural places have unusually high rates for various types of property and/or violent crimes, and some urban places display very low rates for these same crimes. The major point is there is substantial variability in crime across rural places which belie simplistic assumptions about systemic rural-urban differences in crime (Donnermeyer, 2007).

Another consideration in the study of rural crime is the research by Wells and Weisheit (2004) on patterns of crime in rural and urban counties. They showed that an urban crime model might not be fully useful in explaining rural crime; at least without appropriate modifications. For example, they found weak effects from economic factors on both property and violent crime rates. The notion that the causal links or dynamics between the characteristics of rural places and their crime rates may be different from those for urban places is also supported through recent quantitative studies by Rephann (1999), Osgood and Chambers (2000) and Jobes, Barclay, Weinand and Donnermeyer (2004), and in earlier work by Wilkinson (1984a; 1984b). Specifically, Wilkinson (1984a; 1984b) suggested that the smaller population size and density of rural places makes them more vulnerable to change when it does occur, hence, change disrupts established social and cultural patterns that control crime in its various forms more so in rural than in urban
Criminologists, rural sociologists and sociologists have traditionally viewed rural communities as places with highly cohesive social relations, law-abiding residents, low tolerance of deviance, and hence, lower rates of crime. To date, more and more scholars and researches have begun to challenge the generalization that all, or nearly all, rural places have low crime rates, and have begun more in-depth investigations of the social structural and economic factors associated with variations in rural crime (Rephann, 1999; Jobes et al., 2004; Cancino, 2005; Weisheit, Falcone & Wells, 2006).

While scholars do not define what is a rural community or rural place in a consistent way,¹ many with an interest in studies of crime and deviance conclude that rural crime is a real issue deserving of much more attention. As well, some scholars are calling for a greater significance to the study of rural crime in order to test and revise various criminological theories, which they believe may be limited in their ability to generalize due to their urban origins, urban focus, and limited application or testing, up to this point, in the rural context (Donnermeyer & DeKeseredy, 2008). Hence, “the countryside is

¹ Throughout this dissertation, words and phrases like “nonmetropolitan”, “rural”, “rural community”, “rural places” will be used interchangeably. However, the eventual focus of this dissertation is “nonmetropolitan counties” as defined by the US Bureau of the Census.
significant in contemporary criminology mainly because of its absence (Moody, 1999, p. 8).”

As well, on an anecdotal level, it makes sense to give rural crime a more central focus within the fields of rural sociology, criminology and sociology. Recently, several high profile crime events were reported in newspapers that happened to take place in nonmetropolitan locations. These stories varied in content, including the production, processing and trafficking of drugs, drug addiction among rural people, human trafficking, violence against women and children, homicides, high ticket property crime, and other crimes that frequently make front page, headline news. Consider the following:

*In the San Joaquin Valley of California, the theft of metals (such as cooper) from farm equipment and machinery was reported to be nearly $5 million in 2006. ([http://www.desertdispatch.com/onset?db=desertdispatch&id=598=article.html](http://www.desertdispatch.com/onset?db=desertdispatch&id=598=article.html) (12/21/08))

*Agents for the Minnesota Bureau of Criminal Apprehension recently raided a house in a rural area suspected of being a methamphetamine lab. In the backyard, they founded a dog stabbed to death because the owner
believed the animal had been “bugged” by agents, and then forced his son outside to see the canine corpse and warn him that his was the same fate if he said anything about his dad’s lab to the police.

(http://www.news.minnesota.publicradio.org/features/200004/24_newsr
oom_ruralcrime-m/overview (1/20/09)

*In the state of Washington, a 22 year old man from rural Washington County was brought up on capital murder charges for the robbery and shooting of a clerk at a rural grocery store, and then attempting to burn the store. (http://waff.com/Global/story.asp?S=9561391) (1/15/09)

*In rural village of Middleville, New York, along a road by West Canada Creek, is a bank branch that is convenient to the local population but is frequently the target for robbers because of its relatively secluded location.

(http://www.utiaod.com/homepage/x1647201773/State-Police-searching
-for-bank-robber) (1/11/2009)

These incidents frequently surprise readers because they challenge the notion of a peaceful and organized countryside, and raise concerns about safety and security among
people who live in rural communities. Hence, it is important to ask questions about “the why” and “the how” of rural crime. Is it because traditional social structures in nonmetropolitan areas have been destroyed or disrupted? Or is it a long-term and widespread misunderstanding of rural realities?

The purpose of this dissertation is to bring evidence to bear on why some rural places have more crime than other rural localities, that is, why there are variations in crime across different kinds of rural places. Rural sociologists readily speak of the diversity of rural communities, therefore, what features of these places are associated with variability in their rates of crime? Further, if crime varies with rural community characteristics, to what extent must criminological theories, such as social disorganization (whose origins are with the Chicago School of Sociology), be modified to account for the empirical realities that lie beyond the city limits?

A distinction must be drawn between individual-level versus community-level approaches to the study of rural crime. The former focuses on the behavior and motivations of individual offenders, and the reactions of individual victims. The latter is an ecological focus, examining variations of crime in space and time, and the factors associated with these differences.
Community as an appropriate unit of study has gained renewed attention over the past several decades within the field of criminology (Reiss, 1986; Bursik, 1986; Sampson & Groves, 1989; Sampson, Morenoff & Gannon-Rowley, 1997, Silver, 2000; Warner, 2007). Hence, there is also a renewed interest in the ecology of crime. Some communities, or neighborhoods within, are seen as varying by the degree to which they are places where persons who are frequent violators of various offenses reside. In other communities and neighborhoods, there is a high degree of social control and relatively little crime. Why do these places vary? Further, why do some places exhibit higher rates for specific crimes, but lower rates for other types of criminal offenses? What are the social structural, economic and cultural features that help us understand the dynamics of crime in relation to place?

As criminologists and rural sociologists have turned their attention to the ecology of crime, scholarly attention to crime and rural places also emerged (Wilkinson, 1984a, 1984b; Arthur, 1991; Rephann, 1999; Barnett & Mencken, 2002; Jobes et al., 2004; Donnermeyer & DeKeseredy, 2008). The focus on rural crime began in part with the interest of rural sociologists about the various impacts of rapid population and economic growth associated with energy development in small, western towns (Wilkinson,
Reynolds, Thompson & Ostresh, 1984; Krannich, Greider & Little, 1985; Krannich, Berry & Greider, 1989; Freudenburg & Jones, 1991; Seydlitz, Laska, Spain, Triche & Bishop, 1993). This has blossomed into a more general interest in rural crime vis-à-vis the relationship of social change and its impact on rural peoples and places (Wilkinson, 1984a, 1984b; Kowalski & Duffield, 1990; Arthur, 1991; Rephann, 1999; Osgood & Chambers, 2000; Barnett & Mencken, 2002; Lee, Maume & Ousey, 2003; Jobes et al., 2004; Resig & Cancino, 2004; Wells & Weisheit, 2004; Jobes, Donnermeyer & Barclay, 2005; Cancino, 2005; Donnermeyer, Jobes & Barclay, 2007). Both sets of literature share a common conceptual root, which is the utilization of such concepts as *gemeinschaft*, cohesion, integration, collective efficacy, and social capital to describe the structural characteristics of rural places in relation to crime (Sampson, Raudenbush & Earls, 1997; Donnermeyer, 2007; Donnermeyer & DeKeseredy, 2008).

This dissertation endeavor seeks to add new insights into the study of rural crime. It addresses the relationship between social and economic changes in non-metropolitan counties and official rates of crime. Information on social and economic change is gathered from available census data, while crime rate data is available from the Federal Bureau of Investigation’s *Uniform Crime Report*, which is published annually.
1.1 Significance of the research

A study of social structure, change and crime at rural places can reveal the need to revise our understanding of security and safety in rural areas. There has been a widespread tendency to regard the countryside as a set of uniformly peaceful and socially organized places. As mentioned by Flora, Flora & Fey (2004), “in the past, small size and isolation combined to produce relatively homogenous rural cultures, economics based on natural resources, and a strong sense of local identity” (p. 1). However, this conventional knowledge (perhaps mythology is the better term) of well-controlled, cohesive rural places is one reason why for most of the twentieth century, scholars failed to focus on crime in the rural context.

The concept of community provides a useful way to understand rural crime. First, community provides the context or situation in which to understand an individual’s behavior, whether that behavior is law-abiding or criminal. This is well known as the concept of the “sociological imagination” by C.W. Mills (1959). Individual level behaviors (private troubles) can only be understood in terms of social structure (public issues). Second, community can be defined as a group of people who share the same identity, and act, at least to some degree, in concert to meet various socially defined needs.
Therefore, people who live in the same location influence each other to some extent, even in places which display very limited levels of cohesion or social organization. Third, people act through community-located networks -- from neighborhood groups, to friendship circles, to tight-knit cliques -- that either promote or control criminal behavior. Fourth, communities are social systems, with various institutions, such as schools, police, and churches that meet basic socially defined needs. These institutions determine the degree or extent of social control over the behavior of individuals, hence, aggregate level social and economic characteristics of communities should co-vary with criminal behavior as expressed through aggregate-level crime rates.

The choice of study unit is important because the relationship between social structure and aggregate level measures of behavior is different from the relationship between social structure and individual behaviors that can be found in more case study and qualitative studies of crime (Jobes, Donnermeyer & Barclay, 2005). Hence, community as a unit of study has a theoretical and research advantage, especially because much that is individual behavior cannot be explained by the personal, social and economic characteristics of individuals alone (Reiss, 1986; Sampson, Raudenbush & Earls, 1997). One famous and classic example of this is the insights from Shaw and
McKay (1942), who use social disorganization theory to explain variations of crime by the territorial distribution of peoples in differing kinds of urban neighborhoods. Their idea highlights the social influence of place and its sociological significance for understanding crime.

In addition, the importance of a community-level study of crime is that it shows the collective power of place in relationship to criminal behavior. Today, criminologists frequently express this power of place in such terms as social disorganization (Cancino, 2005), collective efficacy (Sampson, Raudenbush & Earls, 1997; Resig & Cancino, 2004), and social guardianship (Spano & Nagy, 2005), all of which are similar to the way many rural sociologists define social capital (Flora, Flora & Fey, 2004). Generally, those studies employ either an ecological model or a structural model, or both, in predicting how place-based characteristics co-vary with the occurrence of crime.

Large-scale and long-term change in the social and economic characteristics of place has been an interest to rural sociologists for many decades (Brown & Swanson, 2003). Further, most of what rural sociologists talk about as significant social and economic changes in rural societies and peoples are the very factors that interest criminologists who examine community and crime (Donnermeyer, 2007).
Different criminological theories explain the social processes of crime in different ways. Subcultural theory sees increases in crime as caused by the development of deviant and criminal cultures, which more likely emerge in highly differentiated social systems. Those who use opportunity theory examine crime factors related to changes in lifestyles, such as the intersection of a motivated offender and a desirable target (either a person or property) in the relative absence of guardianship. Social disorganization theorists believe that crime rates are related to those factors that decrease social control, and that these show specific ecological variations across both space and time (Tittle, 2000; Cao, 2004). Yet, despite their conceptual differences, all three recognize that the social processes which influence behaviors, including criminal actions, occur at the places where people live, work, go to school and church, enjoy leisure time pursuits, eat at restaurants, help their neighbors and otherwise engage in an endless variety of interactions.

There is a great deal to be learned about rural crime. As Weisheit, Falcone and Wells (2006) emphasize, many rural areas have experienced the kinds of changes that are predictive of rising crime. As well, the social impacts of crime to rural communities and rural peoples can be significant for issues related to quality of life and future prospects for the economic and social development of rural places (Rephann, 1999; Donnermeyer

12
and Tunnell, 2007). Thompson (1996) concluded that the nature of some forms of crime may make rural residents more vulnerable to victimization than urban residents.

Some types of rural security issues have the potential for society-wide impacts as well. For example, both domestic and international sources of terrorism could impact agricultural productivity, the availability of food, and perceptions of trust about the safety of food (Moats, 2007). Drug production, transport and trafficking are major economic enterprises in many rural areas, especially marijuana and methamphetamines, which in turn, influences quality of life issues and the normative structures of places, both rural and urban (Weisheit, 1993; Weisheit, Falcone & Wells, 2006; Donnermeyer & Tunnell, 2007).

1.2 Research question

Rural America does not exist in a vacuum, immune from the greater social forces affecting America’s urban centers. As well, crime as it is manifested in nonmetropolitan areas is also related to the economic and social welfare of rural places and rural peoples. Hence, the basic research question of this dissertation is: How do changes in the social and economic structure of rural communities influence changes in their rates of crime?

On a more operational level, the research question becomes: To what extent are changes
in various social and economic indicators of non-metropolitan counties, as measured through available census data, related to variations in official rates of violent and property crime, as measured by the FBI's Uniform Crime Report.

There are two approaches to an ecological-structural model of crime. The first approach considers that social control in a community is shaped over a long period, so that it is stable in the short term. Places with high crime rates have a disrupted or disorganized social system. This stable society assumption fits well with a cross-sectional study of crime rate variations across different kinds of specific places.

The second approach assumes that crime rates are not stable at specific places, even over relatively short periods of time. Crime rates change over time because places are always changing. A low crime rate community can become a high crime rate community because of these changes, and change back again as well. Past studies, both urban and rural, have focused less on answering this question than on the former, that is, on cross-sectional variations rather than longitudinal variations? In this study, I will focus on both.

It could be argued that locality is neither a guarantee of variation in rural community security or insecurity, that is, of low or high rates. The reason for this is that external
factors may be more important for explaining crime rate variations across smaller places than internal factors (Wilkinson, 1984a; 1984b; Donnermeyer 2007). Crime variations may be more regional than local, hence, crime rate differences across rural communities in the same region are negligible. However, it could be counter-argued that macro-level structural features of American society influence crime at the local level by affecting how the social and economic dimensions of specific communities influence local expressions of crime.

This dissertation will examine the relationship of the social and socioeconomic dimensions of nonmetropolitan counties and both violent and property crime, based on the tenets of social disorganization theory. I examine crime rates as derived from the Uniform Crime Reports of the FBI for a twelve year period (1994-2005). Four 3-three periods are used to see how crime rates co-vary with changes in the social and socioeconomic dimensions of nonmetropolitan counties, as indicated through the 1990 and the 2000 census. With these considerations in mind, there are three working hypotheses proposed in this study:

(1) Nonmetropolitan counties vary in terms of their social structural and socioeconomic status dimensions, and accordingly, in their rates of crime.
Changes in social structural and socioeconomic status dimensions of nonmetropolitan counties are predictive of changes in their rates of crime.

There is a time gap for how social structural and socioeconomic status change in nonmetropolitan counties affects variations in rates of crime.

1.3 Outline of the dissertation

Chapter 2 not only reviews the literature related to rural crime, but develops a series of specific hypotheses related to the social structural and socioeconomic status characteristics of places and crime. These hypotheses are described within the three working hypotheses described immediately above.

Chapter 3 describes the methodology used in this study, from sources of the data, to the operationalization of variables, to statistical procedures.

Chapter 4 presents the findings. It begins with a descriptive analysis of crime rates in both metropolitan and nonmetropolitan counties of the US, and of various structural characteristics. It then proceeds to a description of the results of the multivariate analyses, including a series of regression and structural equations analyses.

Chapter 5 reviews the research findings, assesses the viability of social disorganization theory, and recommends future research on rural place and crime.
CHAPTER 2

LITERATURE REVIEW

In this chapter, I describe both social disorganization theory and recent research on crime in rural communities. Almost all of these studies focus on American communities, with a few adopting the same kind of framework to examine rural crime in countries like Australia. After reviewing the literature, I re-state the research question and describe my hypotheses.

The focus of social disorganization theory is the relationship of place-based characteristics to crime. It assumes that aggregate level characteristics, such as population stability or the proportion of two-parent families, for example, are indicators of a community’s cohesion and common identity. In nonmetropolitan areas, criminologists and rural sociologists see a variety of ways that cohesion may be threatened, including rapid population and/or economic growth, growing urbanization, high levels of unemployment and persistent poverty, and a variety of other structural-level social and
economic conditions (Wood, 1942; Wilkinson, 1984a, Wilkinson, 1984b; Krannich et al., 1985; Arthur, 1991; Rephann, 1999; Jobes, 1999; Osgood & Chambers, 2000; Lee, Maumee & Ousey, 2003; Wells & Weisheit, 2004; Reisig & Cancino, 2004; Spano & Nagy, 2005). Many scholars of rural life also point to the diffusion of urban culture and values as a basic, long-term shift that influences individual behavior and the integration of individuals and groups in nonmetropolitan localities (Fischer, 1980; Wilkinson, 1984a).

Classic sociological theories, including functionalism and conflict, recognize that broad social structural forces and long-term change impose basic limits on the capacity of local institutions and organizations to control the behavior of residents, such as through localized versions of social norms, social ties, and community identity (Jacoby, 1994; Anderson & Dyson, 2002). Hence, criminological theories of place provide a useful application of these basic sociological principles in ways that allow researchers to develop appropriate research questions and instigate empirical studies to examine the specifics about how these social forces are related to crime (Anderson & Dyson, 2002).

Many interpretations of classic sociological theories and concepts from the nineteenth century by Emile Durkheim and Ferdinand Tönnies, which to some extent
continue to be used into this new century, would see intrinsic differences in levels of social disorganization between rural and urban areas. These views assume that social disorganization is never a major feature of nonmetropolitan or rural areas, especially when compared to urban areas, because smaller and less densely populated areas exhibit more fully integrated social relations between peoples and groups (Weisheit & Donnermeyer, 2000). However, the assumption that there are immutable differences between rural and urban areas, such that rural areas automatically have both less social disorganization, more social control and less crime, is challenged by a great deal of new criminological literature that has developed over recent decades in the US and elsewhere (Donnermeyer, 2007).

As already mentioned, scholars from the Chicago School of Sociology observed the ecological and structural evolution of areas inside the city and concluded that different neighborhoods manifest different rates of crime, and that an area’s crime rate changes over time concurrent with changes in its social and economic characteristics (Anderson & Dyson, 2002; Davies, 2006; Brantingham & Brantingham, 1981). More recently, scholars have applied the tenets of social disorganization theory to rural areas, examining crime rate variations with the social and economic traits of locations with

2.1 Rural community and crime

The idea of “rural” elicits a set of common images for people. It evokes a countryside populated by family-based farms, spaces much less crowded than big cities, a relatively homogeneous culture with values, norms and beliefs shared by its members, and close-knit communities where everyone knows most everyone else (Flora, Flora & Fey, 2004; Donnermeyer, 2007). When this image of rural is compared to its urban counterpart, however false and stereotypical these images of both may be, it serves to remind scholars that the social forces we commonly associate with urbanization, including industrialization, transportation, mass media, globalization and regional development, have the potential to greatly change the sociological make-up of rural communities.

The images that simultaneously describe rural communities as both cohesive/organized and crime free might be correct, at least for some places, but for most, it is either partially or completely inaccurate and serves as one obstacle to the study of rural crime. This tandem of false images denies variability or diversity in rural places.
and therefore, of the possibility that rural communities vary in their rates of crime. Flora, Flora & Fey (2004) describe four basic kinds of places in rural America, including: (1) areas affected by urban sprawl; (2) rapid growth communities near areas with natural amenities; (3) rural regions with persistent poverty and high unemployment; and (4) remote areas that are far removed from the shadows of a city’s skyscrapers. Certainly, if rural communities can vary fundamentally in their economic and social circumstances, so too can they vary in their rates of crime.

Traditional images of rural communities have faded as criminological attention to rural crime has gradually increased. It is not that the two are related in a cause-effect manner. They are more like two trends in concurrence. However, clarification of what is rural is made more difficult when the definition discards stereotypical traits and over-generalized images. One possible definition of rural might be subjective, that is, whether or not a place is rural can be determined by asking residents how they would define their locality. Unfortunately, a subjective approach to rural has major disadvantages when the unit of study is both place-based and comparative, such as in a statistical comparison of crime rates across a large sample of towns, townships, counties or some other standardized geographic area of reference. It becomes impossible to collect
data of any kind for a comparative or cross-sectional study of different places when places of the same size might be defined differently (rural or urban or something in between) by residents.

A more useful approach is to use an official designation or definition of rural by a government agency (such as the Census Bureau) or an agreed upon designation by researchers, such as a continuum of county types which ranks all nonmetropolitan and metropolitan counties based on their degree of rurality/urbanity. This is also known as the Beale codes (http://www.ers.usda.gov/Briefing/Rurality/RuralUrbCon/). This is more useful because it is easier to connect a standardized list of rural (or urban) places to different databases, such as census data and governmental archival data, like the FBI’s *Uniform Crime Reports*. With this approach, a place is designated as rural based on a standard definition related to population size or distance from a metropolitan area. What is inside these places in terms of social and economic structural characteristics, as well as manifestations of crime, is what a scientific analysis can help explain.

Another way to define what is meant by rural is the concept of locality (Flora, Flora & Fey, 2004). The concept of locality provides for the possibility of great heterogeneity among rural places, even though all may be designated as rural. Within a
location is a field of action (Garkovich, 1989; Liepins, 2000), that is, location is a social space that provides the context in which individuals and groups engage in action. These various social structures exhibit varying degrees of social integration among participants (Liepins, 2000), which in turn, influences the over-all cohesion or *gemeinschaft* of a place. These dynamics, it is assumed, are expressed at an aggregate level by the incidence of various and diverse social phenomena at places among residents, from crime rates to rates of volunteering for civic organizations or churches.

Weisheit & Donnermeyer (2000) emphasize that: “understanding rural crime requires understanding factors that make rural life distinct from urban life, including geography and culture. Understanding rural crime and anticipating future rural crime issues also requires understanding how technology, economic factors, and demographics shape the nature of rural crime (p. 309).” When rural communities are seen as a distinctive class or set of places, different from urban yet exhibiting a great deal of heterogeneity/diversity/variability in their own right, then it becomes conceptually possible for researchers to apply criminological theories like social disorganization to the study of variations in rural crime both across different kinds of rural communities and over time.
Hence, even though the old frameworks related to concepts like *gemeinschaft* that see intrinsic differences between rural and urban places have a certain amount of appeal, because at the very least, they assume places vary in their characteristics, yet, as analytical referents, their usefulness is quite limited. However, a classification scheme for aligning places on a continuum of rural to urban may be a more useful heuristic for the empirical testing of differences in crime across places.

Another tool is also needed, or a continuum falls prey to the same fallacies as a rural-urban dichotomy. One solution is development and/or adoption of a theory, such as social disorganization, in order to gain a fuller understanding of the relationship of crime to the rurality (or urbanity) of places. The real usefulness of social disorganization theory is that it allows scholars to focus on the social and economic composition or structure of different places and how this affects criminal opportunities, hence, crime rates. Therefore, once the idea that rural and urban places are intrinsically different is disregarded, the next step is to recognize that rural or nonmetropolitan places (and urban/metropolitan places, as well) are highly diverse. This extends the traditional idea that integration and crime are related to a wider field of study, namely, the rural context. Integration is no longer assumed to be an intrinsic feature of rural places, but something that co-varies with crime.
For example, in light of social disorganization theory, scholars can classify rural communities by their social and socioeconomic composition, such as family structure, residential stability, economic status, ethnic heterogeneity, population size and distance from a large urban center, and determine the relationship of these community types with variations in crime (Jobes et al., 2004).

2.2 Rural/urban differences and crime

It is assumed that the discerning criminologist living in different places would observe differing levels of social integration or cohesion among the individuals and groups residing there. One way to express this, yet avoiding a simplistic rural-urban dichotomy and all the accompanying stereotypes, is to classify places on a continuum based on population size and proximity to larger places. Accordingly, places can be variously classified as city versus suburban versus small town versus the open-country and farm areas, or as nonmetropolitan versus micropolitan versus metropolitan. This is what the “Beale codes” essentially do. The Rural-Urban Continuum or “Beale” codes is a classification system established by the Economic Research Service of the USDA for all US counties and county equivalents. The typology arrays counties from most urban (populations exceeding 1 million persons) to most rural (less than 2,500 persons living in
an urban location, and not adjacent to a county that is part of a metropolitan area), and everything in between.

How can places be understood in terms of a rural/urban continuum and crime? Generally, there is higher crime on one side of the continuum and lower crime on the other side, with the caveat that many other social structural and economic forces may intervene to create sizeable variations within each type. There are four ways that are useful for understanding these variations, namely, the characteristics of rural crime, cultural diffusion and rural crime, urbanism, and rurality. A summary of these studies within each of these four research traditions can be found in Appendix A.

2.2.1. The characteristics of rural crime

George B. Vold (1941) conducted one of the earliest studies of rural crime. His article, titled “Crime in City and Country areas” is an early example of comparatively examining spatial variations of crime between rural and urban places in Minnesota. He found that there were variations in larceny, burglary, auto theft, robbery, aggravated assault, rape, murder and manslaughter across places, and in general, “the number of crimes decreases as the distance from a large city increases” (Vold, 1941, p 39). He also added a second insight about rural crime which runs counter to one stereotypical image of
today. To quote, “there is not much difference in the relative frequency of serious crimes against the person in city and country areas, but in the case of the more common crimes against property, the urban areas are very much more involved” (Vold, 1941, p 41). His explanation for the differences involved two ideas. First, he reasoned that there was a type of “selective migration” which assumed that the higher rate of urban crime results partly from the migration of individuals from the country to the city who are more likely to commit various offenses. In other words, individuals with a propensity to become criminals are attracted to the opportunities afforded by cities, hence, rural-urban property crime differences are partly a product of selective migration patterns. He also argued a city’s milieu has an influence on its inhabitants, as does rural culture, that tends to promote and facilitate criminality in the former and constrain the commission of crime in the latter. Hence, Vold’s (1941) idea of differences along a rural to urban continuum focused on the cultural effects of cities on criminal behavior and a presumption that migration was selective between rural and urban places.

Six decades later, the general pattern of rural crime, and the idea that on a broad national level, crime occurs less frequently in rural areas, was also examined by Weisheit & Donnermeyer (2000). Their research used the *Uniform Crime Report* of the Federal
Bureau of Investigation. They defined urban as cities with a population size greater than 250,000, and rural as counties outside of metropolitan statistical areas. Weisheit & Donnermeyer (2000) concluded that: (1) urban crime rates are higher than rural crime rates; (2) violent crime rates are especially higher in large cities relative to rural counties; (3) robbery displays the biggest rural/urban differences, as much as 26 times higher in urban areas and accounting for a large share of the rural-urban difference in overall violent crime; (4) the types of crime that are most frequent in large cities are also those that are also most frequent in rural areas.

In a later article, Donnermeyer (2007) compared rates of violent crime (homicide, rape, robbery and assault per 100,000 persons) among approximately 700 non-metropolitan U.S. counties with populations below 10,000 with rates of violent crime for the 351 metropolitan areas found in the 2006 edition of the *Uniform Crime Report*. He discovered that the average violent crime rate for these most rural of all non-metropolitan counties exceeded the violent crime rate for 51 of the metropolitan areas. To quote: “Indeed, aggregated to a national level, urban rates may be higher, but there are plenty of exceptions to that generalization, and these multiple exceptions call into question…..the myth that rural crime is unimportant” (Donnermeyer, 2007, p. 7).
2.2.2 Diffusion and Rural Crime

Fischer’s (1980) theory about the diffusion of crime from urban to rural areas assumes a type of lag, that is, urban crime rates are higher at any one particular point in time than rural rates, and foreshadows rural crime rate levels at a future point in time. His theory assumes that the social forces which cause crime eventually transfer or emerge in rural areas after they first appear in urban areas. Hence, rural crime rates will be lower than urban rates because of this lagged effect.

Fischer’s diffusion theory not only declares that urban rates are higher and that fluctuations in urban crime rates anticipate what will happen at a later time in rural communities, as well his theory assumes that rural and urban places experience social, economic and cultural changes at different rates. Fischer’s diffusion theory (1980) focused especially on how cultural changes influence urban and rural differentials in violent crime over time. In his view, violent crime is a kind of cultural phenomenon, hence, he emphasizes crime as like a fashion or fad that can be imitated. Fischer (1980) focused on factors that enable violent crime rather than factors that inhibit violent crime, as would social control theory as reviewed below. He asserts that “urban-rural differences in behavioral patterns, or ways of life, persist in modern America” (Fischer, 1980).
Accordingly, rural-urban differences in crime rates persist, and rural lags behind urban in terms of manifestations of crime, especially violent crime, because it is only at places with large and dense populations that the kinds of cultural changes associated with violence are nurtured.

There are two conclusions about crime that are reached from a diffusion perspective (Fischer, 1980). The first conclusion is that rural and urban places exhibit different life styles and that a culture associated with crime derives from urban life and cultural changes therein. The second conclusion is that cultural change is a dynamic process which starts from the city and spreads to the country by personal networks. In more academic terms, those phenomena are called “cyclicality” and “lag”. “Cycliality” describes temporal variations in crime, and “lag” explains spatial variations in crime. In summary, diffusion theory considers that changes and innovations are most likely to occur in the largest communities of a society, that these changes diffuse over time from larger to increasingly smaller places, and that innovation is always occurring, therefore, cultural lag is always present.

2.2.3. Urbanism and rural crime

The theory of urbanism goes back to the still frequently cited article by Louis
Wirth (1938) on “Urbanism as a Way of Life.” In his view, crime is a kind of urban phenomena that is a product of characteristics commonly associated with urban life, such as a greater sense of anonymity and alienation by city residents, greater tolerance of deviant/unconventional behaviors, and fewer community-level social bonds. Further, urbanism as a way of life at a specific place is linked to urbanness or the size and density of that place’s population. Hence, rural communities that experience rapid population growth and greater population concentration will also exhibit greater heterogeneity of lifestyles, less cohesion, and increased per capita rates of crime. It is not only the aggregate number or amount of crime that increases with population growth, but the number of crimes proportionate to the population.

There are three variations or differing perspectives of urbanism that can be found in the literature (Tittle, 1989). A determinist perspective sees that “the size, density, and heterogeneity of settlements are said to cause social disorganization and personality disorders by weakening the bonds that tie people together in primary groups and communities (p.172)” The compositional or system approach “contends that population concentration permits various social influences such as occupational, life style, ethnic, and class concerns to play themselves out in a larger network of interconnected social
worlds” (p.172). The subcultural perspective thinks “that there should be a negative effect from the size of place on a community’s social bonds, tolerance, and conventional/deviant behavior but no effect on feelings of anonymity or alienation” (p. 172).

Urbanness itself is the main concern of the determinist. It is a perspective long associated with such sociologists as Ferdinand Tönnies (1887), Georg Simmel (1903) and Louis Wirth (1938). Urbanness is about how the size, density, and composition of a locality’s population determines its degree or amount of urbanism. This perspective argues that people who live in places of larger size, higher population density and greater population heterogeneity will exhibit higher crime rates due to the alienation, estrangement, and anomia associated with a disorganized social structure. The weakening of the bonds that tie individuals together in primary groups and communities due to size cause the social disorganization, the personality traits, and the criminal behavior.

The second or compositional perspective views the city (and by extension, the opposite or rural places) as a location whose population varies by such factors as social class (wealth/income, education, and occupation), race, ethnicity and other factors, hence, there is a greater diversity of behaviors and attitudes among its members. This diversity
of behaviors and attitudes will inhibit or delay social bonding to groups, reducing social control over members. This perspective can be identified with scholars such as W. I. Thomas, Robert Park, Ernest Burgess, and Herbert Gans (Tittle, 1989). It greatly influenced the early development of social disorganization theory by Shaw & Mckay (1942), and its later re-development by such scholars as Kornhauser (1978), Bursik (1988), Reiss & Tonry (1988), Sampson, Raudenbush, and Earls (1997), and Krohn (2000).

The subcultural perspective views crime as a sociological phenomenon related to the presence of differences in beliefs, norms and values among groups who live at the same place (Tittle, 1989). The subcultural perspective sees a kind of “critical mass” or group effect that influences the behaviors and attitudes of individual members, based on their embeddedness in various social groups and social networks. The diversity of populations found in the city increases the opportunity for the development of social networks and cliques that will engage in delinquent and criminal behavior. Hence, “urban dwellers, therefore, should be more bonded interpersonally but less bonded to the community as a whole (Tittle, 1989, pp.172).” Since it is assumed that rural communities display less subcultural diversity, there are less opportunities for members to join
criminal groups and, therefore, there is less crime.

All three variations of urbanism see rural places as manifesting higher crime rates only if they are becoming more urban in some way. That is why criminology scholars who examine crime and population size frequently define urbanism as weakened social control, weakened social relations or bonds, greater anomie, and greater tolerance (Tittle, 1989; Ingram, 1993). For example, Ingram (1993) examined how the type of place predicts rates of delinquency. Place was measured in three ways: population size, population density, and a GINI coefficient indicating ethnic/race heterogeneity. Size of place did not have a strong relationship with youth’s delinquent behavior, but, lifestyles, attitudes, and social bonds did affect delinquent behavior, suggesting that formal and informal social control through family, school, and peer associations were more important than size of place per se. In contrast, size did not matter because it seems to be only weakly associated with the kinds of social relationships and bonding that either constrain or facilitate criminal/delinquent behavior, hence, showing only weak support for Wirth’s contention that places with large populations breed criminality and related criminal cultures.

2.2.4 Rurality and Crime
Rural/urban differences in crime are seen by some scholars as having more to do with the characteristics of rural places, that is, their level of “rurality” than with how urban they happen to be. For example, Kowalski & Duffield (1990) employed Durkheim’s theory from his famous work on *Suicide* (1897) to describe the effect of rurality on social cohesion. For them and scholars like Wilkinson (1984a; 1984b), rurality is assumed to have a positive effect on social bonds and group cohesion. Therefore, urbanization, industrialization and other forms of change reduce a place’s rurality and associated rates of crime (Kowalski & Duffield, 1990). Kowalski & Duffield (1990) see rurality as inversely related to rates of homicide in general, and homicide rates increase in rural places under-going change. Hence, “the bonds of traditional society associated with rural areas lessen crime” (p. 76), that is, rural social conditions are negatively related to homicide for both farm and nonfarm residents in rural areas (Kowalski & Duffield, 1990).

The advantage of a perspective that sees crime as something related to social structural differences between rural and urban places is that it is able to account for differences in crime rates across differing kinds of places in terms of their own characteristics. However, a rural/urban perspective suffers from the same fallacy as the
other three approaches to understanding rural crime, which is, it automatically assumes
that rurality is associated with the conditions that create relatively lower rates of crime,
unless impacted by the kind of change that create urbanization. As well, a rural/urban
perspective can be challenged in the face of various social and economic realities that
have long been associated with many rural communities, such as persistent poverty. In
other words, without an agreed upon definition of rural by scholars, it is indeed difficult
to determine the base by which change and its connection to crime is observed. Implied
in this perspective is the idea that rural places only exhibit crime conducing
characteristics if they are experiencing some sort of urbanization.

2.3 The criminology of place

The past decade has seen a renewed theoretical interest in understanding the
criminology of place, which has a great potential to support research on crime rate
differences in different kinds of rural places, of comparative studies of crime rates
between rural and urban places, and of longitudinal examinations of variations in crime
rates as the same rural places change. The criminology of place asks a question that
seems deceptively simple, namely, what is the role of place with the occurrence of crime
(Reiss, 1986)? There are two major variants on the criminology of place: (1)
environmental criminology; and (2) social disorganization theory.

2.3.1 Environmental criminology

Environmental criminology originated in the 1970’s from concerns about the effect of urban design, such as public housing, on residential security (Jeffery, 1971; Newman, 1972). Those concerns attracted mainly the attention of criminologists, planners, geographers, environmental psychologists and architects to the study of the environmental conditions under which crime occurred (Brantingham & Brantingham, 1978).

Brantingham & Brantingham (1981) mention four dimensions related to the geography of crime: a law that defines a violation, a motivated offender, a desirable target (person or property), and a location where the offender believes that the commission of a crime against a target can be successfully carried out. Moreover, Reiss (1986) defines a crime as “an event or sequence of events in time and space that violates a criminal statuette (p.3).” Therefore, place is considered an important element by many criminologists, although often it is assumed, especially by those who are more interested in motivations and criminal subcultures at a more individualistic or micro level of analysis.
Brantingham & Brantingham’s (1981) theory of place assumes that the physical environment provides the context against which criminal events may be played out. One such perspective emphasizes the opportunity structure of a place in motivating or preventing criminal events. A place provides the environmental conditions for crime in terms of these opportunities. Their model of crime assumes that the physical context influences the convergence of a victim, a target and an opportunity, which are the requisite elements necessary for an individual to consider the commission of a crime, large or small.

The theoretical premise of environmental criminology is that offenders seek to minimize time and distance costs in their search for targets/victims. Beginning with their residence or some other logical starting point in space, their search ends at the first available opportunity to commit the crime (Brantingham & Brantingham, 1978). Davies (2006) summarizes the arguments of environmental criminology as: (1) individuals exist who are motivated to commit specific offenses; (2) given criminal motivation, the actual commission of an offense is the end result of a multistaged decision-making process in which an offender seeks out and identifies a target; and (3) the ‘activity space’ and ‘awareness space’ that comprise the environment emit cues about its physical, spatial,
cultural, legal and psychological characteristics.

The development of an urban design perspective to theories of environmental criminology can be found in a recent study of rural crime by Rephann (1990). Rephann examined crime in relation to the different kinds of development that can be found at rural places, such as tourism, retirement communities, highways, and service sector employment. What makes Rephann’s (1999) work different from the rural/urban and rurality perspectives described above is that he employed a rational choice crime model in which crime is an unconventional labor market activity. He argued that criminals are rational agents who optimize their maximum benefits by prior calculation of the probable results of their actions. The factors tested at the aggregate level in Rephann’s article are urbanization, residential mobility, industrial enterprises, economic conditions (such as poverty), transportation conditions, demographic composition of the population, region (i.e., the southern region, which he used as a proxy measure for culture), and law enforcement. One of the important findings in Rephann’s (1999) article is that employment within the service sector, trade sector, and the amusement and recreation services sector predicts higher crime rates in rural communities. He concluded that economic development increases criminal opportunity at rural localities, regardless of
other social structural characteristics.

Crime opportunity theory, such as routine activities theory (Cohen & Felson, 1979; Felson, 1998) or lifestyle theory, is a second variation on the criminology of place that has been recently applied to the study of rural crime (Spano & Nagy, 2005). One major contribution of Spano and Nagy’s (2005) theory of place is that the focus shifts to the victim, that is, to explaining why certain places are locations where people are more likely to be the victims of crime. Opportunity theory, especially in terms of routine activities, can help explain why there may be a rapid rise of crime rates in certain rural communities, and why some rural communities can be seen as places where there is a high risk to crime. Opportunity theory also focuses on the physical structure or milieu of a community and its relationship to spatial variations in crime.

Spano and Nagy (2005) surveyed a targeted sample of rural youth in Alabama to test the determinants of rural violence. Dependent variables included both assault victimization and robbery victimization. One set of independent variables used to predict victimization levels were related to social guardianship, which they define as “the availability of others who may prevent personal crimes by their mere presence or by offering assistance to ward off an attack.” Agreeing with the observation of Bursik and
Grasmick (1993), they mention that at the community level, social disorganization is in fact a theory of social guardianship, whereas routine activity theory is a theory of social guardianship at the individual or interpersonal level, especially when the focus is on victimization among adolescents. Hence, Spano & Nagy (2005) are attempting to bring synthesis to both theories of crime and place.

Spano and Nagy (2005) suggest a place can decrease/suppress or increase/exacerbate the effect of structural changes on social networks and local institutions of social control. Although they do not explicitly cite the work of C.W. Mills (1959), they are restating his concept of the Sociological Imagination. Hence, for Spano and Nagy (2005), social disorganization theory can be simplified as:

Structural Factors ➔ Social Networks ➔ Social Control.

Basically, social disorganization theory assumes that structural change in a society will cause a change in social networks, which, in turn, influences social control.

The second set of factors is associated with social isolation (Spano & Nagy, 2005). Social isolation is defined by Spano and Nagy (2005) as “an individual level characteristic indicating someone who has no friends and does not have an adult to call on in times of crisis.” (p. 431) The third set of predictors is deviant lifestyle, including
criminal behavior, drinking and drug use, and peer drug use.

Spano and Nagy (2005) concluded that among rural youth in Alabama, social guardianship factors reduced the risk of assault and robbery victimization. They found that blacks were less likely to be assault and robbery victims, and that males were less likely to be robbery victims. As well, they noted that social isolation factors at the individual level were strong risk factors for both robbery and assault victimization.

2.3.2 Social disorganization theory

Compared to environmental criminology, social disorganization theory places less emphasis on the physical environmental and more emphasis on the social structure of specific places. In this sense, social disorganization theory is readily applicable to the study of crime when the focus is on social structure and social change of rural places. Social disorganization theory itself is a major tradition within the general field of criminology and is a direct off-shoot of the rich heritage of criminological research from the first half of the twentieth century that is identified with the Chicago School of Sociology.

As already mentioned, the Chicago tradition emphasized an ecological approach to understanding crime. It was based on the assumption that variations in crime rates are the
product of the social structures of places. Scholars from the Chicago School originally proposed a social ecology model of crime in which a community was seen as a dynamic, adaptive system in which order emerged through the natural processes of competition, dominance, succession, and segregation. Hence, Park along with Burgess, two key figures of the Chicago School, explored crime through an urban growth approach.

However, a somewhat different ecological approach utilizing social disorganization, but still within the tradition of the Chicago School, was developed by Shaw and McKay (Davies, 2006). Their approach was less focused on change and more focused on the capacity of local institutions and organizations to control the behavior of residents. For Shaw and McKay, some characteristics of a place make it difficult for a community to achieve the common goals of its residents, including the control of crime, hence, they called this condition “social disorganization,” and assumed that higher levels of disorganization are associated with higher rates of crime.

After its decline in the decades following WWII, the 1980’s saw a renewed interest in social disorganization theory, especially with the increased capacity of researchers to access census data and official criminal justice statistics and manage these large datasets with computers and spreadsheet software (Jobes et al., 2004). Census
characteristics that form the proxy measures for the structural characteristics of places could be correlated with the incidence of crime, as measured by official statistics available through various criminal justice agencies (Jobes et al., 2004).

One advantage of contemporary social disorganization theory is that it emphasizes the collective or structural dimensions of places. Another advantage of social disorganization theory is its ability to conduct the same kind of research using different levels of places, such as townships, counties, towns, cities, zip codes and even states (Osgood and Chambes, 2000).

2.3.2.1 Rural development and social disorganization theory

Wells and Weisheit’s (2004) study of the “Patterns of Rural and Urban Crime” showed that an urban criminological model might not be fully useful in explaining rural crime. For example, they found weak effects of economic growth on nonmetropolitan rates for both property and violent crimes, a finding dissimilar to most urban based studies which apply the tenets of social disorganization theory. This was also supported by Wilkinson et al.’s earlier study (1984) of violent crime in energy development towns of the rural West. Both studies show that a focus on crime and rural places has the potential to re-test and revise established or mainstream criminological theories.
How does population growth and economic development impact on violent crime rates of rural communities? The answer for Wilkinson and associates (1984a; 1984b; 1984) is that the historical characteristics of rural communities must be understood in order to see how rapid population growth can influence crime rate increases. He concluded that “long-standing structural problems are better predictors of the violent crime rate than are recent changes associated with energy development” (Wilkinson, 1984b, p. 241).

Wilkinson’s approach emphasizes the consequences of social change on places with small populations. For him, high rates of violence are reflective of disruption caused by population growth. High organic solidarity is said to contribute to low homicide, which is associated with a dynamic form of social density that controls individual behavior. Therefore, when the isolation and relatively small population of a rural place sees its social solidarity diminished, homicides and other forms of violence increase. He argued that structural cleavages provoke disruption, which increases opportunity, that is, “rurality affects the opportunity structures for the rates of nonlethal violence, homicide, suicide, and divorce and that these opportunity effects combine with specific provocations to influence the pattern of disruption rates” (Wilkinson, 1984a, p. 32).
For Wilkinson, disruption refers to a social relationship that is torn asunder, and opportunity refers to social interaction that precipitates a given form of social disruption. Hence, three kinds of cleavages are identified by Wilkinson: ascriptive inequality, poverty, and a restriction or modification of traditional values. Disruptions are expressed as: (1) nonlethal violence usually involving nonintimate associations; (2) homicides that involve intimate associations, such as between acquaintances or family members; (3) suicides precipitated by disruptive, isolated events in relatively intimate relationships; and (4) divorce, which involves disruption of a primary relation. Hence, there are possible disruptions to weak ties, which tend to be associated with nonlethal violence, and strong ties, which tend to be involved in homicide, suicide, and divorce.

According to the above logic process, if rurality increases the proportion of contacts in strong ties, rurality has a negative effect on the opportunity structure for rates of nonlethal violence since rates of nonlethal violence involve weak ties. If rurality increases the proportion of contacts in strong ties, rurality has a positive effect on the opportunity structure for rates of nonlethal violence. Hence, the social disorganization effect of economic development is determined by community characteristics and the kinds of interactions or relationships that show up most at specific places.
Krannich, Greider and Little (1985) also examined the impacts of rapid change on rural communities and crime. The conceptual framework of their study was that the growth processes in rapid development communities alters the social conditions of familiarity, mutual support, and trust (Krannich, Greider & Little, 1985). Otherwise, “increased awareness, sensitivity, along with a certain degree of xenophobia, may thus contribute to a heightened fear of crime in rapid growth communities. “ In the short term, rapid economic development might not increase crime rates, but could greatly increase fear of crime. Krannich, Greider and Little (1985) showed that there was no difference between boom and nonboom rural communities on reporting criminal victimization. However, residents in boom communities did have higher levels of fear, as shown in a later article. In this article, Krannich, Berry and Greider (1989) discussed an important controversy relative to the theory of social disruption and the use of subjective and objective data. This analysis incorporated community of residence as a contextual independent variable along with age, sex, and length of residence. The result suggests that “community of residence was the only important predictor of fear of crime” (Krannich, Berry & Greider, 1989, p. 206).” Hence, what Krannich, Berry and Greider (1989) discovered is that the construction of social reality in a community is related to
fear of crime among its members. To quote: “Subjective perceptions of increased crime and threats to personal safety are important social phenomena that may more accurately reflect the degree of social disruption in a community than do more objective data” (Krannich, Berry & Greider, 1989, p. 206). A change of social conditions and social interactions are possible with rapid social change, which in turn, changes how the community is perceived and how people become apprehensive about the possibility of crime. The authors believe that the urbanization of rural places may not cause an increase in crime rates per se, but certainly influence perceptions of crime. Rapid development will change the social conditions of familiarity, mutual support and trust in a relatively stable rural community. As well, rapid development changes social interactions from more private spheres (primary/strong ties) to more public spheres (secondary/weak ties).

2.3.2.2 The socioeconomic dimensions of social disorganization

In addition to Rephann (1999), whose work has already been discussed, two other rural-based studies of crime specifically examine socioeconomic factors. One is by Arthur (1991), who included measures of unemployment, percentage of population living in poverty, the percentage of families receiving government aid as independent variables predictive of crime rates in rural counties of Georgia. His purpose was to understand the
impact of socioeconomic conditions on violent and property criminal victimization while statistically controlling for other confounding factors, such as population size, percentage of the population black, and the percentage of the population between the ages of 15 and 39.

The results show that on both a cross-sectional and longitudinal basis, the data reach the same conclusions, which is that both social and economic factors have positive impacts on increases in crime rates. Only the percentage of the population 15-39 was not positively related to crime rate increases, and in fact, it was inversely correlated. Arthur (1991) concluded that development increases the predictability of socioeconomic variables on property crime rates. However, whether economic development will cause an increase in crime rates depends on the overall context of development. He suggests that the distribution of economic resources can have a substantial ameliorative impact on crime.

Seydlitz, Laska, Spain and Triche (1993) examined the process of rapid community economic development related to the oil industry and rates of both suicide and homicide. They predicted that when a community is involved in economic development, it will inevitably experience social structural change as well, such as rapid
immigration, increased heterogeneity of members, lower primary group controls, and increased economic inequality. In turn, those social changes will cause social disorganization and increase residents’ perceptions of relative economic deprivation that results in increased social problems like homicide and suicide.

2.3.2.3 Change and social disorganization

Carcach’s studies attempt to model the impact of change on communities in rural Australia. Specifically, Carcach’s (2000a, 2000b, 2001) focus is on the impact of regional development on rural crime rates. Crime rate increases are regarded as negative indicators of the success of developmental efforts within a region. Positive regional development is generally associated with urbanization and population growth, population mobility, an increased diversity in a region’s economic base, a growth in service-oriented economic activities and jobs, and the quality of its infrastructure. Carcach (2000a) argued that any kind of economic change will lead to an increase of crime in a community. His results were similar to the findings of studies conducted in U.S., which is there was less crime in regions with stable populations, low unemployment, and an economic structure that is less vulnerable to short-term shocks.

In another analysis, Carcach (2000b) focused on the issue of rurality and crime.
He defined rurality by population size, and then examined the accessibility of rural communities of the same size by distance to service centers. He found that distance has an effect on crime rates in small to median towns, but none on rural communities. Instead, in rural areas, economic change, population exodus and the strength of community ties were key factors in determining levels of crime.

2.3.2.4 Social structural differentiation in nonmetropolitan areas and social disorganization

Like Carcach (2000a, 2000b, 2001), Osgood & Chambers (2000) focused their study on nonmetropolitan counties, that is, counties that lie outside of metropolitan statistical areas as defined by the US Bureau of the Census. Osgood & Chambers (2000) included a broad spectrum of offenses for establishing the consistency of their findings. As well, they utilized indicators typical of most other studies who adopt a social disorganization perspective. Those variables include residential instability, ethnic heterogeneity, family disruption, economic resources (poverty, income inequality, and unemployment), and proximity to metropolitan counties. Residential instability is the proportion of households occupied by persons who had moved from one dwelling to another in the previous five years. Ethnic heterogeneity is the index of diversity (i.e., Gini index), which is calculated
in terms of the proportion of households occupied by white versus nonwhite persons. The proportion of female-headed households was used as the measure of family disruption. Population density correlates with population size, so it was excluded in favor of using only population size. In addition, the number of youth 10 to 17 was included as a dummy variable.

The main finding of Osgood and Chambers (2000) was that juvenile violence was associated with rates of residential instability, family disruption, and ethnic heterogeneity. However, unlike the urban version of social disorganization theory, poverty was not related to rates of juvenile violent crime because poverty and crime in nonmetropolitan areas was negatively related to residential instability.

Also employing social disorganization theory was the rural-focused study of Barnett and Mencken (2002). They argued that at different levels of population change, social disorganization theory would have different effects on crime in rural communities, a logic that is similar to Wilkinson’s (1984a; 1984b) earlier work. Barnett and Mencken (2002) tested the hypothesis that “county measures of socioeconomic status interact with population change to affect social control and crime in nonmetropolitan counties” (p. 377). They argued that the inconsistency of empirical results from the application of
social disorganization theory to rural communities was related to the conceptualization of crime in nonmetropolitan settings, especially crime’s interaction with poverty (Barnett & Mencken, 2002). In order to control for possible random variation by years, five-year periods of total arrests from 1989 to 1993 were pooled to create a single measure of crime. They mostly found what they expected for nonmetropolitan counties, which was that resource disadvantage, such as poverty, income inequality, unemployment, plus the presence of single parent families, had differing effects on both violent crime and property crime at different levels of population change. More specifically, resource disadvantage had a stronger positive effect on both property and violence crimes in counties with greater population loss, and a weaker positive effect on crime in counties with little population change or population growth.

Following the theory developed by Shaw and Mckay’s social disorganization theory, Bouffard and Muftić (2006) examined social disorganization theory in the upper-Midwest region of 221 counties in the United States. For the authors, one image describing the social structure of rural places is the conventional wisdom that they are peaceful places which rely more so than urban communities on informal means of social control. In another respect, they also see rural communities as places filled with socially
disruptive conditions, such as poverty and social isolation. The first perspective is a kind of rural determinism. The second image is a structural perspective that sees relationships between social conditions and social problems.

Bouffard and Muftić (2006) attempted to do two things in their study, including (1) to generalize social disorganization to the nonmetropolitan sector of this region; and (2) to connect social disorganization theory to the violent crimes of assault, robbery and rape. In this study, Bouffard and Muftić (2006) measured rurality by both population density and an urban-influence code, which was the proximity of a non-metropolitan county to an urban area. They concluded that population density predicted more crime, but proximity to urban areas did not show a straight line or linear pattern relative to violent crime. The more important finding in Bouffard and Muftić’s (2006) study was that the proportion of the population living below the poverty line had a negative effect on the number of violence crimes. But unemployment had a positive effect on crime.

Bouffard and Muftić’s (2006) conclusions confirm what other studies have also found, which is that there was not the expected positive effect of poverty on crime rates in rural communities, which is at variance with urban-based research using the same theory. Bouffard and Muftić (2006) explain it in the way poverty mediates residential
stability and ethnic heterogeneity, because poorer rural communities may be more stable and homogenous. However, unemployment results from deindustrialization and economic decline and can have an expected positive effect on crime rates in rural communities.

Bouffard and Muftić’s (2006) results did show that unemployment has a more significant impact than poverty has on crime in rural communities. Despite the variances, they conclude that social disorganization theory can be applied beyond urban settings and is useful for understanding rural crime as well.

Jobes et al. (2004) extend the study of social disorganization theory to rural communities outside North America. Like Carcach (2000a; 2000b; 2001), they conducted their study in Australia and specifically in the state of New South Wales. Their study included 120 Local Government Areas (LGAs) outside of metropolitan areas, such as Sydney and Wollongong. LGA’s are equivalent to counties in the U.S. In this study, they found that indicators commonly associated with social disorganization theory could successfully explain variations in rates of crime for assault, break and enter, malicious damage and motor vehicle theft across a variety of rural places (i.e., rural LGA’s).

The most important contribution in this study (Jobes et al., 2004) was that they used cluster analysis of LGA’s to devise a continuum of 6 rural community types,
corresponding to typical indicators of social disorganization, such as residential instability, ethnic heterogeneity, family disruption, low economic status, and population size and density. These six types of rural communities were given the labels: larger urban centres, coastal communities, satellite communities, median stable communities, medium declining communities, and small farming communities. The results of the clustering procedure showed that underlying social structures were associated with crime. Medium stable communities, and small farming communities experienced the most organized forms of social structures and over-all, the lowest rates of crime. Less organized communities included the urban centers and the coastal communities with the most social disorganization and the highest overall levels of crime. Despite this, each type of community showed a different profile of crime. As a result, each kind of community displayed at least one type of crime that was higher than average when compared to other community types.

Jobes et al. (2004) concluded that not all small, rural communities have less crime than larger urban centres, nor did they show consistently higher degrees of integration and cohesion (i.e., *gemeinschaft*). In this sense, their research reached the same conclusion as Ingram (1993). It was not size that counted, but what happened inside these
rural Australian places. Less organized declining communities with high crime rates had higher unemployment, lower median family income, and population loss. Even though small farm communities had higher unemployment, lower median family income, and population loss, their communities had less crime because they had higher rates of couple families, married people and people living in their own homes, and lower proportion of people living in mobile homes, persons born overseas and Indigenous people. Like Bouffard and Muftic (2006) and most other studies of community structure and crime in the rural context, it was the social variables more than the economic variables that made a difference.

Another study conducted by Jobes, Donnermeyer, & Barclay (2005) shows how a well integrated, cohesive community can prevent social problems. Two communities with higher than average Aboriginal populations were chosen specifically because they are highly over-represented in the criminal justice system relative to arrests and as victims of crime. Data about crime and social structural variables, such as population, average growth, immigration, overseas born, aboriginal population, median age, median individual income, median household income, unemployment, people married and solo parents in both communities was collected, along with mail-in surveys and focus group interviews
used to gather perceptions of community problems, community strengths and solutions.

One had a higher crime rate and the other much less crime. In their conclusions, they noted that the residents in the community which shared common values, community spirit, family, friendliness and trust had less crime and there were better relationships between the Aboriginal and white populations. The rural community with higher crime showed all the characteristics of less cohesion and integration based on the perceptions of the residents in the survey and focus group interviews, and more conflictual and segregative relationships between the white and Aboriginal populations.

2.4 Hypotheses

In chapter 1, I stated three general hypotheses. These are re-stated below, along with sub-hypotheses. I assume, especially for the structural equation model, and in accordance with the logic of social disorganization theory, that the crime rate is an expression of the ability of groups and institutions at a place to control crime. Hence, social control is a latent variable that is measured vis-à-vis rates of crime for both violent and property offenses. Higher rates of crime are assumed to indicate less social control, while lower rates of crime are assumed to indicate more social control. In other words, it assumes that social control is causally related to crime in an inverse fashion. The exogenous variables,
as operationalized by various census measures, are indicators of the social and economic structure of rural places.

1. **Nonmetropolitan counties vary in terms of their social structural and socioeconomic dimensions, and accordingly, in their rates of crime.**

   a. Socially disadvantaged nonmetropolitan counties are negatively associated with the social control of both violent and property crime.

   b. Socioeconomically resourced disadvantaged nonmetropolitan counties are negatively associated with the social control of both violent crime and property crime.

   c. Family disruption moderates the effect of both the social structural and socioeconomic characteristics of nonmetropolitan counties on the social control of both violent and property crime rates.

   d. In reference to violent crime, family disruption has a larger direct effect than do the socioeconomic status factors and the other social structural factors on the social control of both violent and property crime.

2. **Changes in the social and economic dimensions of nonmetropolitan counties are predictive of changes in their rates of crime.**
a. Changes in various socioeconomic status dimensions (as measured by proportion of population with a college degree, median family income, per capita income, proportion of the population below the poverty line, and unemployment rates) of nonmetropolitan counties is predictive of changes in the rate of property crime. Specifically, an improvement in the socioeconomic conditions of a nonmetropolitan county will be associated with increased social control and therefore with a decrease in property crime.

b. Changes in family disruption (as measured by proportion of single parent households, proportion of separated parents, and proportion of youth 16-18 years olds who are drop outs) in nonmetropolitan counties is predictive of changes in rates of violent crime. Specifically, a decrease in family disruption will be associated with increased social control and therefore with a decrease in violent crime.

c. Growth in population size in nonmetropolitan counties is predictive of less social control and therefore with an increase in rates of violent crime.

d. An increase in the unemployment rate in nonmetropolitan counties is predictive of less social control and therefore with an increase in rates of property crime.
rates.

e. Increased unemployment has a larger negative influence on the social control of both violent and property crime in economically resource advantaged counties than in economically resource disadvantaged counties.

3. There is temporal dimension between social structural and socioeconomic change in nonmetropolitan counties and changes in rates of crime.

a. The effect of social structural factors on control of violent crime in nonmetropolitan counties decreases with time. However, its effect is greater on violent crime than is socioeconomic status characteristics. In other words, the predictive power of social structural indicators on violent crime relative to socioeconomic status factors is stronger for each successive time period.

b. The effect of social structural factors on control of property crime in nonmetropolitan counties decreases with time. However, its effect is greater than it is for socioeconomic status characteristics. In other words, the predictive power of social structural indicators on property crime is stronger relative to the socioeconomic factors for each successive time period.
CHAPTER 3

STUDY DESIGN

Social disorganization theory attempts to explain crime rate variations across places by the social structural and socioeconomic factors that are presumed to be associated with the capacity of local social groups and institutions to exercise social control. My model is built from the slowly growing body of findings that have applied social disorganization theory to the study of crime within and between rural communities (Wilkinson, 1984a, 1984b; Rephann, 1999; Osgood & Chambers, 2000; Barnett & Mencken, 2002; Jobes et al, 2004; Wells & Weisheit, 2004; Jobes et al, 2005). The advantage of social disorganization theory is that it is appropriate for a community level study of crime, a characteristic that has been consistent since its emergence through pioneering studies of crime in urban neighborhoods by scholars associated with the Chicago School of Sociology.

However, this reliance poses two potential disadvantages. First, social
disorganization theory is dependent on assumptions about the casual relationships between social structural and socioeconomic factors and crime that have mostly been tested in the urban milieu. Hence, since the origin of assumptions behind the theory arose from urban studies of crime, to what extent is it valid and applicable to rural communities (Donnemeyer & DeKeseredy, 2008)?

Second, since it would be prohibitively expensive to directly observe and measure social organization through participant observation, key informant interviews or other means of qualitative data collection across a large sample of communities (rural or urban), the success of an empirical study using census information and official crime data must rely on the validity of the theory. However, almost all the statistical studies employing social disorganization theory, whether the focus is rural or urban, use “proxy” measures to indicate the capacity of a community to solve problems and control the behavior of its members (Jobes et al., 2005). Hence, a more thorough examination that allows for greater scrutiny of proposed relationships of these proxy measures to crime rates in rural communities, and for revision of the theory, is possible if a variety of different statistical analyses is conducted.

To re-state the research question from Chapter One, this dissertation includes two
primary objectives. One is to test for the association of spatial variations in crime rates and differing social and economic characteristics of places. Another purpose is to test for temporal variations in crime rates. The temporal variation will be explored by utilizing crime data between 1994 and 2005, which is organized into four time periods (1994-1996, 1997-1999, 2000-2002, and 2003-2005). This method for organizing the data allows for the analysis of time-invariant effects of social structure and crime within diverse rural places. As well, it will be possible to examine the effect of changes in place-based characteristics on crime within this period.

3.1. Data

The data was collected from three different sources: the census, the FBI’s Uniform Crime Report, and the U.S. Department of Agriculture’s Economic Research Service (USDA-ERS). County level data files from the U.S. Bureau of Census provide various demographic, social, and economic variables for 1990 and 2000. The Uniform Crime Report, as recalculated and available through the National Archive of Crime Data, provides annualized per capita rates for various kinds of crime. The rural-urban continuum codes come from USDA-ERS. Known as the Beale codes, they are a measurement of the relative rurality of non-metropolitan counties by a combination of the
size of a county’s largest place and its proximity to a metropolitan area.

3.1.1 The Uniform Crime Report (UCR)

With its annual publication since the mid-1930’s, the UCR provides the possibility for longitudinal analyses of nationwide crime trends. However, the main concern of the UCR is that crime data are collected using standardized definitions of crime among the thousands of local police agencies that comprise the US system of law enforcement.

One problem with the UCR is that many police agencies do not report crime for a full year. Therefore, for many counties, both metropolitan and nonmetropolitan, crime reports are provided by local law enforcement agencies representing only a certain proportion of the county. As well, they may only report for certain months of the year. To reduce the possible mistakes caused by missing reports, the alternative is to use the estimated county level crime data provided by the National Archive of Crime Data (NACJD), from the University of Michigan, which is based directly on the original UCR reports for various cities, towns, counties and other local jurisdictions. Hence, the NACJD crime report data adjusts for non-reporting and uneven reporting by some police agencies, and then estimates per capita crime rates on an annual basis for geographic units like counties (U.S. Department of Justice, 1994-2005).
3.1.2 Census data

Information in this study for the social and economic structure of nonmetropolitan counties is from census data for the period between 1990 and 2000. This data is available from County Data Files and includes totals at the national, state, and county levels.

Altogether, data for 3,141 counties or county equivalents, as defined by the Census Bureau, as of December 2005, are available

(http://www.census.gov/geo/www/tiger/ctychng.html).

3.1.3 Measuring rurality: Rural-urban continuum codes

According to official U.S. Census Bureau definitions, the classification of rural areas consist of all territory located outside of urban areas. Urban areas are defined as urbanized areas and urban clusters. Urban areas do not necessarily follow municipal boundaries. Hence, most counties, whether metropolitan or nonmetropolitan, contain a combination of urban and rural populations.

Metropolitan (metro) and nonmetropolitan (nonmetro) areas are defined on the basis of counties. Metro-nonmetro status is determined by the Office of Management and Budget (OMB) based on information from the decennial census. The current classification of counties, for example, relies on information from the 2000 Census of the
The Rural-Urban Continuum Codes is a classification system used to define urban and rural America based on counties or county equivalents. The Economic Research Service (ERS) of the United States Department of Agriculture classifies metro-nonmetro counties into nine groups, from most urban to most rural. The codes (also known as the Beale Codes because they were originally developed by the eminent Rural Sociologist/Demographer, Calvin Beale) aligns all counties along an urban to rural continuum. Based on the version released in 2003, counties designated “1”, “2”, or “3” are metropolitan counties, and those with a designation from “4” through “9” are classified as nonmetropolitan counties. The metropolitan and nonmetropolitan categories then are subdivided into three and six types, respectively. For metropolitan areas, code 1 includes “counties in metropolitan areas of 1 million population or more”; code 2 includes “counties in metropolitan areas of 250,000 to 1 million population”; and code 3 are “counties in metropolitan areas of fewer than 250,000 population.”

The size of a metropolitan area is defined by the total size of the urbanized population in the central city county (city with \( \geq 50,000 \) persons) and all outlying counties that are considered part of its watershed. Inclusion of an outlying county in a metropolitan area
can be based on a single commuting threshold of 25 percent of the civilian labor force with no "metropolitan character" requirement. This means that an outlying county is considered part of a metropolitan area if 25 percent or more of its workers travel to the central city county for work, regardless of what percent of its population actually lives within a urban place. Other outlying counties can be designated as part of the metropolitan area if they are both economically tied to a central city county, as measured by daily commuting, and if they display a level of "metropolitan character" based on population density, urbanization, and population growth. A county with high "metropolitan character" could be included with as little as 15 percent of its workers commuting, for example.

For nonmetropolitan areas, there are 6 codes within the Rural-Urban Continuum. Again, the proportion of the population that lives within urbanized places helps with placement of a nonmetropolitan county into one of the six types. As well, contiguity or lack thereof with a metropolitan county determines the code or group to which it is assigned. Hence, these two criteria provide a stai-step pattern of nonmetropolitan counties which are more urban in character to counties that are more rural in character. Code 4 are all “counties with an urban population of 20,000 or more, adjacent to a
metropolitan area”, with code 5 as “counties with an urban population of 20,000 or more, not adjacent to a metropolitan area”. The next pair includes counties outside of a metropolitan area with an urban population between 2,500 and 19,999. These counties are designated a code 6 if they are adjacent to a metro area, and a code 7 if they are not adjacent to a metro area. Finally, the most rural counties are counties whose urban population does not exceed 2,500. Code 8 counties are those adjacent to a metro area and code 9 are those not adjacent to a metro area (http://www.ers.usda.gov/briefing/rurality).

Again, this study focuses on nonmetropolitan counties (codes 4 through 9) as classified in 2003 by the Economic Research Service (ERS) of the U.S. Department of Agriculture. Figure 3-1 shows a map of US counties based on the 2003 codes. In 2003, there were 2,052 nonmetropolitan counties, or 63.5 percent of all US counties and county equivalents. These counties make up about 75 percent of the nation’s land and are home to 17 percent (49 million) of the total U.S. population (http://www.ers.usda.gov/Briefing/Rurality/RuralUrbCon/).

3.2 Sample

Former studies of crime in nonmetropolitan areas tended to sample places in a single location or in multiple locations with comparable conditions, such as similar rates
of population or economic growth. It is assumed that in this dissertation the improvement in the collection of official crime data allows for the comparison of crime differences through a more systematic manner across a larger number of nonmetropolitan counties.
(Rephann, 1999; Wells & Weisheit, 2004). Following the example of Kowalski & Duffield (1990), Rephann (1999), Lee et al. (2003), Wells and Weisheit (2004), I select most counties in the US unless there was an absence of official crime rate data or a population so small that even three year average rates are not very stable.

3.3. Concepts and measurement

3.3.1 Crime rate

A crime rate represents the per capita occurrence of crime within a specific geographic area, such as a county. It is calculated as the number of criminal events “known to the police” for various offenses against people or property, divided by the population of the area. The crimes classified as Part I offenses in the Uniform Crime Report published by the Federal Bureau of Investigation (U.S. Department of Justice, 1994-2005) are used for the analysis in this study. Part I offenses are crimes of murder, rape, robbery, aggravated assault, burglary, larceny, auto theft, and arson. However, due to limited reporting and varying collection procedures by local law enforcement agencies, the data available for arson is not adequate and is excluded from this analysis.

According to the FBI’s Uniform Crime Reporting (UCR) program, murder and nonnegligent manslaughter is defined as the willful (nonnegligent) killing of one person
by another. Forcible rape is the carnal knowledge of a female that is committed forcibly and against her will. Robbery is defined as the taking or attempting to take anything of value from the custody or control of a person(s) by force or threat of force or violence. Aggravated assault is the unlawful attack by one person upon another for the purpose of inflicting severe or aggravated bodily injury, which means the kind of injury that requires medical attention. Burglary is property crime and is defined as the unlawful entry into a structure to commit a felony or theft. Larceny-theft is defined as the unlawful taking of property from the possession of another person. In almost all cases of larceny, the owner is not present at the time of the incident, such as the theft of a bicycle left in the front yard, or absconding with a tractor left overnight in a field. However, a purse-snatching is a personal larceny because the victim and the offender are at the same place and at the same time. Motor vehicle theft includes the theft or attempted theft of a car, truck or other motor vehicle.

Violent crimes are defined in the UCR as those offenses which involve force or threat of force. Hence, violent crime is composed of four offenses: murder and nonnegligent manslaughter, forcible rape, robbery, and aggravated assault. Property crime includes the offenses of burglary, larceny-theft, and motor vehicle theft.
The data presented in the UCR reflect the “hierarchy rule,” which requires that only the most serious offense in a multiple-offense criminal incident be counted. For example, burglary is a crime that usually leads to a second offense. However, only one offense is counted, which is always the more serious one. A burglary leading to the theft of a television is not counted as a larceny, but as a burglary. However, a burglary that also includes forcible rape is counted as the latter. In descending order of severity, the violent crimes are murder and nonnegligent manslaughter, forcible rape, robbery, and aggravated assault, followed by the property crimes of burglary, larceny-theft, and motor vehicle theft.

Two standards are set in validating FBI data: (1) the coverage index (2) the coverage of population reporting the crime. The original crime data is collected by individual law enforcement agencies. When the data was aggregated to the county level by National Archive of Criminal Justice Data at the Inter-university Consortium for Political and Social Research (ICPSR), the coverage index was created to provide users with a diagnostic measure of aggregated data quality in a particular county (see ICPSR 06850). The Coverage Index represents the proportion of county data that is not imputed for a given year. It ranges from 100, indicating that all agencies in the county reported for
12 months in the year, to 0, indicating that all data in the county is based on an estimate.

The second standard is called the “coverage of population reporting crime.” It is the proportion of the population covered by jurisdictions who participate in the Uniform Crime Report, and adjusts for jurisdictions that may overlap into other counties.

3.3.2 Proximity to a metropolitan county

One focus of this dissertation, and to many other researchers who examine rural crime, is the influence of proximity to larger, urban places and how this affects rural crime rates (Osgood & Chambers, 2000). Even though the social disorganization theory tradition of Shaw & Mckay mainly focused on structural characteristics within a community, the interrelationship of rural communities with different kinds of urban communities is tested. Especially, the assumption that counties close to urban areas have higher rates of violent crime among juveniles has been a previous subject of research (Osgood & Chambers, 2000; Bouffard & Muftić, 2006).

Proximity to a city is defined as a dummy variable, and includes counties that are adjacent to a metropolitan county (or not) according to the Rural-Urban Continuum Codes. In the Rural-Urban Continuum, these are codes 4 through 9. Code 4, 6, and 8 are counties that are adjacent to metropolitan areas. Code 5, 7, and 9 are counties that are not
adjacent to a metropolitan area. A nonmetropolitan county which is adjacent to a metropolitan area is recoded as 1, and those that are not are recorded as 0.

3.3.3 Population size and Population density

Population size is measured by the resident population of a county. The range of population among nonmetropolitan counties is 67 to 182,193 persons. Average population is 22,896 (S.D.=22,869). Density is the population per square mile in a county. Population size and density have been used as proxy measures for the level of strong social ties among communities. For example, Wilkinson (1984a, 1984b) argues that rural communities with less population and population density naturally lead rural residents to form social networks that contain a preponderance of strong social ties. Moreover, strong social ties lead to stronger social control and less crime (Wilkinson, 1984a, 1984b; Kowalski & Duffield, 1990; Osgood & Chambers, 2000). Hence, the impact of a breakdown of strong social ties in small and less density populated communities is an increase in crime rates (Carcach, 2000b; Barnett & Mencken, 2002; Wells & Weisheit, 2004; Jobes, et al., 2004).

3.3.4 Ethnic heterogeneity

Ethnic heterogeneity is a frequently used indicator in studies that adopt a social
disorganization framework (Cao, 2004). Ethnic heterogeneity is measured by the index of diversity, or the GINI index. The GINI index is computed as

\[ 1 - \sum_i P_i^2 \]

where \( P_i \) is the proportion of the ethnic population in a county (Blau, 1977; Sampson, 1984; Osgood and Chambers, 2000; Cao, 2004). There are six ethnic groups considered in calculating the GINI index: White, Black, Indigenous, Asian, Hispanic, and others. In nonmetropolitan counties, the GINI index ranges from 0.006 to 0.82, with an average GINI index score of 0.187 (S.D.=0.166). The GINI index indicates the likelihood of any two persons being from different ethnic groups. The higher a score, the more heterogeneous is the county. Ethnic heterogeneity is also an indicator of social integration at a place, with the presumption that a high score reflects a more segmented population and a greater chance for cultural conflicts to emerge. For example, Osgood & Chambers (2000) concluded that ethnic heterogeneity predicts a higher rate of juvenile violence in nonmetropolitan areas. Wells & Weisheit (2004) found that higher racial diversity was related to high rates of violent and property crime for all counties.

3.3.5 Residential Instability

The proportion of owner-occupied housing is used to indicate residential instability and is another frequently employed indicator by researchers who apply social
disorganization theory to the study of place and crime (Rephann, 1999; Osgood & Chambers, 2000; Wells & Weisheit, 2004; Jobes et al., 2004). Lower ownership designates greater residential instability. The average proportion of owner-occupied housing units among all nonmetropolitan counties in this study is 74.8% (6.53%), with a range from 0% to 89.9%. In the past, residential instability has been used to measure the social identity of residents with their community (Rephann, 1999; Wells & Weisheit, 2004; Jobes, 2004). For example, Rephann (1999) found that residential instability predicts lower crime rates and lower arrest rates in nonmetropolitan counties. Wells & Weisheit (2004) found a positive relationship between residential instability and property crime rate in all counties. Jobes et al. (2004) found that residential crime rates for assault and break and enter were associated with residential instability.

3.6 Family Disruption

Three variables are adopted for measuring family disruption. They include the proportion of high school drop outs, the proportion of solo parent families (Wells & Weisheit, 2004; Bouffard & Muftić, 2006), and the proportion of separated parent families (Jobes et al. 2004). High school drop outs are represented by the proportion of youth in the 16 to 19 year age range who are not in school. The average proportion of
high school drop outs is about 9.65% (S.D.=5.66%), with a range from 0 to 58%.

Solo parent families are measured by the proportion of single parents with children 18 years and younger. On average, 8.06% (S.D.=2.96%) of families with children aged less than 18 are from solo parent families. The proportion of solo parent families ranges from 0 % to 30.22%.

Separated family is defined as the proportion of families having been separated among the population aged 15 years and over. The proportion of separated families shows an average of 1.72% (S.D.=1.04%), and a range from 0 to 10.20%.

An Index of Family Disruption is created by combining the three variables, a procedure that was previously used by Barnett and Mencken (2002) in their study of social disorganization and rural crime. The same variables in this study have a Cronbach’s reliability coefficient of 0.749 in 2000 and 0.725 in 1990, which is similar to the results of Barnett and Mencken (2002). The Index of Family Disruption for each county is a scored number determined by factor analysis (a regression method that provides a score based on weights assigned to all three variables). Before conducting the factor analysis, the variables are standardized as z-scores. The factor loading for each variable in 1990 was .645 for the proportion of high school drop outs, .866 for the
proportion of solo parent families, and .890 for the proportion of separated parent families. The factor loading for each variable in 2000 was .719 for the proportion of high school drop outs, .862 for the proportion of solo parent families, and .864 for the proportion of separated parent families.

3.3.7 Socioeconomic status (SES)

The socioeconomic status of a place is measured by five Census variables: the proportion of the population living in poverty, the proportion of the civilian labor force that is unemployed, median individual income, median household income, and the proportion of the population with an associate or 2-year college degree or higher. The socioeconomic status of a community represents the kinds of human, social, and financial resources that can be used to solve social problems, and presumably, creates greater social cohesion or integration in a community, hence, greater social control. This can be seen in the study by Lee et al. (2003) of the relationship between homicide and socioeconomic disadvantage. Lee et al. (2003) concluded that socioeconomic disadvantage leads to an increase in homicide rates by reducing the ability of a community to exercise effective social control.

Except for the proportion of the labor force unemployed, the four variables are
combined as an index of socioeconomic status because of their high factor loadings.

Employing the same procedure used to construct the index of family disruption, those
four variables have a Cronbach’s reliability coefficient of 0.843 in 2000 and 0.841 in
1990. The factor loading for each variable in 1990 was: .815 for median individual
income, .892 for median household income, .742 for the proportion of the adult
population with a college degree, and .848 for the proportion of the population designated
as living below the poverty line. The factor loading for each variable in 2000 was .811 for
median individual income, .905 for median household income, .736 for the proportion
with a college degree, and .837 for the proportion in poverty.

3.4 Analyses

The theory of social disorganization suggests a high correlation between conditions
reflecting a community’s social structure and crime. I intend to test social disorganization
theory in two ways. The first one is by using conventional methods that correlate crime
rates with social structural variables for each specific crime. For this analysis, regression
will be employed. The second is to regard social disorganization as a latent variable
reflected in both features of its social structure and of rates for various crimes. For this
analysis, structural equations modeling will be used.
Regression is widely used in a number of social and behavioral sciences and a variety of other scientific fields. Historically, the name regression is from a paper written in 1885 by F. Galton on “Regression toward Mediocrity in Heredity.” Galton found that children’s height has the tendency to “regress” to the group mean for offspring of both short and tall parents. The statistical relationship between parents’ height and their children’s height coalesced toward the group mean when plotted on a graph. The tendency for data for a large number of observations to regress to the mean remains the primary assumption of regression, and values that do not correspond to the value as calculated by the predictor variable is its statistical error. In regression, error is assumed to be a random variable, that is, independent of the relationship between the variables in the analysis, and to show a specific statistical distribution (mean value of zero, constant variance and a normal distribution). Estimation methods are presumed valid under those conditions, such as ordinary least squares (Neter, Kutner, Nachtsheim, and Wasserman, 1999; Johnson and Wichern, 2002).

In this study, regression is used to test (accept or reject) the hypotheses as described in Chapter 2. Specifically, I use regression analysis to test the effects of specific social structural and socioeconomic variables on rates for various crimes by controlling for the
other independent variables. As well, the strength to which the various social structural
and socioeconomic variables predict crime rates is calculated and is indicated by the
regression coefficient.

A regression analysis with 12 years of pooled data examines the effect of location
and adjacency with metropolitan counties on crime rates and crime trends. The purpose
of this analysis is to test the assumption that rurality has a positive and significant effect
on crime after controlling for population size. Also, a regression analysis is conducted to
predict the crime rate in 2000 and the relative contribution of various changes in the
social structural and socioeconomic variables for explaining variance in rates of the UCR
crimes. In this regression analysis, three types of correlates are considered as predictors.
The first type is the social structure and socioeconomic indicators in 1990, the second one
is the difference in social structural and socioeconomic indicators between 1990 and 2000,
and the last one is the interaction between the two sets of predictors.

A structural equation model is used to estimate multiple equations simultaneously
(Bollen, 1989; Jörekog and Sörbom, 1996). In brief, a structural equation model is
essentially a combination of factor analysis and path analysis. There are two components
of a structural equation model: a latent model and a measurement model. The latent
model includes latent endogenous (dependent variables), latent exogenous variables (independent variables), and latent errors in its equations. In a structural equation model, it is possible to estimate the coefficients between the latent endogenous variables and the latent exogenous variables. As well, one can estimate the explained proportion of the variance of the endogenous variables much like one does for regression.

The measurement model denotes the relationship between the indicators, the latent variables and the measurement errors. We can examine the loading of each indicator to their common factor (i.e., latent variable), as one does in confirmatory factor analysis. Also, we can examine the validity of each indicator by estimating the error structure of the measurement model.

In this study, I calculate two structural equation models to examine the relationship of crime with social and economic structure for each of the time periods. First, I estimate the moderating effect of family disruption on other social and economic structural variables and crime. Second, both path analysis and factor analysis is applied to three time periods in order to examine the utility of social disorganization theory to rural counties. The reason for the use of three rather than four time periods is related to the assumption that the census data is a more valid predictor of something else (like crime)
when the two sets of data are closer to each other than farther away in time. Hence, I use only the crime rates for the 3-year periods of 1997-1999, 2000-2002, and 2003-2005.

Several indicators are developed to decide and test the goodness of fit for the overall model (formulas for each may be found in Appendix B). Under certain conditions (such as the sample size is large, covariance matrix is analyzed, and no excessive kurtosis for observed variables), as mentioned by Bollen (1989, pp268-289), the chi-square test determines statistical significance for the model based on the comparison between implied variance and covariance matrix and observed variance and covariance matrix.

Implied variance and covariance matrix is based on the model with several restrictions on the parameters. Both the observed variance and covariance matrix have no restrictions on the parameters. Hence, the chi-square test evaluates whether the restrictions are valid.

If conditions are violated, other tests become more important for assessment of a model’s fit. For example, the chi-square tends to be too large in small sample (<100) and lead to the too frequent of rejections of our hypotheses (Bollen, 1989, p. 266). This is because in a small sample size the estimator of chi-square statistics is likely less accurate and has a greater chance to depart from the observed values. According to Hoyle & Panter (1995), Hu & Bentler (1995) and American Psychological Association (APA, 1994,
p. 247), certain tests of goodness of fit should be included, such as the Goodness of Fit Index (GFI) as described by Jörekog & Sörbom (1985), the Non-normed Fit Index or Tucker-Lewis index (NNFI/TLI) (Bentler and Bonnett, 1980, Tucker & Lewis, 1973), the Normed Index ρ1 or Incremental Fit Index (IFI) (Bollen, 1989), and the Comparative Fit Index (CFI) (Bentler, 1989).

The GFI is an index based on residuals. The explanation of the GFI is analogous to R-square in a regression model, and presents the relative amount of variance and covariance accounted for by the model. Score values of the GFI should range between 0 and 1. If the GFI is close to 1, there is a better fit. The data probably do not fit the model if the GFI is negative or much larger than 1.

The Normed Fit Index (NFI) is an index based on comparing the lack of fit of the baseline model (Tb) and a hypothesized model (Tm). The NFI can be denoted as (Tb-Tm)/Tb. The baseline model is related to the Chi-Square value of Tb, and is the most restrictive, dependable model because all variables are inter-correlated to some extent. Its value is between 1 and –1. If the NFI is close to 1, it is a better fit. However, the NFI can increase because of an increase in the degrees of freedom. Also the NFI is affected by sample size, and its means within a sampling distribution varies with N. A modification
of the NFI was proposed by both Bollen (1989) and Hoyle & Panter (1995), and is referred to as the Non-normed Fit Index/Tucker-Lewis index (NNFI/TLI), which performs well in the estimation of the relative improvement (per degree of freedom) of the hypothesized model over a baseline model for the ML estimate and a larger sample. The value of the NNFI/TLI represents the relative improvement per degree of freedom of the model. The Normed Index ρ1 or incremental fit index (IFI) is more consistent in a small sample than the NNFI/TLI.
CHAPTER 4

RESULTS

Guided by social disorganization theory, this chapter describes the findings of the analysis on variations in crime rates for over 1,500 nonmetropolitan counties. It begins with a descriptive analysis of crime rates in both metropolitan and nonmetropolitan counties of the US. The second half of the chapter includes results of both the multiple regression and the structural equation analyses.

4.1 Descriptive statistical analysis

4.1.1 Crime in metropolitan and nonmetropolitan counties

Mean crime rates for each year from 1994 to 2005 are presented in Table 4-1. At the county-level, the crime rate is calculated by dividing the total number of crime incidents to the relative population (covered population) for the county, which is then multiplied by 100,000. The mean crime rate is the average of the crime rates for all counties, with county as the unit of analysis. In the following analysis, we use the mean, the coefficient
of variation (CV), and the ratio of property to violent crime to describe the distribution of crime rates across counties from 1994 to 2005.

County-level data shows a trend indicating that both the property crime rate and the violent crime rate were decreasing from 1994 to 2005 for all counties included in the analysis, both metropolitan and non-metropolitan. For example, in Table 4-1, the violent crime rate averaged 364 (S.D=360) in 1994, 311(S.D=323) in 2000, and 284 (S.D=238) in 2005. The property crime rate averaged 2,973(S.D=1,869) in 1994, 2,572 (S.D=1,507) in 2000, and 2,460 (S.D=1,433) in 2005.

Crime rates by four 3-year averages – (1994-1996), (1997-1999), (2000-2002), and (2003-2005) – is also shown in Table 4-1. The results indicates that the change in crime rates is significant across the four time periods for both violent (ANOVA test, F=64.62, d.f.=3, 28,826, p-value<0.001) and property offenses (ANOVA test, F=141.56, d.f.=3, 28,826, p-value<0.001). The Post Hoc test also shows a significant difference between each pair.

Tables 4-2 and 4-3 present crime rates for the same time periods, with the rates broken down for metropolitan counties, micropolitan counties, and rural counties. As a reminder, both micropolitan counties and rural counties are nonmetropolitan. The basic
pattern across these three types of places is that rural counties have lower rates when compared to metropolitan and micropolitan counties. Also, metropolitan counties have higher violent and property crime rates than micropolitan counties. The same pattern can be seen for each of the three types of violent crime and each of the four types of property crime (Table 4.3). For each of the time periods, metropolitan counties demonstrated higher rates of crime than micropolitan counties, and micropolitan counties showed higher rates of crime than rural or non-metropolitan counties.

When we review crime rate changes from 1994 to 2005, different patterns in the over-all crime trends among metropolitan counties, micropolitan counties and rural counties can be seen. Based on ANOVA analysis, metropolitan counties show statistically significant declines in both violent and property crime. Micropolitan counties show a significant decline in violent crime for the period 1997-1999, and in property crime for 2000-2002. Rural counties exhibit no statistically significant changes in violent crime rates and as well, no significant differences in property crime rates for three time periods, namely, 1994-1996, 1997-1999, and 2000-2002 (seen in Appendix C-1 and C-2).

An analysis of changes from 1994 to 2005 in rates for specific crimes for metropolitan counties shows a similar trend (seen in table 4-3). With the exception of
forcible rape, micropolitan counties also show the same kind of decline across the 12 year time period. However, in rural counties, forcible rape, robbery, aggravated assault, and burglary do not change to any statistically significant degree from 1994 to 2005. Despite these differing rates of decline, metropolitan counties still exhibit higher rates of crime than micropolitan counties, who in turn, display higher rates than nonmetropolitan or rural counties.

The coefficient of variation (CV) is used to compare variations in crime rates between different time periods and between different types of crime. A low CV score means that the crime is more common in relation to the mean across all the units or cases, which in these analyses, is a county or county equivalent. For example, if homicide showed the lowest CV score, this would indicate that homicide as a crime type is common or closer to the mean across all counties than the other crimes.

The results in Table 4-1 and Table 4-2 show a larger dispersion of violent crime than property crime for all counties from 1994 to 2005. The CV for violent crime rates for each year was between 1.04 and .084. In contrast, the CV for property crime rates for each was between .63 and .58. For all counties, violent crime has a higher relative variation than property crime, which means that it is more risky for a researcher to
| Year | Violent | | | | Property | | | | | | Ratio |
|------|----------|---|---|---|----------|---|---|---|---|---|
|      | N | Mean(1) | S.D. | CV | N | Mean(2) | S.D. | CV | (2)/(1) |
| 1994 | 2363 | 364 | 360 | 0.99 | 2363 | 2974 | 1869 | 0.63 | 8.16 |
| 1995 | 2376 | 355 | 371 | 1.04 | 2376 | 3008 | 1860 | 0.62 | 8.46 |
| 1996 | 2210 | 336 | 333 | 0.99 | 2210 | 3011 | 1826 | 0.61 | 8.96 |
| 1997 | 2241 | 341 | 334 | 0.98 | 2241 | 3005 | 1764 | 0.59 | 8.16 |
| 1998 | 2225 | 333 | 309 | 0.93 | 2225 | 2845 | 1687 | 0.59 | 8.59 |
| 1999 | 2335 | 311 | 287 | 0.92 | 2335 | 2632 | 1520 | 0.58 | 8.46 |
| 2000 | 2426 | 312 | 323 | 1.04 | 2426 | 2572 | 1508 | 0.59 | 8.26 |
| 2001 | 2450 | 306 | 302 | 0.99 | 2450 | 2604 | 1506 | 0.58 | 8.51 |
| 2002 | 2513 | 302 | 275 | 0.91 | 2513 | 2577 | 1482 | 0.58 | 8.52 |
| 2003 | 2498 | 290 | 257 | 0.89 | 2498 | 2552 | 1472 | 0.58 | 8.79 |
| 2004 | 2627 | 281 | 241 | 0.86 | 2627 | 2494 | 1446 | 0.58 | 8.86 |
| 2005 | 2566 | 285 | 239 | 0.84 | 2566 | 2461 | 1433 | 0.58 | 8.65 |
| Time period | | | | | | | | | | |
| 1994-1996 | 6949 | 352 | 356 | 1.01 | 6949 | 2997 | 1852 | 0.62 | 8.51 |
| 1997-1999 | 6801 | 328 | 310 | 0.95 | 6801 | 2825 | 1665 | 0.59 | 8.62 |
| 2000-2002 | 7389 | 307 | 300 | 0.98 | 7389 | 2584 | 1498 | 0.58 | 8.43 |
| 2003-2005 | 7691 | 285 | 246 | 0.86 | 7691 | 2502 | 1451 | 0.58 | 8.77 |
| Total | 28830 | 317 | 305 | 0.96 | 28830 | 2718 | 1630 | 0.60 | 8.58 |

1. Crime rate in each time period is three years combination.
2. N is the number of valid counties for analysis in each year or time period.
3. Coefficient of variation CV=S.D/Mean. Coefficient of variation is used to estimate variation instead of standard deviation because of the widely different means between violent and property crime. The CV for a single variable aims to describe the dispersion of the variable in a way that does not depend on the variable’s measurement unit. The higher the CV, the greater the dispersion is.

(http://www.ats.ucla.edu/stat/mult_pkg/faq/general/coefficient_of_variation.htm)

Table 4-1 Violent and property crime rates (per 100,000 for all counties): 1994 to 2005
describe the mean violent crime rate as applicable or representative across all counties.

Simply put, the violent crime across counties is more heterogeneous than property crime.

When we compare the coefficients of variation for each of the three types of counties, the results in Table 4-2 show a higher dispersion of both violent and property crime for rural counties, even though their rates are not as large. Metropolitan and micropolitan counties have similar dispersions or variations in their crime rates. More specifically, across all metropolitan counties, forcible rape and aggravated assault are the more common violent crimes because of their lower CV, and burglary and larceny theft are the more common property crimes. For micropolitan counties, the pattern is quite similar, but also includes motor vehicle theft. In contrast, for rural counties, all seven crimes have higher rates of dispersion, indicating that rural places show more variability in crime. This may be due to smaller population sizes on which the rates were calculated for individual rural counties, but it may also mean that crime is more sensitive to variations in various social structural and socioeconomic factors associated with crime in these rural counties, according to social disorganization theory.

From 1994 to 2005 (in Table 4-1), the dispersion of crime rates among places was decreasing, which means that the heterogeneity of places in terms of crime was
decreasing. It is especially evident for violent crime. The dispersion of property crime

![Graph showing changes in ratio of property to violent crime from 1994 to 2005.]

Figure 4-1 Changes in ratio of property to violent crime from 1994 to 2005 in metropolitan, micropolitan and rural counties

changed little from 1994 to 2005, but was lower to begin with. Therefore, property crime rates across places and across time are more similar, that is, less various than violent crime rates.

Table 4-1 also includes information for the 12 year period from 1994 through 2005
on the ratio of property to violent crime. This rate ranges from 8.16 (1994) to 8.96 (1996).

Basically, there is about 8 to 9 times more property crime than violent crime. A 3-year time periods shows that the ratio of property and violent crime changes goes up, then down, and then back up again, but never varying between 8.51 and 8.77. Figure 4-1 plots these ratios across the four time periods for metropolitan, micropolitan and rural counties.

In Figure 4-1, it can be seen that for metropolitan counties, the proportion of property crimes are increasing. Hence, it shows that in metropolitan counties, a steadily growing share of crime is property in nature (see also Table 4.2). For micropolitan counties, the ratio of property to violent crime decreases, but increases again for 2003-2005. Over-all, the ratio of property crime to violent crime is greater for micropolitan than metropolitan counties. Rural counties show the lowest ratio of property to violent crime, with the ratio decreasing from 1994-1994 to 2000-2003 and then increasing for the time period from 2003-2005.

To summarize up to this point, there are five important findings about crime in metropolitan and nonmetropolitan counties. These are as follows.

(1) Crime rates are highest in metropolitan counties and lowest in rural counties.
(2) Crime rates are decreasing in metropolitan counties at a faster rate than in micropolitan and rural counties.

(3) Violent crime shows relatively less variation between metropolitan, micropolitan and rural counties than property crime.

(4) Rural counties display more variation in crime, based on the coefficient of variation, than either metropolitan or micropolitan counties. Metropolitan and micropolitan counties show a similar structure to their crime rate variations. These results support the assumption that rural counties are more heterogeneous in their crime profiles, which may be due either to smaller populations on which the rates were calculated, or greater variability to changes in social structural and socioeconomic factors that previous studies using social disorganization theory also have found to be associated with crime (Wilkinson, 1974a; Rephann, 1999; Wells & Weisheit, 2004, Jobes et al, 2004).

(5) The ratio of property to violent crime increases in metropolitan counties over time, which means that the proportion of property crimes are increasing in metropolitan counties. However, in nonmetropolitan counties (both micropolitan and rural), the ratio of property crime to violent crime has been more irregular. Among the three types of counties, the ratio of property to violent crime is highest in micropolitan counties.
<table>
<thead>
<tr>
<th></th>
<th>Metropolitan</th>
<th>Micropolitan</th>
<th>Rural</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>Mean</td>
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<td>CV</td>
</tr>
<tr>
<td>Violent 1994-96</td>
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<td></td>
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<td></td>
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<td>273</td>
</tr>
<tr>
<td>2000-2002</td>
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<td>285</td>
</tr>
<tr>
<td></td>
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<td>296</td>
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</tr>
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<td></td>
<td>1386</td>
<td>188</td>
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<td>2003-2005</td>
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<tr>
<td></td>
<td>12488</td>
<td>300</td>
<td>259</td>
</tr>
<tr>
<td></td>
<td>5378</td>
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<td>289</td>
</tr>
<tr>
<td>Property 1994-96</td>
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<td>1157</td>
</tr>
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</table>

1. Metropolitan counties are the counties classified as 1 to 3 in Rural-Urban Continuum codes. Micropolitan counties are the counties classified as 4 to 7. Rural counties are the counties classified as 8 and 9.
2. Crime rate in each time period is three years combination.
3. N is the number of valid counties for analysis in each time period. Total of N is a sum of counties for four time period.
4. Coefficient of variation CV=S.D/Mean. Coefficient of variation is used to estimate variation instead of standard deviation because of the widely different means between violent and property crime. The CV for a single variable aims to describe the dispersion of the variable in a way that does not depend on the variable's measurement unit. The higher the CV, the greater the dispersion is.

(http://www.ats.ucla.edu/stat/mult_pkg/faq/general/coefficient_of_variation.htm)

Table 4-2 Violent and property crime rate: metropolitan, micropolitan and rural counties (3 year averages)
<table>
<thead>
<tr>
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<th>Metropolitan</th>
<th>Micropolitan</th>
<th>Rural</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>S.D.</td>
<td>CV</td>
</tr>
<tr>
<td>Murder</td>
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<td>1994-1996</td>
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<td>Forcible Rape</td>
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<tr>
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<td>Total</td>
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<td>277</td>
<td>0.96</td>
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</tbody>
</table>

Table 4-3 Crime rate: Urban, Micropolitan and Rural Counties (3 year averages)
In this section, all 3,141 counties in the United States are analyzed relative to various measures used to describe their social structural and socioeconomic features. As mentioned in Chapter 3, the data come from the 1990 and the 2000 census. I mainly focus on indicators that are typically associated with social disorganization theory and attempt to explain variations in crime rates, namely, family disruption, ethnic heterogeneity, residential instability, population components, and socioeconomic status. Social structures are observed by their classification of rurality as metropolitan, micropolitan and rural. Results are shown in Tables 4-4 to 4-7.

4.1.2.1 Family disruption

In this study, there are three aggregated characteristics of family structures that serve as proxy measure for family disruption. Those three indicators are: (1) the proportion of high school drop outs, (2) the proportion of solo parents, and (3) the proportion of separated parents. As shown in Tables 4-5, 4-6, and 4-7, the proportion of high school drop outs decreased in both metropolitan and nonmetropolitan counties from 1990 to 2000. In metropolitan counties, the proportion of high school drop outs among youth in the 16-19 age range was 11.0% in 1990, and 9.4% in 2000. In micropolitan
counties, high school drop outs was 11.3% in 1990, and 10.3% in 2000. In rural counties, high school drop outs was 9.9% in 1990, and 8.4% in 2000.

The proportion of solo or single parent families increased in both metropolitan and the two types of nonmetropolitan counties from 1990 to 2000. In metropolitan counties, the proportion of solo parent families was 7.2% in 1990 and 8.6% in 2000. In micropolitan counties, solo parent families made up 7.2% of all families in 1990 and 8.6% in 2000. In rural counties, solo parent families were 5.6% of the total in 1990 and 7.0% in 2000.

The proportion of separated parent families decreased slightly in metropolitan counties, from 2.0% in 1990 and 1.9% in 2000. In micropolitan counties, separated parent families did not change, being 1.8% in both 1990 and 2000. In rural counties, separated parent families was 1.4% of the total in 1990 and 1.5% in 2000.

4.1.2.2 Urban population

The proportion of the population that is urban has been increasing in metropolitan and micropolitan counties, but decreasing in rural counties. As shown in Table 4-5, the urban population for metropolitan counties was 53.8% and 59.2% in 1990 and 2000, respectively. For all micropolitan counties, the average for the urban population was
39.8% in 1990 and 44.2% in 2000. For rural counties, it was only 2.0% in 1990 and 0.6% in 2000.

4.1.2.3 Ethnic heterogeneity

Ethnic heterogeneity is calculated by the index of ethnic diversity or GINI index. A higher score indicates greater ethnic diversity. The GINI index is formulated as

\[ 1 - \sum_i P_i^2, \]

and is based on six groups: White, Black, Indigenous, Asian, Hispanic, and others. The average score for ethnic heterogeneity for all counties was 0.168 (S.D.=0.164) in 1990 and 0.206 (S.D.=0.167) in 2000. In metropolitan counties, the ethnic diversity increased from 0.201 (S.D.=0.158) in 1990 to 0.246 (S.D.=0.163) in 2000. In micropolitan counties, ethnic diversity also went up, from 0.165 (S.D.=0.165) in 1990 to 0.202 (S.D.=0.166) in 2000. In rural counties, ethnic diversity increased as well, from 0.120 (S.D.=0.160) in 1990 to 0.151 (S.D.=0.162) in 2000. As the scores clearly indicate, rural counties have less diversity than either micropolitan or metropolitan counties.

4.1.2.4 Residential instability

A county with a higher proportion of owner occupied homes is assumed to have lower residential instability. There is a higher proportion of owner occupied homes in 1990 than in 2000 for both metropolitan and nonmetropolitan counties. In metropolitan
counties, owner occupied homes was 70.6% in 1990 and 72.3% in 2000. In micropolitan counties, it was 72.5% in 1990, compared to 73.7% in 2000. Finally, in rural counties, the proportion of owner occupied homes increased slightly from 75.4% in 1990 to 77.1% in 2000.

4.1.2.5 Population size and density

The population size and population density were both increasing from 1990 to 2000 for both metropolitan and nonmetropolitan counties. There was an average population increase of 27,907 in metropolitan counties, 2,722 in micropolitan counties, and 505 in rural counties from 1990 to 2000, respectively.

The population density in metropolitan counties was 555 in 1990 and 618 in 2000. The population density in micropolitan counties was 56 in 1990 and 59 in 2000. The population density in rural counties was 14 in 1990 and 15 in 2000.

4.1.2.6 Socioeconomic status (SES)

As seen in Tables 4-4 through 4-7, there are five measures of socioeconomic status. These include the proportion of the population living below the poverty line, per capita income, the proportion of the civilian labor force that is unemployed, median household income, and the proportion of the population over the age of 20 with a college degree.
The proportion of the population in poverty decreased in both metropolitan and nonmetropolitan counties from 1990 to 2000. In metropolitan counties, the proportion living below the poverty line was 12.8% in 1990 and 11.2% in 2000. In micropolitan counties, the average proportion of the population in poverty was 17.5% in 1990 and 14.6% in 2000. For all rural counties, the average proportion of the population living below the poverty line was 19.1% in 1990 and 15.7% in 2000.

The per capita income in 1990 was $16,724 for metropolitan counties, $14,353 for micropolitan counties, and $14,322 in rural counties. The individual income in 2000 was $26,015 in metropolitan counties, $21,411 in micropolitan counties, and $20,787 in rural counties.

The proportion of the civilian work force that was unemployed decreased for both metropolitan counties and rural counties from 1990 to 2000, but there was no difference in micropolitan counties. The proportion unemployed was 6.6% in 1990 and 6.1% in 2000 for metropolitan counties. The proportion of unemployed was 7.2% in 1990 and 7.3% in 2000 for micropolitan counties. The proportion of unemployment was 6.4% in 1990 and 6.3% in 2000 in metropolitan counties.

The median household income in 1990 was $28,595 for metropolitan counties,
$22,190 for the population living in micropolitan counties, and $20,122 in rural counties.

The household income in 2000 was $41,677 for metropolitan counties, $32,833 for micropolitan counties, and $30,315 for rural counties.

The final measure of socioeconomic status is the proportion of the population with at least a 2-year college degree. There was an increase in the proportion of people with an associate degree or higher in metropolitan and nonmetropolitan counties for the period 1990 to 2000. In metropolitan counties, 40.2% of the population had an associate degree in 1990, and 47.7% in 2000. In micropolitan counties, 33.1% of the population had earned at least a 2-year college degree in 1990, and 40.0% in 2000. In rural counties, 32.1% of population had achieved an associate degree or better in 1990, and 40.0% in 2000.
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<td>3139 0.096</td>
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*a. Paired t-test between 1990 and 2000, *p<.05; **p<.01; *** p<.001*

Table 4-4 Social structure and change for all counties: 1990 and 2000
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Paired t-test between 1990 and 2000, *p<.05; **p<.01; *** p<.001

Table 4-5 Social structure and change for metropolitan counties: 1990 and 2000
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Paired t-test between 1990 and 2000, *p<.05; **p.01; *** p<.001

Table 4-6 Social structure and change for micropolitan counties: 1990 and 2000
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<tr>
<td>Proportion of high school dropout</td>
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</tr>
<tr>
<td>Proportion urban</td>
<td>668</td>
<td>0.020</td>
<td>0.082</td>
</tr>
<tr>
<td><strong>Ethnic Heterogeneity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GINI index</td>
<td>668</td>
<td>0.120</td>
<td>0.160</td>
</tr>
<tr>
<td><strong>Residential Instability</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proportion of owner occupied homes</td>
<td>669</td>
<td>0.754</td>
<td>0.079</td>
</tr>
<tr>
<td><strong>Population</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population</td>
<td>669</td>
<td>7307</td>
<td>5387</td>
</tr>
<tr>
<td>Population density</td>
<td>669</td>
<td>14</td>
<td>15</td>
</tr>
<tr>
<td><strong>Socioeconomic Status</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proportion below poverty line</td>
<td>668</td>
<td>0.191</td>
<td>0.082</td>
</tr>
<tr>
<td>Per capita income</td>
<td>669</td>
<td>14322</td>
<td>3602</td>
</tr>
<tr>
<td>Proportion of unemployed</td>
<td>669</td>
<td>0.064</td>
<td>0.045</td>
</tr>
<tr>
<td>Median household income</td>
<td>669</td>
<td>20122</td>
<td>4515</td>
</tr>
<tr>
<td>Proportion: 2-year college degree or higher</td>
<td>668</td>
<td>0.321</td>
<td>0.096</td>
</tr>
</tbody>
</table>

Paired t-test between 1990 and 2000, *p<.05; **p<.01; *** p<.001

Table 4-7 Social structure and change for rural counties: 1990 and 2000
4.2 Multivariate statistical analysis

4.2.1 Regression analysis of location, time and crime

Regression analysis is used to predict crime rates in those counties for which crime data is available and reliable. The purposes of this analysis are, first, to examine the effect of place itself, urban influence and time change on crime; and secondly, to examine their interaction effects on crime. Rurality/urbanity of counties is coded as dummy variables, with metropolitan, micropolitan and rural counties representing the three types of places. Proximity to a metropolitan area is a dummy variable if it is adjacent to a metropolitan county, and 0 denotes not adjacent to a metropolitan county for the two types of rural counties. This analysis will combine all 12 years of the crime data. There are several states and their counties who do not have UCR data, such as Kentucky and Indiana. Otherwise, counties that have a coverage index score of reporting crime that is less than 80 for the three years within any of the specified time periods were excluded in the analysis and their crime rates were set as missing data for that period of time. Population size is controlled by adding into the model its logarithm transformation. To avoid bias due to violation of the normality assumption of OLS, crime rates are transformed into their logarithmic form.
Table 4-8 represents the results of the regression analysis for all counties, after controlling for population size, which means that I explain the influence of the various independent variables once the influence of population size has been considered. Twice as much variance in property crime (34.4%) was explained as for violent crime (16.5%). Both the micropolitan and rural status of the county were statistically related to violent and property crime. The interaction of time and the rural or micropolitan status of the counties was statistically significant, except for T2 (1997-1999). Of all the variance, robbery showed the most variance explained. One reason is that it is strongly correlated with the status of a county. In essence, rates of robbery are very low in rural counties, and higher for micropolitan counties because the former have a much smaller percentage of the population which is urban.

Returning to Table 4-8, the regression coefficients present a proximate estimate of the increase in a crime rate for a one unit increase in an independent variable, after holding population size constant. The purpose is to compare the crime rate and the trend in crime among nonmetropolitan counties (both rural and micropolitan) compared with metropolitan counties. After controlling for the influence of population size, in the first time period (1994-1996), rural counties have a -0.278 less effect than on the metropolitan
counties for violent crime, which is a sum of -0.403 (p<0.001) in rural counties not adjacent to metropolitan counties and 0.125 (p<0.001) for rural counties adjacent to metropolitan counties. That is, as expected, rural counties have 27.8% less violent crime than metropolitan counties after controlling for population size. Respectively, rural counties not adjacent to metropolitan counties have a 40.3% less crime rate than metropolitan counties, and rural counties adjacent to metropolitan counties have a 12.5% larger violent crime rate than metropolitan counties. These results show that although rural counties have less violent crime, this does vary depending on the type of rural area under consideration. Those adjacent to metropolitan counties raise the rate of violent crime, after controlling for the effect of population size for all counties. Hence, even after controlling for population size, there is an identifiable urban influence on violent crime rates in nonmetropolitan counties based on proximity. However, for micropolitan counties, the effect of proximity to a metropolitan county was much weaker, except for murder and robbery. This may indicate that there is a greater urban influence when two counties adjacent to each other are more different in character (rural versus metropolitan) than when the two adjacent counties are more similar in character (micropolitan versus metropolitan).
For property crime, rural county status reduces the crime rate by 32.8% when compared to metropolitan county status. Respectively, rural counties not adjacent to metropolitan counties have a crime rate that is 43.5% less than metropolitan counties, and those rural counties adjacent to metropolitan counties have a crime rate that is 10.7% larger than metropolitan counties. As shown in Table 4-8, rural counties have a regression coefficient of -0.328, which is the sum of -0.435 (p<0.001) for the non adjacent to metropolitan counties, and 0.107 (p<0.001) for the adjacent to metropolitan counties, in the first time period (1994-1996).

For violent crime, micropolitan counties have -0.039 less crime, which is the sum of -0.137 (p<0.001) for micropolitan counties not adjacent to metropolitan counties and 0.098 (p<0.001) for those adjacent to metropolitan counties. On property crime, micropolitan counties show 0.037 more crime, which is the sum of 0.091 (p<0.001) in micropolitan counties not adjacent to metropolitan counties and -0.054 (p<0.001) for micropolitan counties adjacent to metropolitan counties. That is, micropolitan county status results in a 3.9% lower violent crime rate and a 3.7% increase in the property crime rate than for metropolitan county status, after controlling for population size.
<table>
<thead>
<tr>
<th></th>
<th>Violent Crime</th>
<th>Property Crime</th>
<th>Murder</th>
<th>forcible rape</th>
<th>robbery</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>t</td>
<td>B</td>
<td>t</td>
<td>B</td>
</tr>
<tr>
<td>(Constant)</td>
<td>3.484***</td>
<td>62.910</td>
<td>5.797***</td>
<td>157.03</td>
<td>-2.527***</td>
</tr>
<tr>
<td>1997-1999(T2)</td>
<td>-0.058**</td>
<td>-2.501</td>
<td>-0.059***</td>
<td>-3.800</td>
<td>-0.180***</td>
</tr>
<tr>
<td>2000-2002(T3)</td>
<td>-0.114***</td>
<td>-4.999</td>
<td>-0.134***</td>
<td>-8.708</td>
<td>-0.270***</td>
</tr>
<tr>
<td>2003-2005(T4)</td>
<td>-0.162***</td>
<td>-7.215</td>
<td>-0.177***</td>
<td>-11.600</td>
<td>-0.290***</td>
</tr>
<tr>
<td>MICRO</td>
<td>-0.137***</td>
<td>-5.380</td>
<td>0.091***</td>
<td>5.314</td>
<td>-0.167***</td>
</tr>
<tr>
<td>RURAL</td>
<td>-0.403***</td>
<td>-11.862</td>
<td>-0.435***</td>
<td>-19.662</td>
<td>-0.297***</td>
</tr>
<tr>
<td>ADJ*MICRO</td>
<td>0.098***</td>
<td>6.287</td>
<td>-0.054***</td>
<td>-5.113</td>
<td>0.211**</td>
</tr>
<tr>
<td>ADJ*RURAL</td>
<td>0.125***</td>
<td>5.002</td>
<td>0.107***</td>
<td>6.609</td>
<td>0.104</td>
</tr>
<tr>
<td>RURAL*T2</td>
<td>0.067</td>
<td>1.587</td>
<td>0.052</td>
<td>1.898</td>
<td>0.044***</td>
</tr>
<tr>
<td>RURAL*T3</td>
<td>0.165***</td>
<td>3.998</td>
<td>0.082***</td>
<td>3.044</td>
<td>0.208</td>
</tr>
<tr>
<td>RURAL*T4</td>
<td>0.158***</td>
<td>3.853</td>
<td>0.046</td>
<td>1.749</td>
<td>0.078</td>
</tr>
<tr>
<td>MICRO*T2</td>
<td>0.042</td>
<td>1.327</td>
<td>0.025</td>
<td>1.147</td>
<td>0.039</td>
</tr>
<tr>
<td>MICRO*T3</td>
<td>0.080**</td>
<td>2.553</td>
<td>0.015</td>
<td>0.689</td>
<td>0.034</td>
</tr>
<tr>
<td>MICRO*T4</td>
<td>0.104***</td>
<td>3.375</td>
<td>0.039</td>
<td>1.848</td>
<td>0.005***</td>
</tr>
<tr>
<td>POP(Log)</td>
<td>0.225***</td>
<td>45.117</td>
<td>0.223***</td>
<td>67.367</td>
<td>0.360</td>
</tr>
</tbody>
</table>

R-Square | .165 | .344 | .174 | .279 | .492 |
Adjusted | .165 | .344 | .173 | .278 | .492 |
F       | 396 | 1077 | 432 | 795 | 1993 |
df1    | 14 | 14 | 14 | 14 | 14 |
df2    | 28,873 | 28,693 | 28,801 | 28,801 | 28801 |

1. Dependent variable: Log (Crime rate); 2. See appendix E for each year’s county numbers; 3. Adj: counties adjacent to metropolitan county; 4. Rural: 8-9 of the Beale Codes and Micro is 4-7 of the Beale Codes.

continued

Table 4-8 Regression results of crime rate for all counties from 1994 to 2005
Table 4-8 Continued

<table>
<thead>
<tr>
<th></th>
<th>aggravated assault</th>
<th>burglary</th>
<th>larceny theft</th>
<th>motor vehicle theft</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>t</td>
<td>B</td>
<td>t</td>
</tr>
<tr>
<td>(Constant)</td>
<td>2.392***</td>
<td>29.467</td>
<td>4.240***</td>
<td>78.360</td>
</tr>
<tr>
<td>1997-1999(T2)</td>
<td>-0.037</td>
<td>-1.067</td>
<td>-0.090***</td>
<td>-3.937</td>
</tr>
<tr>
<td>2000-2002(T3)</td>
<td>-0.094**</td>
<td>-2.775</td>
<td>-0.204***</td>
<td>-9.005</td>
</tr>
<tr>
<td>2003-2005(T4)</td>
<td>-0.150***</td>
<td>-4.457</td>
<td>-0.222***</td>
<td>-9.891</td>
</tr>
<tr>
<td>MICRO</td>
<td>0.012</td>
<td>0.314</td>
<td>0.092***</td>
<td>3.638</td>
</tr>
<tr>
<td>RURAL</td>
<td>-1.096***</td>
<td>-22.512</td>
<td>-0.367***</td>
<td>-11.322</td>
</tr>
<tr>
<td>ADJ*MICRO</td>
<td>0.117***</td>
<td>5.055</td>
<td>0.058***</td>
<td>3.754</td>
</tr>
<tr>
<td>ADJ*RURAL</td>
<td>0.609***</td>
<td>17.184</td>
<td>0.355***</td>
<td>15.023</td>
</tr>
<tr>
<td>RURAL*T2</td>
<td>0.153**</td>
<td>2.533</td>
<td>0.053</td>
<td>1.323</td>
</tr>
<tr>
<td>RURAL*T3</td>
<td>0.260***</td>
<td>4.425</td>
<td>-0.015</td>
<td>-0.389</td>
</tr>
<tr>
<td>RURAL*T4</td>
<td>0.275***</td>
<td>4.708</td>
<td>-0.090*</td>
<td>-2.302</td>
</tr>
<tr>
<td>MICRO*T2</td>
<td>0.027</td>
<td>0.574</td>
<td>0.047</td>
<td>1.474</td>
</tr>
<tr>
<td>MICRO*T3</td>
<td>0.084</td>
<td>1.799</td>
<td>0.054</td>
<td>1.734</td>
</tr>
<tr>
<td>MICRO*T4</td>
<td>0.096*</td>
<td>2.094</td>
<td>-0.072*</td>
<td>2.346</td>
</tr>
<tr>
<td>POP(log)</td>
<td>0.279***</td>
<td>38.203</td>
<td>0.220***</td>
<td>45.214</td>
</tr>
<tr>
<td>R-Square</td>
<td>.197</td>
<td>.190</td>
<td>.315</td>
<td>.314</td>
</tr>
<tr>
<td>Adjusted R-square</td>
<td>.197</td>
<td>.190</td>
<td>944</td>
<td>1055</td>
</tr>
<tr>
<td>F</td>
<td>506</td>
<td>484</td>
<td></td>
<td>14</td>
</tr>
<tr>
<td>df1</td>
<td>14</td>
<td>14</td>
<td></td>
<td>14</td>
</tr>
<tr>
<td>df2</td>
<td>28,801</td>
<td>28,801</td>
<td>28,801</td>
<td>28,801</td>
</tr>
</tbody>
</table>
The results for other time periods are shown in Figures 4-2 and 4-3. Controlling for population size, metropolitan county status shows a decreasing effect on the rates of violent and property crime from 1994 to 2005. At the same time, micropolitan county status has a greater relative effect on both property and violent crime, with the influence increasing for violent crime but varying little for property crime over time. As well, for rural counties, its influence increases for violent crime and remains about the same for property crime over time.

The general trend of crime for both types of nonmetropolitan counties is as follows. After controlling for population size, those rural counties adjacent to metropolitan counties have higher crime than those not adjacent to metropolitan counties for both violent and property crime. However, micropolitan counties adjacent to metropolitan counties have higher crime rates than those not adjacent to metropolitan counties for violent crime, but not for property crimes, such as burglary, larceny theft and motor vehicle theft. Also, micropolitan counties not adjacent to metropolitan counties have higher crime rates than micropolitan counties adjacent to metropolitan counties for the crime of forcible rape.

Generally speaking, rural counties adjacent to metropolitan counties have higher
regression coefficients for predicting crime rates than any other type of nonmetropolitan county for both violent and property crime, after controlling for population size. For example, for forcible rape, rural counties adjacent to metropolitan counties have higher crime rates than other counties (0.433, t=11.24, p < .001), and also for aggravated assault (0.609, t=11.24, p < .001), burglary (.355, t=11.24, p < .001), larceny theft (0.279, t=11.24, p < .001), and motor vehicle theft (0.372, t=11.24, p < .001). Rural counties which are not adjacent to metropolitan counties have the lowest crime rates for both violent and property crime.

In comparison to metropolitan counties, rural (0.125, t=5.002, p < .001) and micropolitan counties (0.098, t=6.287, p < .001) adjacent to metropolitan counties have higher violent crime rates. Also, rural counties (0.107, t=6.609, p < .001) adjacent to metropolitan counties and micropolitan counties (0.091, t=5.314, p < .001) not adjacent to metropolitan counties have higher rates than metropolitan counties for property crime. Specifically, for forcible rape, burglary, larceny theft, and motor vehicle theft, the rates are higher in rural counties adjacent to metropolitan counties and in micropolitan counties not adjacent to metropolitan counties. Murder, robbery, and aggravated assault display higher rates in nonmetropolitan counties adjacent to metropolitan counties.
Figure 4-2 The prediction of violent crime rate by time and type of county after controlling for population size.
Figure 4-3 The prediction of property crime by time and type of county after controlling for population size

4.2.2 An analysis of the structural equations model of family disruption, socioeconomic status (SES) and social control in nonmetropolitan counties

Structural equation model with latent variable is employed in this analysis in order to answer the question of the validity of crime data for each time period. That is, I examine the validity of three time periods (1997-1999, 2000-2002, and 2003-2005) of crime around the 2000 county census data in terms of their social structural and socioeconomic status variables. It is assumed that the closer time period of the crime data, the better the validity of the census data. Structural equations with a measurement model can estimate the variance of the measurement error, plus, the amount of error can be estimated.

In the model, there are two endogenous (predictor) variables and two exogenous (explanatory) variables. The social control of violent crime and the social control of property crime as represented by various crime rates, are both endogenous variables. The family disruption (FD) index and socioeconomic status (SES) index are both exogenous variables, without measurement error. Both endogenous variables are latent variables and are predicted by each other and the other two exogenous variables in this model. Both latent variables, indicating social control, are measured by crime rates. In the

In nonmetropolitan counties, as shown in Figure 4-4, the chi-square is 8.26 (df=5, p=0.142). The other statistics of model fit is the GFI=0.99, AGFI=0.98, NFI=0.99, Non-normed Index=0.99, Normed index Rho1=0.99. Hence, the overall model fit is good.

Violent crime and property crime in 2000-2002 have measurement validity of $R^2 = 0.860$ and $R^2 = 0.939$. The two have the best values among the indicators. The validity of the endogenous variables of violent crime is $R^2 = 0.704$, and of property crime, is $R^2 = 0.602$. That is, SES, family disruption and other factors can explain 70.4% of the variation in violent crime and 60.2% variation in property crime.

Family disruption predicts a negative (-0.307) direct effect on the control of violent crime and a negative (-0.059) direct effect on the control of property crime in nonmetropolitan counties. Indirectly, family disruption predicts an effect of -0.285 and -0.338 on the control of violent crime and on the control of property crime in nonmetropolitan counties. Hence, family disruption has a larger influence on violent crime control than on property crime control.
Socioeconomic status (SES) index predicts a positive (0.108) direct effect on the control of violent crime and a negative (-0.229) direct effect on the control of property crime in nonmetropolitan counties. Indirectly, SES has an effect of -0.203 and -0.054 on the control of violent crime and on the control of property crime in nonmetropolitan counties, respectively. That is, an increase of socioeconomic status decreases with violent crime, but does little for property crime.

Results from this analysis show that first, in nonmetropolitan counties, those with a higher degree of family disruption have higher levels of violent crime (that is, less control), and this effect is direct, thus causing higher levels of property crime indirectly. Indirectly, socioeconomic status increases the effect of family disruption on the control of crime. Second, in nonmetropolitan counties with higher socioeconomic status, there are lower levels of violent crime (that is, more control) and higher levels of property crime (that is, less control). Indirectly, therefore, higher socioeconomic status leads to less property crime (that is, more control).

According to the results in the measurement model for all nonmetropolitan counties, the effect of the various social and economic structural factors, as measured through indicators from the 2000 census, increases with the 3-year property crime rate for

There are reciprocal effects of violent and property crime rates in nonmetropolitan counties (Figure 4-4). A one unit increase of social control in violent crime has a .719 influence on the increase of social control for property crime. However, a one unit increase of social control in property crime has only a .571 influence on the increase of the social control of violent crime. In other words, a decrease in the violent crime rate causes a greater decrease in the property crime rate than the other way around.

Figure 4-5 presents the results for rural counties. For rural counties, family disruption predicts a negative (-0.123) direct effect on the social control of violent crime and a negative (-0.035) direct effect on the control of property crime. Indirectly, family disruption predicts an effect of -0.229 and -0.263 on the social control of violent and property crime, respectively.

In rural counties, socioeconomic status (SES) index predicts a positive (0.151) direct effect on the social control of violent crime and a negative (-0.277) direct effect on the social control of property crime. Indirectly, SES has an effect of -0.205 and -0.040 on the social control of violent crime and property crime, respectively.
Figure 4-6 presents the results for micropolitan counties. For micropolitan counties, family disruption predicts a negative (-0.342) direct effect on the social control of violent crime rate and a negative (-0.007) direct effect on the social control of property crime. Indirectly, family disruption predicts an effect of -0.265 and -0.300 on the social control of violent crime and property crime, respectively.

For micropolitan counties, socioeconomic status (SES) index predicts a positive (0.105) direct effect on the social control of violent crime rate and a negative (-0.166) direct effect on the social control of property crime. Indirectly, SES has an effect of -0.171 and -0.032 on the social control of violent crime and property crime, respectively.

The possible differences in causal effects between rural and micropolitan counties is that in micropolitan counties, family disruption predicts higher levels of violent crime than in rural counties. However, in rural counties, socioeconomic status predicts a higher levels of property crime than in micropolitan counties.

In summary, the structural equation models for rural and micropolitan counties indicates the following.

(1) The mutual influence on violent and property crime on each other are
approximately equal in rural counties. However, in micropolitan counties, property crime has a larger effect on the social control of violent crime.

(2) In rural areas, the effect of the social structural variables on the social control of property crime sustains itself for a longer time, but for violent crime, the effect decreases very quickly from 1997-1999 to 2000-2002. The effect of social structure in micropolitan counties on the social control of property crime sustains itself for a longer time.

(3) The effect of family disruption in micropolitan counties is not significant on the social control of property crime, but the effect on violent crime is larger than it is for rural counties.

(4) Socioeconomic status in micropolitan counties has a larger effect on the social control of both violent crime and property crime than in rural counties.

(5) Family disruption has a larger effect on the social control of violent crime than SES in both rural and micropolitan counties. However, SES has a larger effect on the social control of property crime than family disruption for micropolitan and rural counties.
3. SAS codes seen in appendix F, p.222.

Figure 4-4 Structural equation model of social control of violent and property crime in nonmetropolitan counties
3. SAS codes seen in appendix F, p.222.

Figure 4-5 Structural equation model of social control of violent and property crime in rural counties
3. SAS codes seen in appendix F, p.222.

Figure 4-6: Structural equation model of social control of violent and property crime in micropolitan counties
<table>
<thead>
<tr>
<th>Dependent variables</th>
<th>Violent (Log) coefficients</th>
<th>Property (Log) coefficients</th>
<th>Murder (Log) coefficients</th>
<th>Forcible rape (Log) coefficients</th>
<th>Robbery (Log) coefficients</th>
<th>Aggr. Assault (Log) coefficients</th>
<th>Burglary (Log) coefficients</th>
<th>Larceny-Theft (Log) coefficients</th>
<th>Motor-vehicle theft (Log) coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>4.055***</td>
<td>5.998***</td>
<td>-2.272***</td>
<td>-3.176***</td>
<td>-2.855***</td>
<td>2.035***</td>
<td>2.882***</td>
<td>4.083***</td>
<td>1.363***</td>
</tr>
<tr>
<td>FD index</td>
<td>0.285***</td>
<td>0.128***</td>
<td>0.157**</td>
<td>0.082</td>
<td>0.380***</td>
<td>0.342***</td>
<td>0.146***</td>
<td>0.098***</td>
<td>0.151***</td>
</tr>
<tr>
<td>SES index</td>
<td>0.014</td>
<td>0.166***</td>
<td>-0.112**</td>
<td>0.142***</td>
<td>-0.020</td>
<td>0.041</td>
<td>0.104***</td>
<td>0.225***</td>
<td>0.130**</td>
</tr>
<tr>
<td>Population (Log)</td>
<td>0.102***</td>
<td>0.136***</td>
<td>0.171***</td>
<td>0.466***</td>
<td>0.491***</td>
<td>0.220***</td>
<td>0.175***</td>
<td>0.225***</td>
<td>0.292***</td>
</tr>
<tr>
<td>Urban Pop. %</td>
<td>0.581***</td>
<td>0.801***</td>
<td>-0.039</td>
<td>0.918***</td>
<td>0.911***</td>
<td>0.695***</td>
<td>0.476***</td>
<td>1.104***</td>
<td>0.529***</td>
</tr>
<tr>
<td>GINI</td>
<td>0.985***</td>
<td>0.377**</td>
<td>1.371***</td>
<td>0.836***</td>
<td>2.312***</td>
<td>0.959***</td>
<td>0.643***</td>
<td>0.475**</td>
<td>0.450*</td>
</tr>
<tr>
<td>Owner occupied household %</td>
<td>0.026</td>
<td>-0.182</td>
<td>1.246*</td>
<td>1.174</td>
<td>-1.031</td>
<td>0.863</td>
<td>1.704***</td>
<td>0.476</td>
<td>0.351</td>
</tr>
<tr>
<td>Unemployment %</td>
<td>0.098***</td>
<td>0.095***</td>
<td>-0.012</td>
<td>0.152***</td>
<td>-0.026</td>
<td>0.144***</td>
<td>0.119***</td>
<td>0.119***</td>
<td>0.102***</td>
</tr>
<tr>
<td>MIDWEST</td>
<td>-0.132**</td>
<td>-0.050</td>
<td>-0.296***</td>
<td>0.065</td>
<td>-0.360***</td>
<td>-0.215**</td>
<td>-0.130**</td>
<td>-0.047</td>
<td>-0.061</td>
</tr>
<tr>
<td>POP. Density (Log)</td>
<td>-0.058*</td>
<td>0.008</td>
<td>0.097**</td>
<td>-0.029</td>
<td>0.131**</td>
<td>-0.092**</td>
<td>0.008</td>
<td>0.005</td>
<td>-0.030</td>
</tr>
<tr>
<td>R-square</td>
<td>.375</td>
<td>.388</td>
<td>.240</td>
<td>.260</td>
<td>.573</td>
<td>.318</td>
<td>.260</td>
<td>.322</td>
<td>.259</td>
</tr>
<tr>
<td>Adj. R-square</td>
<td>.371</td>
<td>.384</td>
<td>.235</td>
<td>.256</td>
<td>.570</td>
<td>.314</td>
<td>.256</td>
<td>.318</td>
<td>.255</td>
</tr>
</tbody>
</table>

*p<.05, ** p<.01, *** p<.001; 1 Dependent variable is the logarithm transformation of the crime rate. 2 Social structure is in 2000. 4 Crime rate is three year average from 2000-2002.

Table 4-9 Regression analysis of crime rates in nonmetropolitan counties
4.2.3 Regression analysis of spatial variation in crime rates within nonmetropolitan counties

A regression model is used for the analysis of social disorganization theory to examine variations in crime rates among nonmetropolitan counties. In this analysis, the crime rate for various offenses, as a dependent variable, is an average of three years from 2000 to 2002. As shown in Table 4-9, there are nine models: for all three violent crimes, all four property crimes, murder, forcible rape, robbery, aggravated assault, burglary, larceny theft, and motor vehicle theft respectively. Social structural factors, as derived from the 2000 census are the independent variables. The explained variation for each model is between 0.235 and 0.573. Robbery has the highest explained variation among all the dependent variables. In the following discussion, I examine the results by each type of structural factor using each structural factor in explaining the variation of crime rate cross places.

4.2.3.1 Family disruption

The Family Disruption Index had a statistically significant effect on both violent crime (.285, p-value<.001) and property crime (.128, p-value<.001) in nonmetropolitan counties. More specifically, counties displaying higher scores on the Family Disruption
Index had a higher violent crime rate, and the effect was stronger on robbery (.380, p-value<.001) and forcible rape (.342, p-value<.001). However, the effect of family disruption in nonmetropolitan counties was not significant for forcible rape. In general, family disruption has a larger impact on violent than on property crime, especially for those counties where a smaller percentage of violent crimes are homicide and rape.

4.2.3.2 Socioeconomic status

Nonmetropolitan counties with a higher socioeconomic status score do not have lower rates for either violent crime (.014, p-value>.05) or property crime (.166, p-value<.001), except for the murder rate (-.112, p-value<.01). The murder or homicide rate was lower in those counties with higher socioeconomic status. Among the four property crimes, socioeconomic status showed its strongest effect on larceny-theft (.225, p-value<.001) in nonmetropolitan counties.

Social disorganization theory anticipates a negative effect of socioeconomic status on crime, which considers community resources as an important factor in favoring social integration. However, for the most part, this assumption was not supported by the results in this study, except for murder and robbery.

4.2.2.3 Population size
The results of the effect of population size were consistent with expectations from social disorganization theory. Nonmetropolitan counties with larger populations have higher rates for both violent and property crime. In this analysis, the largest effect of population size was on forcible rape (.466, p-value<.001) and robbery (.491, p-value<.001).

4.2.3.4 Urban population

Counties with a higher percentage of the population that is urban have higher crime rates, except for murder. As the percent of the population that is urban increased, the murder rate decreased, even though it was not statistically significantly. The percent of the population that was urban also had a larger effect on property crime than on violent crime, especially for larceny-theft.

4.2.3.5 Ethnic heterogeneity

Ethnic heterogeneity predicted a higher crime rate for both property and violent crime. The effect of ethnic heterogeneity was larger on violent crimes, such as robbery and murder, than on property crime.

4.2.3.6 Residential instability

A lower proportion of owner occupied households means higher residential
instability. Residential instability, as represented by the proportion of owner occupied households, does not have a significant effect on either violent crime or property crime. However, when its effect is examined for specific crimes, higher residential stability did predict a higher crime rate for both murder and burglary.

4.2.3.7 Unemployment

Generally, higher unemployment in nonmetropolitan counties was associated with higher crime rates for both violent crime and property crime, except for murder and aggravated assault.

4.2.3.8 Population density

When applied to urban settings, social disorganization assumes that population density lessens the amount of cohesion or social integration, hence, increasing crime. The anticipated positive sign of population density on crime was not found in this study, however. In this analysis, population density was negatively related to violent crime (-0.058, p<.05), but was not significantly related to property crime. Specifically, the effect of population density on violent crime was variable. Population density had a negative effect on aggravated assault (-0.092, p<.01), a positive effect on murder (0.097, p<.01) and a positive effect on robbery (0.131, p<.01).
4.2.3.9 Midwest

The regression analysis indicates that nonmetropolitan counties in the Midwest have lower violent crime rates (-0.132, p < .01) than other regions of the country. However, there was no significant difference with other regions in terms of property crime, except for forcible rape.

The results are summarized as follow:

(1) Family disruption was strongly related to robbery and assault.

(2) SES was related to property crime, with the largest effect on rates of larceny-theft. For violent crime, SES has its largest influences on forcible rape and murder.

(3) Population size has a positive effect on all 9 measures of crime, especially forcible rape and robbery.

(4) The percent of the nonmetropolitan population living in an urban area was associated with higher rates of robbery, forcible rape and larceny theft.

(5) Residential instability showed its largest effect on rates of both murder and burglary.
(6) Ethnic heterogeneity was more closely related to violent crime than to property crime.

(7) Unemployment does not increase either the murder rate or the forcible rape rate, but does increase the violent crimes of forcible rape and assault. The effect of unemployment on the three property crimes is similar.

(8) Population density has a negative effect on violent crime in general.

(9) The Midwest region is predictive of less violent crime.

4.2.4 Regression analysis of social change and crime in nonmetropolitan

This analysis estimates the effect of social structural and socioeconomic change on crime rates for the time period between 1990 and 2000. Social disorganization theory assumes that the relationship between various social and economic dimensions of a place and crime is linear. It is also assumed to be linear in this analysis. The second assumption is that crime rates are increasing or decreasing in a way that represents a linear or straight-line trend. According to the analysis of crime rates for metropolitan counties, crimes rates were decreasing from 1994 to 2005, and for micropolitan counties as well. However in rural counties, there was no difference in crime rates for this period. I extend this analysis to 1990, and assume that there is a decreasing crime trend in both
metropolitan and nonmetropolitan (micropolitan and rural) counties. Based on these assumptions then, the crime rate (in 2000) is defined as:

\[
\text{Crime rate (in 2000)} = \text{crime rate (in 1990)} + \text{changes of crime rate.}
\]

In this expression, the crime rate in 2000 is measured by a three year average of crime from 2000 to 2002. Crime rates from 1990 are not available from the National Archive of Crime Rate Data. The closest crime rate is from 1994. However, I assume that the crime rate in 1990 is a function of social structural and economic factors in 1990. Hence, I can estimate the crime rate in 1990 by the social and economic dimensions of counties found in the 1990 census.

The model reveals that the crime rate in 2000-2002 was a function of social structural and socioeconomic characteristics in 1990 and changes in both types of characteristics between 1990 and 2000. The regression analysis results for the effects of social change on crime are presented in Table 4-10.

\[4.2.3.1 \text{Social structural effects on crime rates in 1990}\]

Results are compared with those in the last section (seen Table 4-8). The effect of family disruption on crime rates in 1990 was similar to the effect of family disruption on crime rates in 2000. Family disruption in 1990 had a higher effect on (0.375) violent
crime (0.375) and property crime (.200) than in 2000 (0.285 on violent crime and 0.128 on property crime, respectively).

The effect of socioeconomic status on violent and property crime between 1990 and 2000 is not much different. However, SES had a significant influence on property crime in 1990 (0.178) and 2000 (0.128).

4.2.4.2 Social structural changes and crime rate

Table 4-10 presents the effects of change on crime rates in nonmetropolitan counties. Specifically, an increase in population size (.007, p <.001), the family disruption index (.120, p <.01), the proportion of the population that is urban (.386, p <.05), and ethnic heterogeneity (1.320, p <.01) led to an increase in the 3-year average (2000-2002) for violent crime.

Also, an increase in SES (0.151, p <.001), the proportion of the population that is urban (0.355, p <.01), ethnic heterogeneity (.749, p <.05), and the proportion of the population that is unemployed (.017, p <.01) all lead to an increase in the property crime rate, based on the 3-year average from 2000-2002.

For specific crimes, similar results are found. An increase in population size led to an increase in the rate of murder (.082, p <.05) and robbery (.103, p <.01). An increase in
the Family Disruption Index increased the rate of robbery (.192, p < .01) and aggravated assault (.134, p < .05). SES increased forcible rape (.355, p-value < .001), burglary (.186, p < .001), and larceny-theft (.208, p < .001). An increase in the urban population increase predicted an increase in robbery (.743, p < .01). Ethnic heterogeneity predicted an increase in the rates of forcible rape (2.068, p < .01), robbery (1.831, p < .05), aggravated assault (2.015, p < .01), burglary (1.240, p < .01), larceny-theft (1.102, p < .05), and motor-vehicle theft (2.012, p < .001). A higher unemployment rate predicted a decrease in murder (-.071, p < .01), and an increase in assault (.138, p < .01), burglary (.132, p < .001), larceny-theft (.120, p < .01), and motor vehicle theft (.086, p < .05).

4.2.4.3 Interaction between social change and social structure

In this section, I examine the interaction effect of SES and change in the unemployment rate, and the unemployment rate and change in SES on crime rates in nonmetropolitan counties. Results from the regression analysis show that SES and a change in the unemployment rate had a positive effects on both violent (.060, p-value < .001) and property crime (.050, p-value < .001) rates. The analysis also shows that an increase in unemployment will have a larger effect on reducing social control and increasing social disorganization in more wealthy counties.
<table>
<thead>
<tr>
<th></th>
<th>Violent (Log)</th>
<th>Property (Log)</th>
<th>Murder (Log)</th>
<th>Forcible rape (Log)</th>
<th>Robbery (Log)</th>
<th>Aggr. Assault</th>
<th>Burglary (Log)</th>
<th>Larceny-Theft (Log)</th>
<th>Motor-vehicle theft</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>4.714***</td>
<td>6.226***</td>
<td>-1.051***</td>
<td>-1.903***</td>
<td>-3.223***</td>
<td>3.541***</td>
<td>4.474***</td>
<td>4.860***</td>
<td>2.299***</td>
</tr>
<tr>
<td>FD index</td>
<td>0.357***</td>
<td>0.200***</td>
<td>0.205***</td>
<td>0.174***</td>
<td>0.524***</td>
<td>0.458***</td>
<td>0.217***</td>
<td>0.190***</td>
<td>0.234***</td>
</tr>
<tr>
<td>SES index</td>
<td>-0.018</td>
<td>0.178***</td>
<td>-0.169***</td>
<td>0.116***</td>
<td>0.002</td>
<td>0.016</td>
<td>0.089***</td>
<td>0.253***</td>
<td>0.112***</td>
</tr>
<tr>
<td>Population (Log)</td>
<td>0.032</td>
<td>0.100***</td>
<td>0.151**</td>
<td>0.437***</td>
<td>0.461***</td>
<td>0.126**</td>
<td>0.148***</td>
<td>0.183***</td>
<td>0.216***</td>
</tr>
<tr>
<td>% of Urban POP.</td>
<td>0.737***</td>
<td>0.958***</td>
<td>-0.113</td>
<td>1.083***</td>
<td>1.133***</td>
<td>0.757***</td>
<td>0.408***</td>
<td>1.206***</td>
<td>0.600***</td>
</tr>
<tr>
<td>GINI</td>
<td>0.745***</td>
<td>0.170</td>
<td>1.183***</td>
<td>0.459</td>
<td>2.047***</td>
<td>0.409</td>
<td>0.199</td>
<td>0.116</td>
<td>0.024</td>
</tr>
<tr>
<td>% Unemployment</td>
<td>0.113***</td>
<td>0.002</td>
<td>0.006*</td>
<td>0.003</td>
<td>0.005*</td>
<td>0.008***</td>
<td>0.004*</td>
<td>0.001</td>
<td>0.006***</td>
</tr>
<tr>
<td>MIDWEST</td>
<td>-0.050</td>
<td>0.118***</td>
<td>-0.045</td>
<td>0.189***</td>
<td>-0.062</td>
<td>0.162***</td>
<td>0.124***</td>
<td>0.158***</td>
<td>0.133***</td>
</tr>
<tr>
<td>POP. Density</td>
<td>-0.056*</td>
<td>-0.045</td>
<td>-0.265***</td>
<td>-0.033</td>
<td>-0.321***</td>
<td>-0.100</td>
<td>-0.118*</td>
<td>-0.043</td>
<td>-0.005</td>
</tr>
<tr>
<td>% of pop. Change</td>
<td>0.007***</td>
<td>0.007</td>
<td>0.082*</td>
<td>-0.046</td>
<td>0.103**</td>
<td>-0.064</td>
<td>0.025</td>
<td>0.020</td>
<td>-0.005</td>
</tr>
<tr>
<td>FD change</td>
<td>0.120**</td>
<td>0.061</td>
<td>-0.023</td>
<td>0.041</td>
<td>0.192**</td>
<td>0.134*</td>
<td>0.055</td>
<td>0.032</td>
<td>0.047</td>
</tr>
<tr>
<td>SES change</td>
<td>-0.078</td>
<td>0.151***</td>
<td>-0.025</td>
<td>0.355***</td>
<td>0.061</td>
<td>-0.060</td>
<td>0.186***</td>
<td>0.208***</td>
<td>0.017</td>
</tr>
<tr>
<td>URBAN Pop.</td>
<td>0.386*</td>
<td>0.355**</td>
<td>0.248</td>
<td>0.121</td>
<td>0.743***</td>
<td>0.072</td>
<td>-0.332</td>
<td>0.244</td>
<td>0.171</td>
</tr>
<tr>
<td>GINI Change</td>
<td>1.320**</td>
<td>0.749*</td>
<td>1.205</td>
<td>2.068**</td>
<td>1.831*</td>
<td>2.015**</td>
<td>1.240**</td>
<td>1.102*</td>
<td>2.012***</td>
</tr>
<tr>
<td>UNEM. Change</td>
<td>0.046</td>
<td>0.071**</td>
<td>-0.103*</td>
<td>0.064</td>
<td>-0.069</td>
<td>0.138**</td>
<td>0.132***</td>
<td>0.120**</td>
<td>0.086*</td>
</tr>
<tr>
<td>SES*Unemchange</td>
<td>0.069***</td>
<td>0.050***</td>
<td>-0.002</td>
<td>0.095**</td>
<td>0.036</td>
<td>0.092**</td>
<td>0.069***</td>
<td>0.073***</td>
<td>0.077**</td>
</tr>
<tr>
<td>Unem*SESChange</td>
<td>0.007</td>
<td>0.086**</td>
<td>0.066</td>
<td>0.348***</td>
<td>0.113</td>
<td>-0.028</td>
<td>0.101*</td>
<td>0.050</td>
<td>0.064</td>
</tr>
<tr>
<td>R-square</td>
<td>.408</td>
<td>.412</td>
<td>.250</td>
<td>.289</td>
<td>.581</td>
<td>.345</td>
<td>.275</td>
<td>.340</td>
<td>.286</td>
</tr>
<tr>
<td>Adj. r-square</td>
<td>.401</td>
<td>.405</td>
<td>.242</td>
<td>.281</td>
<td>.576</td>
<td>.338</td>
<td>.267</td>
<td>.333</td>
<td>.278</td>
</tr>
</tbody>
</table>

1* p<.05, ** p<.01, *** p<.001; 2. Social structure is in 1990, and change is the difference between 2000 and 1990. 3. Crime rate is three year average from 2000-2002. 4. Dependent variable is the logarithm transformation of crime rate.

Table 4-10 Regression analysis of crime rate of social changes in nonmetropolitan counties
I also assess the interaction of the unemployment rate and socioeconomic status and its effect on property crime. The results show that when socioeconomic status rises, counties with a higher proportion of unemployed will show a higher rate of forcible rape (.348, p <.001) and burglary (.101, p <.05).

4.2.5 Structural equation models with observed variables

I now turn to an analysis of the relationship between social structure and crime among nonmetropolitan counties. I make two important assumptions. One is the assumption that there is a mediating effect that exists between social structural factors and crime rate. In particular, I assume that family disruption has a mediating effect on social disorganization. The second assumption is that there is no measurement error. Considering both assumptions in this model, a structural equation model with observed variables is suggested in order to take advantage of the method’s ability to efficiently deal with the various multiple regression equations (Bollen, 1989).

Six social disorganization factors among the exogenous variables were included in the model. For this analysis, the three endogenous variables included were family disruption, the violent crime rate and the property crime rate. This is a "mediational"
model because it allows one of the endogenous variables to mediate the effect between the other exogenous variables and endogenous variables (violent and property crime rate).

Mediating effect is different from moderation effect. Moderation or effect modification is the situation that an observed relationship between two variables may be different at different levels of a third or control variable. Mediating effect is the situation that a mediator or mediating variable provides a causal process among the three variables, a mediational hypothesis. The mediational hypothesis reflects causal hypotheses about variables (MacKinnon, 2008). Substantively, this model implies that social disorganization as measured by multiple social structural and socioeconomic factors is predictive of crime.

SAS software is adopted for this analysis. A procedure called CALIS is useful in producing the estimates since multiple regression equations cannot easily be solved by using traditional multiple regression procedures (codes seen in appendix F, p.222). The covariance matrix used in this study can be found in appendix D. A more detail discussion for an analysis of covariance matrix is addressed in the EQS 2.0 manual (Bentler 1985) and in the LISREL VIII manual (Jöreskog and Sörbom 1996). Maximum likelihood estimates are computed in this analysis (Bollen, 1989, page 107-111). This
model is illustrated and estimated in the following equations.

\[
\begin{align*}
\text{VIOL} &= b_{11} \text{FD} + b_{12} \text{SES} + b_{13} \text{LPOP} + b_{14} \text{URBAN} + b_{15} \text{GINI} \\
&\quad + b_{16} \text{UNEM} + b_{17} \text{MIDWEST} + b_{18} \text{DENSITY} + b_{19} \text{SES_UM} + e_1, \\
\text{PROP} &= b_{21} \text{FD} + b_{22} \text{SES} + b_{23} \text{LPOP} + b_{24} \text{URBAN} + b_{25} \text{GINI} \\
&\quad + b_{26} \text{UNEM} + b_{27} \text{SES_UM} + e_2, \\
\text{FD} &= b_{31} \text{SES} + b_{32} \text{LPOP} + b_{33} \text{URBAN} + b_{34} \text{GINI} \\
&\quad + b_{35} \text{UNEM} + b_{36} \text{MIDWEST} + b_{37} \text{DENSITY} + b_{38} \text{SES_UM} + e_3;
\end{align*}
\]

In this model, VIOL represents the violent crime rate, PROP represents the property crime rate, FD stands for the family disruption index, LPOP is population size, URBAN is percent urban population, GINI is the ethnic heterogeneity, UNEM is the unemployment rate, MIDWEST is the Midwest region of the US, SES is socioeconomic index, DENSITY is population density and SES_UM is the interaction between SES and UNEM.

In this analysis, indices and test statistics point to a good fit of the model. Chi-Square was used for the overall test of model fit. The value of chi-square for 2 degrees of freedom is 0.178, which means that this model was not considered significantly different from the data \( (p \text{ value} = 0.915) \). The goodness of fit Index (GFI) was 1.000, GFI Adjusted for Degrees of Freedom (AGFI) was 0.999, Parsimonious GFI was 0.036, Bentler's Comparative Fit Index was 1.00, Bentler and Bonett's NFI was 1.00,
and Bollen’s Normed Index $\rho_1$ was 0.99. A more detailed explanation of those indices and test statistics are discussed by Bollen (1986, page 269-281) and in Appendix B (pp. 202). Suffice it to say, however, that all of these statistics indicate the model is very likely to be valid.

The results of the estimation of parameters are:

$$\text{VIOL} = 0.298(\text{SE}=0.03, t=9.56) \times \text{FD} + 0.013(\text{SE}=0.03, t=5.0) \times \text{SES} + 0.094(\text{SE}=0.03, t=3.08) \times \text{LPOP} + 0.611(\text{SE}=0.08, t=7.29) \times \text{URBAN} + 0.923(\text{SE}=0.16, t=5.73) \times \text{GINI} + 0.125(\text{SE}=0.02, t=5.16) \times \text{UNEM} + -0.115(\text{SE}=0.04, t=2.94) \times \text{MIDWEST} + 0.060(\text{SE}=0.02, t=2.88) \times \text{DENSITY} + 0.055(\text{SE}=0.02, t=3.63) \times \text{SES}_{\text{UM}} + e_1$$

$$\text{PROP} = 0.134(\text{SE}=0.02, t=5.93) \times \text{FD} + 0.149(\text{SE}=0.02, t=8.20) \times \text{SES} + 0.134(\text{SE}=0.02, t=7.98) \times \text{LPOP} + 0.827(\text{SE}=0.06, t=13.45) \times \text{URBAN} + 0.341(\text{SE}=0.12, t=2.93) \times \text{GINI} + 0.104(\text{SE}=0.02, t=6.01) \times \text{UNEM} + 0.052(\text{SE}=0.01, t=4.71) \times \text{SES}_{\text{UM}} + e_2$$

$$\text{FD} = -0.263(\text{SE}=0.02, t=-13.24) \times \text{SES} + 0.090(\text{SE}=0.03, t=3.31) \times \text{LPOP} + 0.241(\text{SE}=0.07, t=3.49) \times \text{URBAN} + 3.100(\text{SE}=0.11, t=28.84) \times \text{GINI} + 0.089(\text{SE}=0.02, t=4.45) \times \text{UNEM} + 0.184(\text{SE}=0.04, t=-4.93) \times \text{MIDWEST} + 0.083(\text{SE}=0.02, t=4.25) \times \text{DENSITY} + -0.049(\text{SE}=0.01, t=-4.00) \times \text{SES}_{\text{UM}} + e_3$$

Family disruption predicted a positive effect (0.298, p<.001) on both violent crime and property crime (0.134, p<.001). Also, SES predicted a total effect of -0.066 (p<.001) on violent crime and 0.114 (p<.001) on property crime. The direct effect for SES is
-0.013 for violent crime and 0.15 (p<.001) for property crime, after holding family
disruption constant. Population size, urban population, ethnic heterogeneity, and
unemployment all predicted a positive effect on the increase of both violent crime and
property crime. Location of a nonmetropolitan county in the Midwest region predicted
less crime than for other regions. Population density decreased violent crime but
increased property crime in nonmetropolitan counties. The interaction of SES and the
unemployment rate was positive for both violent and property crime.

The analysis showed that SES and the Midwest region had positive effects on
reducing family disruption. Moreover SES and unemployment had a negative interactive
effect, that is, decreased family disruption. When SES was statistically controlled,
unemployment led to a greater degree of family disruption in both high and low SES
counties. However, in the low SES counties, there was a greater increase in levels of
family disruption when the unemployment rate was increasing, compared to high SES
counties. When unemployment was held constant, high SES communities had a lower
level of family disruption, and its effect is greater in high unemployment communities.

Based on this analysis, there are several important findings in reference to
nonmetropolitan counties, which can be summarized as follows:
(1) Family disruption has a larger effect on the reduction of social control of violent crime than on the social control of property crime.

(2) Family disruption is a very important mediating factor for the relationship of ethnic heterogeneity and both violent and property crime. Half of the influence of ethnic heterogeneity on the decrease of social control results from its influence on family disruption.

(3) An increase in socioeconomic status decreases violent crime in nonmetropolitan counties. The effect of socioeconomic status on control of violent crime was mostly indirect and due to a decrease in family disruption when SES increases. An increase of socioeconomic status reduced violent crime, but had a smaller effect on the control of property crime.

(4) Unemployment increases both violent crime and property crime directly. Moreover, unemployment also interacts with the socioeconomic status of nonmetropolitan counties to increase both violent and property crime. The effect of socioeconomic development on increasing the social control of violent crime was reduced by increasing unemployment. Also, unemployment enhanced the positive effect
of socioeconomic status on the property crime.

(5) Low SES counties have larger chance to have higher family disruption when unemployment rate rises. In higher unemployment rate counties, the increase of county SES has significant function in preventing family disruption.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Violent Crime (log)</th>
<th>Property Crime (log)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>Total effect</td>
</tr>
<tr>
<td>Family Disruption</td>
<td>.298***</td>
<td>.298</td>
</tr>
<tr>
<td>SES</td>
<td>.013</td>
<td>-.066</td>
</tr>
<tr>
<td>Population (log)</td>
<td>.094*</td>
<td>.121</td>
</tr>
<tr>
<td>% Urban population</td>
<td>.610***</td>
<td>.682</td>
</tr>
<tr>
<td>Ethnic heterogeneity</td>
<td>0.923***</td>
<td>1.846</td>
</tr>
<tr>
<td>% Unemployment</td>
<td>.125***</td>
<td>.151</td>
</tr>
<tr>
<td>Midwest</td>
<td>-.115*</td>
<td>-.169</td>
</tr>
<tr>
<td>Population density (log)</td>
<td>-.059*</td>
<td>-.034</td>
</tr>
<tr>
<td>SES*UNEM</td>
<td>0.055**</td>
<td>.040</td>
</tr>
</tbody>
</table>

R-square                  | .380      | .389        |

1. *p<.05, **p<.01, ***p<.001

Table 4-11 Structural equation model for violent and property crimes in nonmetropolitan counties from 2000-2002
CHAPTER 5

CONCLUSIONS

5.1 A Macro-level perspective on informal social control

The over-all research question in this study was the role of place (community) on crime in nonmetropolitan America? Questions about place are asked by all criminologists interested in the ecology of crime because they seek to understand why there are high and low crime areas in places of all types, including urban, suburban, and rural localities (Sampson, Raudenbush & Earls, 1997; Osgood & Chambers, 2000; Barnett & Mencken, 2002; Lee et al, 2003; Wells & Weisheit, 2004; Jobes et al., 2004; Reisig & Cancino, 2004; Bouffard & Muftić, 2006).

In order to answer this question, scholars suggest that we should “deconstruct categories such as inner city, urban, suburban and rural so that underneath the myths we can see the complexity of the social structures and relations which explain crime and criminality in different places” (Wiles, 1999, p.6). The present study adopted social
disorganization theory as a framework to examine the structural factors of crime in nonmetropolitan U.S. counties. Social disorganization theory was adopted to guide the formulation of hypotheses and the analysis because it assumes that social structure influences social networks and social institutions and how they control the behavior of individuals, therefore, there should be a relationship with crime. Hence, social disorganization theory provides both a theoretical and a methodological framework for an ecological or macro-level study that focus on such structural features as population, family structure, socioeconomic status, residential instability, and ethnic heterogeneity.

An ecological approach focusing on a community’s capacity to exercise social control can be traced back to the Chicago School of Sociology. Formulating social disorganization theory, they assumed that crime was based on a lack of shared values and beliefs among members of a community, and an inability to solve common problems (Sampson & Groves, 1989, Bursik & Grasmick, 1993, Osgood & Chambers, 2000, Jobes et al., 2004). However, the concept of macro-level sources of social control harkens back to theorists such as Durkheim (1897), who refers to the ability of societies and communities to realize common values which unite its members. As such, social disorganization theory focuses on those characteristics that refer to systematic social
relationships that strengthen or weaken social control (Bursik and Grasmick, 1993).

Osgood and Chambers (2000) summarize three kinds of social relationships in a community as derived from Hunter (1985) and Bursik and Grasmick (1993) that influence social control: private order, parochial networks, and public order. First, the private order is based on intimate, informal primary groups capable of controlling unacceptable behavior. Second, parochial networks are the broader local interpersonal networks and their relationships to local institutions, such as schools, churches and civic groups. Third, the public order is an external resource related to community-level norms which influences social control through citizens’ reactions to prior criminal events which take place in a community. Wilkinson (1984a; 1984b) explains lower rates for most crimes in many rural communities because of the predominance of strong social ties and the lack of weak social ties, hence, he taps into these three sets of relationships in his work. He argues that more dominant strong social ties in rural communities makes these places less likely to see an increase in crime even if they exhibit high rates of family disruption, poverty and other forces.

The social structural and socioeconomic correlates chosen in this study follow contemporary empirical studies by Osgood and Chambers (2000), Barnett and Mencken
(2002), Jobes et al. (2004), and Bouffard and Muftić (2006), among others. For example, in the study by Osgood and Chambers (2000), the focus was on juvenile violence in 264 nonmetropolitan counties of four states. Six structural characteristics were used to predict violent crime, including socioeconomic disadvantage, residential instability, ethnic heterogeneity, family disruption, population density, and proximity to metropolitan counties. They found that poverty and unemployment had no effect on juvenile violence but other correlates were consistent with the assumptions of social disorganization theory. Jobes et al (2004) used similar measures in their study of crime of rural Australia. They concluded that social structural factors, based on social disorganization theory, can explain variations in crime in Australia’s rural areas, even though the theory originated from the study of crime in urban America.

Changes in the nature of rural communities have been discussed and analyzed for many decades by rural sociologists (Flora, Flora and Fen, 2004). Changes in macro-level social structural factors are assumed to influence the ability of a community to maintain cohesive relationships and a common identity. Liepins’s (2000) concept of community adopts the idea of a value contested society based on unequal power and income inequality, which plays out at the local level among individuals and groups. In her model,
a community with competing values is more likely the reality of most rural places than a

tight-knit community with common values.

In this study, I use two strategies based on the logic of social disorganization theory

and a handful of rural focused studies conducted over the recent past. These strategies

were: (1) a spatial analysis of the variation of crime between different kinds of rural

places; and (2) a temporal analysis of variations in crime among places and their

relationship to social structural and socioeconomic change.

In order to achieve my over-all goals, I pose three primary hypotheses, with several

corollary hypotheses within each, as described in Chapters 1 and 2. Specifically, these

were as follows. First, *nonmetropolitan counties vary in their social and economic

dimensions, which in turn, influences their rates of crime* – a. socially disadvantaged

counties will display higher property and violent crime rates; b. socioeconomically

disadvantaged counties will display higher property and violent crime rates; c. family

disruption mediates the effect of other social structural and socioeconomic characteristics

and both property and violent crime; and d. family disruption has a larger direct effect on

the relationship of socioeconomic factors and violent crime.

Second, *changes in both the social structural and socioeconomic dimensions of*
nonmetropolitan counties are predictive of changes in their rates of crime – a. an improvement in the socioeconomic conditions of nonmetropolitan counties will be predictive of lower property crime rates; b. a decrease in family disruption will be associated with a decrease in violent crime rates; c. population growth increases rates of violent crime; d. higher unemployment increases property crime; and e. increased unemployment will increase property and violent crime in more in economically advantaged than in economically disadvantaged nonmetropolitan counties.

Third, there is a temporal dimension to the relationship of social structural and socioeconomic characteristics and crime, such that: a. the effects of changes in social structural factors on violent crime is stronger over time than it is for socioeconomic status characteristics; and b. the effects of changes in social structural factors on property crime is stronger over time than it is for socioeconomic status characteristics.

In providing an answer to these three guiding hypotheses, I address several specific issues, both methodological and theoretical. First, there is the issue of when both data on crime and on social and socioeconomic structural characteristics, such as through the census, are collected. With the assumption that social structural and socioeconomic conditions are the independent factors that influence or cause crime, and crime rates are
the dependent variables, I assume a time gap or temporal order between the two. Second, I attempt to answer the question of whether or not nonmetropolitan counties with higher levels of social disorganization have higher rates of crime, even after controlling for their population size. Third, I examine the mediating effect of family disruption on other measures of social structure and socioeconomic conditions with crime. Fourth, I analyze spatial variations in crime based on measures of social disorganization from the 2000 census. Finally, I look at the effect of changes in measures of social disorganization based on census data from both 1990 and 2000 on crime.

Data comes from three different sources: the census, the FBI *Uniform Crime Report*, and the USDA Economic Research Service. US Counties data files of the US Bureau of Census provide the demographic and social economic variables for 1990 and 2000. The *Uniform Crime Report* provides county crime rates from 1994 through 2005, as recalculated by the National Archive of Crime Data from the University of Michigan. The classification of nonmetropolitan counties based on the Economic Research Service (ERS) of the U.S. Department of Agriculture Rural-Urban Continuum Codes. Codes 4 through 9 designate the 2,052 out of 3,142 counties (63.3%) defined as “nonmetropolitan”. In this study, a small number of counties with populations less than 500 were excluded. Other
counties were excluded because of a low coverage index score. A total of 1,541 nonmetropolitan counties were used in this analysis. Regression analysis and structural equation modeling were used in examining various hypotheses. I apply SPSS and SAS programming for statistical analysis and model estimation.

5.2 Findings

5.2.1 Sensitivity of informal social control in nonmetropolitan counties

Informal social control in crime is assumed as a latent variable which is not able to be observed directly. Only the crime rate can be observed. In my model, social control in crime was measured by the crime rate for three time periods as indicators of this social control. Hence, I can estimate the measurement error or explained variation of crime rates by the latent social control variables for each indicator. When this is done, it is evident that social structural characteristics are predictive of the social control of crime, in accordance with social disorganization theory. In other words, the effect of social disorganization on crime control is reflective of the crime rate.

The results show that the effect of social structure and socioeconomic status on social control is stronger for the closest time period, even though these factors also explain variance in crime rates for the two more distant time periods. As well, I test for
the effect of family disruption and socioeconomic conditions in 2000 on crime rates for
three 3-year time periods, before, during or immediately, and after 2000. The immediate
case has the best validity, indicating the sensitivity of informal social control in
nonmetropolitan communities.

Among the social structural factors, family disruption is the larger and more
important factor of social control on violent crime in nonmetropolitan communities. The
relationship is even greater for micropolitan counties than for rural counties. However,
the impacts of family disruption on the social control of violent crime grows weaker more
quickly with time in rural than it does for mixropolitan counties from 1997-1999 to
2000-2002 (seen in Figures 4-5 and 4.6).

5.2.2. Socially disorganized nonmetropolitan counties and crime

Another consideration in this study is whether there were highly disorganized
nonmetropolitan counties after controlling for population size. This is based on the idea
by Weisheit et al. (2006, p. 208) that even in non-urban settings, size makes a difference,
that is, variations in size is the “urban process written small.”

I found that nonmetropolitan counties have differing crime trends from metropolitan
counties, and even higher crime rates in some cases, after holding population size
### Social Control of Violent and Property Crime

<table>
<thead>
<tr>
<th>Spatial analysis</th>
<th>Social control of violent crime</th>
<th>Social control of property crime</th>
<th>Expected</th>
<th>This study</th>
<th>Expected sign</th>
<th>This study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximity to a metropolitan county</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Mixed (+ for micro; - for rural)</td>
<td>-</td>
</tr>
<tr>
<td>Population size</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Population density</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>- (n.s.)</td>
<td>-</td>
</tr>
<tr>
<td>Residential instability</td>
<td>-</td>
<td>- (n.s.)</td>
<td>-</td>
<td>-</td>
<td>- (n.s.)</td>
<td>-</td>
</tr>
<tr>
<td>Ethnic heterogeneity</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Family disruption</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Socioeconomic status (SES)</td>
<td>+</td>
<td>?</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Unemployment</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### Temporal Analysis

(Changes in 1990-2000)

| Population change                                   | -                               | -                                | -        | -          | - (n.s.)     | -          |
| Ethnic heterogeneity change                          | -                               | -                                | -        | -          | -            | -          |
| Family disruption change                             | -                               | -                                | -        | -          | - (n.s.)     | -          |
| Socioeconomic status (SES) change                    | +                               | + (n.s.)                         | +        | -          | -            | -          |
| Unemployment change                                  | -                               | - (n.s.)                         | -        | -          | -            | -          |
| SES * unemployment change                            | -                               | - (n.s.)                         | -        | -          | -            | -          |

1. + denotes the increase social control.
2. – denotes the decrease of social control.
3. n.s. means not significant.

<p>| Table 5-1 The expected and estimated effects of social disorganization variables on the social control of violent and property crime in nonmetropolitan counties | 154 |</p>
<table>
<thead>
<tr>
<th>Description of hypotheses</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-a Socially disadvantaged counties will display higher property and violent crime rates.</td>
<td>Accepted</td>
</tr>
<tr>
<td>1-b Socioeconomically disadvantaged counties will display higher property and violent crime rates.</td>
<td>Accepted for violent crime, rejected for property crime</td>
</tr>
<tr>
<td>1-c Family disruption mediates the effect of other social structural and socioeconomic status characteristics and both property and violent crime.</td>
<td>Accepted</td>
</tr>
<tr>
<td>1-d Family disruption has a larger direct effect on the relationship of socioeconomic status factors and violent crime.</td>
<td>Accepted</td>
</tr>
<tr>
<td>2-a An improvement in the socioeconomic status conditions of nonmetropolitan counties will be predictive of lower property crime rates.</td>
<td>Rejected</td>
</tr>
<tr>
<td>2-b A decrease in family disruption will be associated with a decrease in violent crime rates.</td>
<td>Accepted</td>
</tr>
<tr>
<td>2-c Population growth increases rates of violent crime.</td>
<td>Accepted</td>
</tr>
<tr>
<td>2-d Higher unemployment increases property crime.</td>
<td>Accepted</td>
</tr>
<tr>
<td>2-e Increased unemployment will increase property and violent crime in more in economically advantaged than in economically disadvantaged nonmetropolitan counties.</td>
<td>Accepted</td>
</tr>
<tr>
<td>3-a The effects of changes in social structural factors on violent crime is stronger over time than it is for socioeconomic status characteristics.</td>
<td>Accepted</td>
</tr>
<tr>
<td>3-b The effects of changes in social structural factors on property crime is stronger over time than it is for socioeconomic status characteristics</td>
<td>Accepted</td>
</tr>
</tbody>
</table>

Table 5-2 Hypotheses and results
constant. Regression analysis (see Table 4-8) with pooled data combined for 12 years (1994 to 2005) shows decreasing rates of both violent crime and property crime for metropolitan counties. However, for micropolitan counties, the violent crime rate is increasing, although there is little change in property crime. Similarly, for rural counties, the effect of place on crime rates is also increasing for violent crime, but was not so different (except for 2000-2002, which was increasing) for property crime.

It is difficult to discern if there is a reciprocal relationship between metropolitan and nonmetropolitan counties and crime because violent crime is increasing in nonmetropolitan counties while decreasing in urban counties. Subcultural theory (Fischer, 1984) argues that there is possible time gap between urban and rural crime trends, with the assumption that rural crime rises due to the diffusion of urban cultural patterns. The assumption of subcultural theory is doubtful, however, according to the results in this study. It is likely that there is a difference in the crime trend due to various social structural and socioeconomic conditions of different kinds of places. For example, the decreasing trend in crime rates for metropolitan counties is due to economic growth, that is, better socioeconomic conditions during the time period under consideration. However, the economic factors do not appear to have the same effect on decreasing crime in rural
counties, that is, those with the smallest population among the three types of counties analyzed in this dissertation.

My results show a pattern such that rural counties have less crime than micropolitan and metropolitan counties. The most rural counties, that is, those not adjacent to metropolitan counties (defined in this study by the Beale codes as 8 and 9) exhibited the lowest crime rates of all. However, rural counties that are adjacent to metropolitan counties have higher crime than the metropolitan counties themselves for such offenses as murder, forcible rape, aggravated assault, burglary, and larceny theft.

Micropolitan counties manifest crime rates that generally are in between the averages for the metropolitan and rural counties. Micropolitan counties adjacent to metropolitan counties have either higher or lower crime than the metropolitan county rates, depending upon the crime type. Crime rates are higher in adjacent micropolitan counties homicide, robbery, and burglary, but lower for forcible rape, assault, larceny, and motor vehicle theft. The results support the assumption that in micropolitan counties, the effect of adjacency to metropolitan counties is minimal or at the very least, mixed (Bouffard and Muftić, 2006). I conclude that micropolitan counties have their own unique pattern of crime. However, in rural counties, the effect of adjacency is significant, both
for violent crime and property crime. Smaller sized counties are the most disorganized and have weaker social control when they are closer to metropolitan areas.

Generally, we identify two kinds of patterns of crime in terms of rurality and their proximity to urban. The first pattern shows that a place’s effect on violent crime is higher in those counties proximate to metropolitan counties. The second pattern is that the effect on property crime is higher in those counties that are micropolitan but not adjacent to metropolitan counties, and for rural counties that are adjacent to metropolitan counties.

5.2.3. Spatial and temporal variations in crime rates

Basically, the results show a consistent pattern, which is that socially disorganized places are predictive of higher crime rates. Family disruption, larger population size, residential instability, ethnic heterogeneity, and unemployment explain much of the variance in crime rates, both spatially and temporally. Nonetheless, counties that are resource disadvantaged do not show an expected relationship with crime, that is, are not necessarily lacking in the kind of social cohesion that controls crime. A higher socioeconomic status index score predicted an increase of property crime and a decrease of violent crime, based on the analyses from the previous chapter. Population density in nonmetropolitan areas was also predictive of lower violent crime rates, such as for
forcible rape.

Social disorganization theory originally was based on an assumption of long term social processes as exhibited through the ecology of place. Cross-sectional studies abound because there is less longitudinal data available. However, even a look at the short term impacts of social disorganization is useful for understanding how social and economic change influences crime in the rural context. A ten year change of social structure and socioeconomic status from 1990 to 2000 shows results similar to those for spatial or cross-sectional variations in crime rates. In short, the analysis indicates that change affects the social organization of a community such that crime rates go up.

In general, the results show that the perspective of social disorganization can be used in the analysis of crime in rural America. Several major conclusions emerge from the empirical analysis.

5.2.3.1 Residential instability

The results in this study show that residential instability in nonmetropolitan counties will increase crime. It is significant that residential instability will increase violent crime, such as murder and aggravated assaults, more so than either forcible rape or robbery. Theoretically, residential instability leads to lesser social integration and
social control (Osgood and Chambers, 2000). As well, the density of acquaintanceship is lower in a community with higher residential instability. Hence, the consequence of residential instability is a higher crime rate (Freudenburg, 1986). It also takes time to integrate newcomers into existing community organization (Barnett & Mencken, 2002). Residential instability can occur because of various forms of community development, such as highways, retirement communities, and tourism. Those activities introduce new and transient populations into communities, which can reduce established forms of social control (Rephann, 1999; Donnermeyer, 2007).

My results suggest that long term relationships in a local community between residents are important in preventing violent crime. As mentioned before, parochial networks are the broader local interpersonal networks and the interlocking of local institutions that help residents to be integrated into the community, which the data seems to prove out.

5.2.3.2 Family disruption

My results show that family disruption plays an important role in predicting violent crime. A place with a higher degree of family disruption leads to a lack of social cohesion between adults and youth in particular, and between adults and youth from two parent
versus single parent families. As well, family disruption also shows the importance of other social relations in a community. The mediating effect of family disruption was especially apparent in the path analysis. Those results show an enhanced effect of the disorganization of social structures by family disruption.

The family is not only an organization for parenting but also a mediating organization in connecting individuals to other organizations in a community. Evidently, a community with a high percentage of solo parent and separated parent households will exhibit less social control within the private sphere of the family and through various parochial or strong tie networks, and a greater need for social control in public settings. The effects of family organization on social control explains how both community-level analysis of social structure and more social-psychological analyses of citizen perceptions of crime can converge. If the proportion of family disruption is high in a community, residents tend to perceive this kind of disorganization and react accordingly (Jobes et al., 2005).

Single parent and separated parents represent fewer networks by which children communicate and interact with adults. Hence, a higher ratio of adults to children is regarded as a better environment for the supervision of children and adolescents (Osgood
& Chambers, 2000). Both indicate that two parent households are better able to provide social control that reduces criminal behavior by youth. Specifically, these households provide greater opportunity for youth to participate in local organizations, in part because married parents themselves are more involved in local organizations of various kinds. A higher level of family disruption in a community may interfere with the individual and collective efforts of families to link youth to the wider society through institutional means such as schools, religion, and sport (Sampson, 1986). The second function of families is that they play a role in helping to supervise youth at the neighborhood level and the surveillance of houses and other property in a localized area. Studies show that married families are more willing to establish and maintain contact with their neighbors. Marital disruption is also an indicator of overall social disorganization (Blau & Blau, 1984; Sampson, 1986). Blau and Blau (1984) concluded that divorced and separated families in a population are indicative of much instability and conflict in a community’s network of interpersonal relations.

5.2.3.3 Socioeconomic Status

In this study, socioeconomic status was indicated by education, income, unemployment and poverty. The socioeconomic status of a community has a mixed effect
on the social organization of a community. As expected, and as indicated by social
disorganization theory, a community with more social and economic resources will
facilitate a community’s ability to better organize resources to control crime. In this study,
socioeconomic status did exactly that for rates of murder and aggravated assault, however,
for the other offenses, socioeconomic status did not show an improvement in the social
control of crime. In this case, the perspective of Liepins (2000) of the contested meanings
of community among residents is useful in explaining this result. According to Liepins
(2000), the social organization of a community represents a kind of expression of
localized power which indicates the interests of competing groups and individuals. Hence,
the social organization of a community is segmented when there is substantial inequality
or unemployment. Hence, the only crimes that are controlled or paid attention to are those
which might threaten the established order of more powerful groups in a community, and
all other offenses are given lower priority relative to the investment of community
resources, such as what the police pay attention to.

According to social disorganization theory, socioeconomic status affects a
community’s ability to bring resources to bear on various processes of social control,
from school to police to youth groups. The effects of socioeconomic status, however,
show inconsistent results on crime rates in nonmetropolitan counties, based on this and a number of other studies (Osgood & Chambers, 2000; Jobes et al., 2004; Barnett & Mencken, 2002; Rephann, 1999). These results are dissimilar from findings in urban settings (Cao, 2004). Bouffard and Muftić (2006) found that poverty has a negative effect on the social control of violent crime, such as aggravated assaults and other assaults.

Unemployment had a positive effect on the social control of aggravated assaults, robbery and rape. Rephann (1999) explained that socioeconomic status always coexists with social inequality and unemployment. Osgood and Chambers (2000) thought that areas with low socioeconomic status also have higher residential instability and ethnic heterogeneity.

The results here show that resource advantaged nonmetropolitan counties have more social control of violent crime (less violent crime), but less control of property crime (more property crime). The literature shows that many rural counties are economically disadvantaged. However, the connection between different kinds of socioeconomic indicators in rural counties were stronger in controlling crime. Hence, the assumption from social disorganization theory of better social integration in a resource advantaged community may be true for urban areas, but does not necessarily apply to
5.3 Limitations of study

There are several limitations to this study. For example, the discussion by Osgood and Chambers (2000) about the advantages and disadvantages of county-level study of crime is likewise applicable to this study. They point out that the concept of community does not generalize very well to rural settings where population density is much lower and where most counties include several distinct communities. Yet, counties have their own governmental structures and internal economic dynamics that indicate to some degree they are indeed a type of social system. As well, the county is a convenient unit of analysis for the study of rural crime because of the availability of data across a large number of sites. Hence, in lieu of a better unit for statistical examinations of the social and economic dimensions of places and crime, the county remains the best and sometimes only option.

How do the disadvantages of the selection of county bias the results? Because we will treat the characteristics of the same county as the characteristics of a whole community, variation between places within a county is unknown and is a possible source of error. It is possible to justify that if a meaningful level of variation in crime and its
predictors occurs across counties, then the researcher can observe the statistical
associations, test hypotheses and infer back to various theoretical relationships. Another
justification for using counties is the claim that the relationships between crime rates and
various structural variables are robust across city, county, and state levels of aggregation
(Land, McCall & Cohen, 1990).

Researchers are always concerned about the accuracy of official crime records. It is
possible that in nonmetropolitan counties, the police are less likely to deal with crime by
formally arresting an individual, and more likely to find a solution which is informal,
such as returning custody of a juvenile who was vandalizing town property to the parents,
who in turn, make the adolescent repair the damage. Hence, no official recording of the
crime occurs (Weisheit et al., 2006). At this point, it is unknown what kind of crime data
is more appropriate in representing a lack of social control in a community in order to test
social disorganization theory. Osgood and Chambers suggest that, besides the arrest data
they used, findings have been convergent through “citizen calls for police assistance”,
“self-report of victims” and “self-reports of offenders”.

Another concern of this study is that county-level UCR figures might include
systematic bias within the imputed crime data of the National Archive of Criminal Justice
Data (Maltz & Targonski, 2002, 2003; Lott & Whitley, 2003). It is inevitable that all crime data has measurement error, and that the largest errors may be in counties with small populations and with smaller and under-resourced agencies who do not participate or participate sporadically in the UCR. By excluding the smallest counties, using the coverage indices provided by the National Archive on Criminal Justice Data, pooling data from multiple years, including as many nonmetropolitan counties as possible in the analysis, and examining the data statistically by employing several forms of analyses, these shortcomings can be mitigated.

5.4 Suggestions for future research

There are four suggestions for the future study of informal social structure, social control and crime in nonmetropolitan counties.

The first recommendation is for research using multiple levels for the unit of analysis. As the conclusions in this study reveal, it is a mistake to assume that all rural communities are alike or homogeneous in their characteristics. A multilevel study can not only solve problems of auto-correlation, but also provide new insights about how a community is nested by higher-level or larger scale social structures. This kind of study assumes that some of the characteristics at a higher level or larger unit of analysis (such
as a region) have an effect on the lower or smaller units of analysis relative to informal social control as expressed through crime rates.

The second suggestion is a different scale of study, such as city or neighborhood. Although a county-level study provides a ready application of social disorganization theory because of the researcher’s ability to develop a large sample size, the kind of research completed here also shows the limitation of conducting a county level analysis. Hence, it is possible to apply social disorganization theory to cross-cultural studies of crime in rural communities of different countries, or of carefully selected communities that are comparable in some fashion, such as the examination of two rural Australian communities to examine the impact of the Aboriginal population on crime by Jobes et al (2005).

The third suggestion is the need for more longitudinal data for county level studies of change and rural crime. This kind of study will need to find a way to collect valid information that represents several decades of crime data and information on the social and economic indicators of rural places. I believe that this kind of study would be highly significant in unraveling some of the causal relationships between social structural and socioeconomic characteristics, change, and crime.
The last recommendation is to study the effect of rurality on crime rates in the city.

The question of whether additional variance in urban crime rates can be explained by the characteristics of their surrounding rural hinterland is a new question that has never been examined in the criminology literature. Yet, criminologists have long presumed that rural communities and their rates of crime are influenced by proximity to urban places.

Certainly, if the effect is one way, it is probably also reciprocal.
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APPENDIX A

RURAL CRIME STUDIES: SUMMARY OF FINDINGS
<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Focus of study</th>
<th>Crime incidence</th>
<th>Key findings</th>
<th>Data base</th>
<th>Unit of analysis (sample size)</th>
</tr>
</thead>
</table>
| Vold (1941) | Rural/urban difference | Offenses known to the police (murder, rape, robbery, aggravated assault, burglary, larceny, and auto theft) | 1. Crime rate increase as the increase of population size of a place.  
2. There is not much difference in the relative frequency of serious crimes against the person in city and country area, but in the case of the more common crimes against property the urban areas are very much more involved. | 1. FBI, Uniform Crime Report (UCR), 1937 & 1940;  
2. State Bureau of Criminal Apprehension, 1936-1938 | 1. City (2,001) for the national data;  
2. County for the state data in Minnesota |
| Wood (1942) | Social organization | Male felons | 1. The conclusions in this study are limited to small communities.  
2. Demographic factor are less related to the crime rate than other social factors.  
3. Economic prosperity has the highest correlation with the crime rate such as the proportion of working in business and professions in a community (-), the proportion on W.P.A in a community(+) and per capita recommended assessed of properties in a community (-)  
4. Social participations are correlated with the crime rate such as the proportion of males in mutual aid groups (-). | 1. 1940 Census;  
2. State and local official records  
3. Field survey and interview;  
4. County court records | city or village (7 homogenous small cities and villages) in Wisconsin |
| Clark (1962) | The effect of social status (Duncan Socio-Economic Index for All Occupations) | Juvenile delinquency (illegal behavior) | 1. Totally, industrial city has the most high illegal behavior rate, followed by lower urban, upper urban and rural farm. This tendency is good for most of rates of juvenile conduct.  
2. The biggest difference between four types of communities in juvenile delinquency is not of nuisance offence but of more serious offense.  
3. Community effect is determined by predominant class of that area in urban areas.  
4. The lower class areas have higher illegal behavior rates, particularly in more serious offenses.  
5. The conclusions in this study are limited to the communities of rural to small city in size. | Self administrated questionnaire | Individual (1,154 public school students from 6 to 12 grades) located at four types of communities (rural farm, lower urban, industrial city, and upper urban) in Midwest |
| Ferdinand (1964) | The effect of family structure and types of place | Juvenile delinquency (against property and against authority) | 1. Urban and socially disorganized communities have higher male property delinquents than rural, but not significantly different for against authority.  
2. Youth in rural communities conduct more types of property delinquent behaviors than delinquents against authority. That is, there is a preference for rural delinquents for male and female. However, this is more balance in urban community of the types of delinquent behaviors. | County court records in 1958; 1950 Census. | County (28 counties in Michigan; 11 rural counties, 15 villages and 2 urban counties) |
<table>
<thead>
<tr>
<th>Author</th>
<th>Title</th>
<th>Data Source</th>
<th>County</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fischer</td>
<td>Diffusion of Urbanism</td>
<td>1. FBI crime statistics; 2. County fact books; 3. State and national Bureau of Criminal Statistics</td>
<td>County (56 counties in California)</td>
</tr>
<tr>
<td>(1980)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wilkinson</td>
<td>The patterns of crime</td>
<td>1. 1970 Census; 2. annual vital statistics; 3. county and city data book</td>
<td>County (275 counties in the region of northeastern United State)</td>
</tr>
<tr>
<td>(1984a)</td>
<td>and rurality (the proportion of population living in remote areas)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Violent crime</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(homicide, rape, robbery, and assault)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. The difference of crime rate between large cities and small communities extends from 1955 to 1975.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Violent crime culture originates in big city and then is diffused to rural county.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nonlethal violence,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>homicide, suicide, and divorce</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. Rurality combine with other social disruption factors, such as poverty, ethnic, industrial, show various patterns of crimes.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. A combination of low rurality with high black predicts a high nonlethal violence rate and a high suicide rate.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. A combination of high rurality with high poverty predicts a low nonlethal violence rate, a high homicide rate, a high suicide rate, and a high divorce rate.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. A combination of high rurality with agriculture and elderly predicts a high suicide rate and a low divorce rate.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Canonical correlation analysis.</td>
<td></td>
</tr>
</tbody>
</table>
Wilkinson, Reynolds, Thompson & Ostresh (1984c)  
The effect of population growth, and economic growth  
Violent crime rate (homicides, rapes, robberies, and assaults)  
1. Recent population growth, and economic growth has little effect on the increase of violent crime.  
2. Long-standing structural problems, such as rurality are better predictors of the increase of violent crime rate in rapid developing communities.  
3. Hierarchical regression analysis.

Krannich, Greider & Little (1985)  
Rapid growth (population change, length of residence)  
Fear of Crime; victimization experiences  
1. Residents in rapid growth communities do not report victimization experience different from other communities.  
2. Residents in rapid growth communities report higher fear of crime.  
3. Regression analysis.

Kowalski & Duffield (1990)  
Rural population component (rural population, farm resident, rural nonfarm resident, nonagricultural industrial earning)  
Homicide rate  
1. The proportion of rural population, such farm, rural nonfarm in a county, predicts a decreasing effect on homicide.  
2. Other controlling factors on homicide rate: nonagricultural population(+), population density(-), poverty(+), education(-), black-other(+), divorce(+), religious diversity(+), south(+), rural*divorce(+), nonfarm*divorce(+), poverty*education(-).  
3. Regression analysis.
| **Arthur (1991)** | Socioeconomic factors (unemployment, poverty, population size, government aid, black, aged 15-39) | Violent (Homicide, rape, aggravated assault, and robbery); property crime (Larceny theft, burglary, arson, and auto theft) | 1. The effect and importance of socioeconomic predictors on crime rate changes by the time.  
2. Socioeconomic conditions, such as unemployment (+), poverty (+), and family dependence on government assistance (+) are good predictors of crime rate in rural communities.  
3. Socioeconomic conditions is more effective predictors of property crime than of violence crime.  
Central Savannah River Area Economic Development and Planning Commission;  
State County Guide;  
State Statistical Abstract  
County (13 rural counties in east-central Georgia) |
| **Ingram (1993)** | The effect of type of place (current residential location & the growing up location), urbanism on juvenile delinquency | Juvenile delinquency | 1. Less evidence show the prediction of determinant theory that more urban place predict higher unconventional behaviors.  
2. Urbaness does not predict delinquency.  
3. Urbaness does not predict urbanism.  
Individual (2213 form five types of communities including farm, country but not farm, town, small city, and large |
| Seydlitz, Laska, Spain, Triche, & Bishop (1993) | Economic development (level of development, rapid changes and community involvement) | Suicide and homicides rates | 1. High levels of and rapid changes in development lead to the increase of social problems, such as crime in a community because of social disorganization and relative deprivation.  
2. Crime rate increases more sharply when changes in industrial activities are large, such as a more wells and high oil price.  
3. Crime rate are affected by the rapid changes of industrial activities, especially for those communities that are more involved.  
2. Department of Health and Human Resources 1956-1986;  
3. Department of Commerce 1969-1687 | Parish (county, 23 parishes in Louisiana) |
| Rephann (1999) | Rural Development (urbanization, demographics, residential mobility, industrial structure and types of enterprises, economic conditions, transportation system) | Offenses and arrests rate | 1. The degree of urbanization (+).  
2. The proportion of owner-occupied household (-), retirement destination county (+).  
3. Farm industrial (-), service (+), recreation (+), military presence (-)  
4. Income (+), poverty (N.S.), unemployment (+), employment growth (+)  
5. Highway (+)  
6. Black (+), Indian (+), Hispanic (+)  
7. Divorce (N.S.)  
2. 1990 Census data.  
3. Other official data from around 1990’s. | County (1,706 nonmetropolitan counties) |
| Jobes (1999) | Migration (residential stability) and social density | Felony convictions (forgery, drugs, theft, mischief, burglary, parole, manslaughter, rape, and homicide) | 1. Recent migrants accounted for a highly disproportionate amount of crime. 2. Recreational communities have more crime. 3. Small towns have much more crime comparatively than larger town while they are highly immigrated. 4. Migration is associated with crime because of new comers have social impact on the cohesion and integration of a community. 5. ANOVA and multiple classification analysis (MCA). | 1. District court records 1988 and 1989; 2. 1990 Census | Town (10 small rural and recreational towns in Montana) |
| Osgood & Chambers (2000) | Social disorganization (residential instability, ethnic heterogeneity, family disruption, low economic status, population density, and closer to urban areas) | Juvenile violence (homicide, rape, robbery, aggravated assault, weapons violations, and simple assault) | 1. Residential instability (+): for rape, aggravated assault, weapons violations, and simple assault.  
2. Ethnic heterogeneity (+): for all, except homicide and simple assaults.  
3. Female-headed households (+): for all, except homicide.  
4. Poverty rate and unemployment: not significant.  
5. Proximity to metropolitan areas: not significant.  
6. Population size or density: curvilinear relation (negative for first order and positive for second order).  
7. Negative binomial regression. |
| Barnett & Mencken (2002) | Social disorganization (resource disadvantage, & population change) | Violent crime (murder, rape, robbery, and aggravated assault) and property crime (burglary, larceny-theft, motor theft) | 1. Resource disadvantage (RD): violent (+), property (+) for metropolitan and nonmetropolitan counties; but (n.s.) for nonmetropolitan counties in property crime.  
2. Population change (PC): violent (+), property (+) for metropolitan and nonmetropolitan counties.  
3. RD*PC: violent (-) for metropolitan (but ns) and nonmetropolitan counties; property (-) for nonmetropolitan counties and (+) for metropolitan (but n.s.) counties.  
4. Urban population: violent (+), property (+) for |
2. Poverty concentration: (+) for metropolitan counties and (- but not significant) for nonmetropolitan counties.  
3. Other variables: divorce (+), mover rate (+) for metropolitan counties and nonmetropolitan counties.  
4. Negative binomial regression | Metropolitan and nonmetropolitan counties.  
5. Spatial lag: violent (+), property (+) for metropolitan and nonmetropolitan counties. But for metropolitan counties, not s.n. on property crime.  
6. To population growth nonmetropolitan counties, resource disadvantage has less impact on the increase of violent crime.  
7. To population growth nonmetropolitan counties, resource disadvantage decrease property crime rate.  
To population loss nonmetropolitan counties, resource disadvantage increase property crime rate.  
8. Spatial lag regression. |
<table>
<thead>
<tr>
<th>Factor</th>
<th>Violent Crime</th>
<th>Property Crime</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family Instability,</td>
<td>assault) and property crime</td>
<td></td>
<td>2. 2000 census;</td>
</tr>
<tr>
<td>Population Change,</td>
<td>(burglary, larceny-theft, motor theft)</td>
<td></td>
<td>3. Beal codes</td>
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<tr>
<td>Economic Change,</td>
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<tr>
<td>Economic Resources,</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Racial Heterogeneity,</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Cultural Capital,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employment Rate</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Family disruption: violent (+), property (+) for metropolitan and nonmetropolitan counties. There is no significant difference between larger-city and small rural counties for both violent and property crime.

3. Urban density: violent (+), property (+) for metropolitan counties, but uncertain for nonmetropolitan counties. Such as, for rural counties, urban density has negative effect on violent crime rate and for some small towns, urban density has positive effect on violent and property crime.

4. Household instability: violent (+) for metropolitan counties, however, for more urban nonmetropolitan counties (+) for more rural counties (-); property (+) for metropolitan and nonmetropolitan counties.

5. Economic stability: violent (-) for metropolitan and nonmetropolitan counties; property (-) for nonmetropolitan counties.

6. Cultural Capital: violent (+), property (+) for metropolitan and nonmetropolitan counties. But may n.s. for metropolitan counties.

7. Racial Diversity: violent (+), property (+) for
| Jobes, Donnerneyer, Barclay, & Weinard (2004) | Social disorganization (residential instability, ethnic heterogeneity, family disruption, low economic status, population size and density) | Assault, break and enter, car theft, and malicious damage | 1. Assault: proportion of indigenous population (+), living in their own home (-), growth of community (-).  
2. Break and enter: indigenous population (+), living in their own home(-), moving form other place (+), sol parent (+).  
3. Malicious damage: moving from other place (+), growth of community (-), married persons (-).  
4. In nonmetropolitan areas, there are various communities in terms of crime, such as low crime rate small inland towns, high crime rate medium unstable communities, and low crime rate medium |

1. Bureau of Crime Statistics and Research (BOCSAR), UCR;  
2. 1996 Census  

LGAs (123 LGAs in New South Wales, Australia) | metropolitan and nonmetropolitan counties. But not significant for metropolitan counties of property crime.  
8. Economic resources: violent (-), property (-) for metropolitan counties. But property (+) for more rural nonmetropolitan counties.  
9. Unemployment rate: violent (+), property (+) for metropolitan and nonmetropolitan counties.  
10. Social structural factors have larger social disorganization effect on small rural counties than larger-city.  
11. Regression analysis. |
stable communities, also high malicious damage satellite communities.
5. Regression and Cluster analysis.
APPENDIX B

FIT CRITERIA FOR STRUCTURAL EQUATION MODEL
Not all estimation methods of parameters and goodness of fit indices for structural equation model obtain the same results (Hu & Bentler, 1992; Hoyle & Panter, 1992). Hence, scholars always report multiple indicators in order to decide the goodness of fit of a model. It is impossible to have an informed evaluation of a model if there is no knowledge about those estimation methods applied to a structural equation model. Based on a suggestion from the American Psychological Association (APA, 1994, p.247) since many psychological studies employ structural equation models as data analytical tools, as well, based on this the principle of examining multiple indicators and those available on the SAS software I used, I focused on the following goodness of fit indices: (1) Chi-Square ($\chi^2$), (2) Goodness-of-fit index (GFI), (3) Nonnormed fit index (NNFI) or Tucker-Lewis index (TLI), (4) Incremental fit index (IFI) or normed index rho1, and (5) Comparative fit index (CFI). Chi-Square and GFI show the absolute fit index of a model which is the differences in the variance and covariance matrices between from data and the assumed model. When there is a lack of fit, according to the one of the indices, such as chi-square or GFI, one would then check on other indicators, such as TLI or IFI. Following is the formulas of those indicators of test of fit in SAS CALIS procedure (SAS/STAT(R) 9.2 User's Guide, http://support.sas.com/documentation/cdl/en/statug/59654/HTML/default/statug_calis_sect034.htm):

(1) GFI

$$GFI = 1 - \frac{Tr((W^{-1}(S - C))^2}{Tr((W^{-1}S)^2)}; \quad AGFI = 1 - \frac{n(n+1)}{2df}(1 - GFI);$$

$$PGFI = \frac{df_{min}}{df_o} GFI;$$

(2) NNFI/TLI

$$\rho = \frac{f_o/df_o - f_{min}/df_{min}}{f_o/df_o - 1/NM}; \quad NFI= \Delta = \frac{f_o - f_{min}}{f_o}$$

(3) IFI

$$\rho_1 = \frac{f_o/df_o - f_{min}/df_{min}}{f_o/df_o}$$
(4) CFI

\[
CFI = 1 - \frac{\max(NM * f_\min - f_\min,0)}{\max(NM * f_o - df_o,0)}
\]

where,

\( S = (s_{ij}) \) for the \( n \times n \) input COV, CORR, UCOV, or UCORR matrix

\( C = (c_{ij}) = \hat{\Sigma} = \Sigma(\gamma) \) for the predicted model matrix, and

\( W \) for the weight matrix (\( W = I \) for ULS, \( W = S \) for default GLS, and \( W = C \) for ML estimates)

\( n \) for the number of manifest variables

\[
NM = \begin{cases} 
(N - 1) & \text{if the CORR or COV matrix is analyzed} \\
& \text{or the intercept variable is not used in the model} \\
N & \text{if the UCORR or UCOV matrix is analyzed} \\
& \text{and the intercept variable is not used in the model}
\end{cases}
\]

\( f_o \) for the function value of the independence model

\( df_o \) for the degrees of freedom of the independence model

\( f_\min = F \) for the function value of the fitted model

\( df_\min = df \) for the degrees of freedom of the fitted model
APPENDIX C
FIGURES OF CRIME RATES FROM 1994 TO 2005

C-1: Violent crime
C-2: Property crime
C-3: Murder
C-4: Forcible rape
C-5: Robbery
C-6: Aggravated assault
C-7: Burglary
C-8: Larceny-theft
C-9: Motor-vehicle thefts
Appendix C-1 Violent crime rate (3 years average): 1994 to 2005 by places

- Metropolitan
- Micropolitan
- Rural

Time:
- 1994-1996
- 1997-1999
- 2000-2002
- 2003-2005

Violent crime rate
Appendix C-2 Property crime rate (3 years average): 1994 to 2005 by places

- Metropolitan
- Micropolitan
- Rural

Appendix C-3 Murder rate (3 years average): 1994 to 2005 by places
Appendix C-4 Forcible rape rate (3 years average): 1994 to 2005 by places
Appendix C-5 Robbery rate (3 years average): 1994 to 2005 by places
Appendix C.-6 Aggravated assault rate (3 years average): 1994 to 2005 by places
Appendix C-7 Burglary rate (3 years average): 1994 to 2005 by places
Appendix C-8 Larceny-thefts rate (3 years average): 1994 to 2005 by places

- Metropolitan
- Micropolitan
- Rural
Appendix C-9 Motor-Vehicle thefts rate (3 years average):
1994 to 2005 by places

Metropolitan
Micropolitan
Rural

Time

Motoc Vehicle thefts rate


Appendix C-9 Motor-Vehicle thefts rate (3 years average):
1994 to 2005 by places
APPENDIX D
<table>
<thead>
<tr>
<th></th>
<th>y1</th>
<th>y2</th>
<th>y3</th>
<th>y4</th>
<th>y5</th>
<th>y6</th>
<th>x1</th>
<th>x2</th>
<th>Mean</th>
<th>S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>VIOL_04: y1</td>
<td>1</td>
<td>0.860</td>
<td>0.797</td>
<td>0.568</td>
<td>0.526</td>
<td>0.541</td>
<td>0.518</td>
<td>-0.203</td>
<td>248</td>
<td>212</td>
</tr>
<tr>
<td>VIOL_01: y2</td>
<td>0.860</td>
<td>1</td>
<td>0.867</td>
<td>0.513</td>
<td>0.533</td>
<td>0.541</td>
<td>0.426</td>
<td>-0.193</td>
<td>266</td>
<td>315</td>
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<td>VIOL_98: y3</td>
<td>0.797</td>
<td>0.867</td>
<td>1</td>
<td>0.549</td>
<td>0.553</td>
<td>0.599</td>
<td>0.564</td>
<td>-0.199</td>
<td>272</td>
<td>264</td>
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<td>0.568</td>
<td>0.513</td>
<td>0.549</td>
<td>1</td>
<td>0.904</td>
<td>0.854</td>
<td>0.412</td>
<td>0.010</td>
<td>2,219</td>
<td>1,241</td>
</tr>
<tr>
<td>PROP_01: y5</td>
<td>0.526</td>
<td>0.533</td>
<td>0.553</td>
<td>0.904</td>
<td>1</td>
<td>0.919</td>
<td>0.373</td>
<td>0.076</td>
<td>2,215</td>
<td>1,274</td>
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<tr>
<td>PROP_98: y6</td>
<td>0.541</td>
<td>0.541</td>
<td>0.599</td>
<td>0.854</td>
<td>0.919</td>
<td>1</td>
<td>0.386</td>
<td>0.113</td>
<td>2,421</td>
<td>1,399</td>
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<tr>
<td>Family disruption: x1</td>
<td>0.518</td>
<td>0.426</td>
<td>0.564</td>
<td>0.412</td>
<td>0.373</td>
<td>0.386</td>
<td>1</td>
<td>-0.495</td>
<td>0</td>
<td>1</td>
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<tr>
<td>Economic resources: x2</td>
<td>-0.203</td>
<td>-0.193</td>
<td>-0.199</td>
<td>0.010</td>
<td>0.076</td>
<td>0.113</td>
<td>-0.495</td>
<td>1</td>
<td>0</td>
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APPENDIX E

TABLE OF SAMPLE SIZE PER YEAR
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<tr>
<th>year</th>
<th>numbers of counties</th>
<th>included counties</th>
<th>included %</th>
<th>metropolitan</th>
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<th>rural</th>
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<tr>
<td>1994</td>
<td>3142</td>
<td>2,363</td>
<td>0.752</td>
<td>900</td>
<td>1,016</td>
<td>445</td>
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<tr>
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<td>3142</td>
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<td>0.756</td>
<td>908</td>
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<td>0.703</td>
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<td>421</td>
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<td>1997</td>
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<td>2,241</td>
<td>0.713</td>
<td>867</td>
<td>963</td>
<td>410</td>
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<td>3142</td>
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<td>0.708</td>
<td>859</td>
<td>962</td>
<td>403</td>
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<tr>
<td>1999</td>
<td>3142</td>
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APPENDIX F

SAS CODES FOR STRUCTURAL EQUATION MODELLING
1. Codes for structural equation model with latent variable (social control of violent and property crime)

```sed
PROC CALIS DATA=midwest cov print;
VAR lnvio04 lnvio01 lnvio98 lnpro04 lnpro01 lnpro98
   FD_t2 SES_t2
LINEQS
   lnvio04 = -1 F1 + e1,
   lnvio01 = lam21 F1 + e2,
   lnvio98 = lam31 F1 + e3,
   FD_t2 = F2,
   SES_t2 = F3,
   lnpro04 = -1 F4 + e4,
   lnpro01 = lam52 F4 + e5,
   lnpro98 = lam62 F4 + e6,

   F1 = b12 F2 + b13 F3 + b14 F4 + d1,
   F4 = b41 F1 + b42 F2 + b43 F3 + d3;

STD
   e1-e6 = ve1-ve6, f2-f3 = vf3-vf3, d1 = vd1, d3 = vd3;
   cov e1 e2 = cove1e2, e5 e6 = cove5e6
   .e1 e4 = cove1e4, e3 e6 = cove3e6,
   f2 e1 = covf2e1, f2 e2 = covf2e2,
   f2 e4 = covf2e4, f2 e5 = covf2e5,
   f3 e4 = covf3e4, f3 e4 = covf3e4, f3 e5 = covf3e5,
   d1 d3 = covd1d3, f2 f3 = covf2f3
;RUN;
```
2. Codes for structural equation models with observed variables

**PROC CORR DATA=test1 NOPRINT N-OMISS COV OUT=crime1;**

VAR Viol Prop FD SES LPOP Urban GINI PCH Unem Midwest Density SES_UM;

**RUN;**

**PROC CALIS DATA=crime1 cov CORR PRINT;**

VAR Viol Prop FD SES LPOP Urban GINI PCH Unem Midwest Density SES_UM;

LINEQS

Viol =b11 FD + b12 SES +b13 LPOP+b14 Urban+b15 GINI 
+b16 Unem+ b17 Midwest+ b18 Density +b19 SES_UM +e1, 
Prop =b21 FD+ b22 SES +b23 LPOP+b24 Urban+b25 GINI 
+b26 Unem+b27 SES_UM +e2, 
FD = b31 SES +b32 LPOP+b33 Urban+b34 GINI 
+b35 Unem+ b36 Midwest+ b37 Density +b38 SES_UM +e3;

STD e1=var_e1, e2=var_e2,e3=var_e3;

cov 
e1 e2=cove1e2;

**RUN;**