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EXAMINING MACRO-LEVEL CORRELATES OF FARM EQUIPMENT THEFT: A
TEST OF ROUTINE ACTIVITY THEORY AND SOCIAL DISORGANIZATION
THEORY

By

Dustin Lee Osborne
B.A., University of Virginia's College at Wise
M.A., East Tennessee State University

A Dissertation
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College of Arts and Sciences of the University of Louisville
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A Dissertation Approved on

June 23, 2015

by the following Dissertation Committee:

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Kristin Swartz, PhD

_____
George E. Higgins, PhD

_____
Thomas Hughes, PhD

_____
Pamela Wilcox, PhD

DEDICATION

This dissertation is dedicated to my mother and grandfather, both of whom have been

instrumental in my desire to pursue an education.

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None of this would have been possible without the support that I have received from my family and the individuals who have been so gracious to serve on my dissertation committee. I would like to thank my mentor and dissertation chair, Dr. Kristin Swartz, for all that she has done to assist me during my time at the University of Louisville. Her advice and friendship have been instrumental in both my development and completion of the program. Needless to say, words cannot express my gratitude. I would also like to thank Dr. George Higgins for his willingness to assist me in developing my knowledge of quantitative methods and criminological theory. Both have been invaluable in completing this dissertation. To Dr. Thomas Hughes and Dr. Pamela Wilcox, thank you for your advice and willingness to serve on the dissertation committee. Your input has significantly improved the final product, and for that I will be forever appreciative.

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ABSTRACT

EXAMINING MACRO-LEVEL CORRELATES OF FARM EQUIPMENT THEFT: A
TEST OF ROUTINE ACTIVITY THEORY AND SOCIAL DISORGANIZATION
THEORY

Dustin Lee Osborne

June 23, 2015

This dissertation explores the potential for routine activity theory and social

disorganization theory to explain incidence of farm equipment theft at the county level.

Relatively few attempts have been made to discern the factors that contribute to such

theft. Most are relatively dated, and all focus upon the relationship between victimization

risk and the characteristics of individual farms. Accordingly, the current study represents

the first attempt to examine the influence of macro-level processes and characteristics

upon the problem. Data are gathered for 306 counties housed within four Southeastern

States.   Counts of farm equipment theft are collected from the 2011-2012 iterations of

the National Incident Based Reporting System, and attributed to the county in which they

occurred. The routine activity measures employed are based upon the findings of micro-

level studies, and drawn primarily from the 2007 version of the Census of Agriculture.

Social disorganization measures are created in line with past attempts to explore the

applicability of the theory to crime problems outside of metropolitan areas. These

measures are derived from the 2010 version of the United States Census. Negative

binomial regression analysis suggests that both theories have applicability to our

understanding of farm equipment theft incidence. Agricultural characteristics aggregated

to the county level appear to condition the number of opportunities available to motivated offenders. Moreover, counties featuring structural characteristics conducive to disorganization appear to experience higher incidence of theft than those that would be considered "more organized." Based upon these findings, implications for each theoretical framework are addressed. In addition, policy implications are covered, with a specific focus upon strategies designed to reduce opportunities for theft and improve levels of informal social control in rural areas. The dissertation concludes with a brief discussion of limitations associated with the study, directions for future research, and concluding remarks.

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CHAPTER ONE: INTRODUCTION TO THE PROBLEM

To date, much of our collective attention to understand crime and deviance has focused upon issues present in urban areas. Comparatively, little attention has been directed at understanding the relationship between offending and rural America (Deller & Deller, 2012; Donnermeyer, Jobes & Barclay, 2006; Weisheit & Wells, 1996). Though the prevalence may be less than that seen within more populated, urban areas, rural areas are confronted with crime-related problems as well (Weisheit, Falcone & Wells, 2005). For example, nonmetropolitan counties experienced slightly over 1,600 property crime victimizations—and approximately 195 violent victimizations—for every 100,000 residents in 2010 (Federal Bureau of Investigation, 2010). Furthermore, it appears as if the disparity between crime rates in large cities and rural areas has shrunk over time. For example, Weisheit and Donnermeyer (2000) assessed crime rate trends in urban (cities featuring a population of over 250,000) and rural areas between 1966 and 1997. The urban-rural gap in rates of violent and property crime per 100,000 people was less pronounced through the 1990's than seen in earlier years.[1] In addition, rural America is faced with crime problems unique to its environment and opportunity structure that warrant researchers' attention. Crimes such as poaching (Green, 2011; Musgrave, Parker & Wolok, 1993), timber theft (Mortimer, Baker & Schaffer, 2005; Pendleton, 1998), and

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[1] In relation to violent crimes, the city/rural ratio was well over 8:1 throughout the 1980's. This ratio had diminished to below 6:1 by 1997. In relation to property crimes, the city/rural ratio was slightly over 4:1 throughout the 1980's. By 1997 this ratio had shrunk to 3:1.

methamphetamine production (Sexton, Carlson, Leukefeld & Booth, 2006) are prominent examples of these unique problems.

Recent years have seen increased attention toward these forms of offending, both from researchers and law enforcement agencies. However, one additional form of offending unique to rural areas that has failed to receive a comparable amount of attention is the theft of farm equipment (Mears, Scott & Bhati, 2007). Though a significant amount of resources has been directed toward understanding its prevalence and motivations in other nations (e.g., Australia, Great Britain), a relatively scant amount of attention has been directed at doing so within the United States (Barclay & Donnermeyer, 2011).

The purpose of this work is to provide a better understanding of the factors that may potentially contribute to the occurrence of farm equipment theft. It does so by seeking to apply both routine activity theory—at the macro-level—and social disorganization theory to farm equipment theft. Specifically, it seeks to discern what county-level factors work to make such theft more or less likely to occur. These factors are drawn from the core premises of each theory, and based upon data available for a selection of counties in four Southeastern states. Before proceeding to a discussion on the two theories, and their applicability to the issue at hand, attention is first turned toward describing our current knowledge regarding the prevalence of farm equipment theft.

Farm Equipment Theft

Farm equipment theft is defined by the Federal Bureau of Investigation as the "theft of any kind of machinery used on a farm to conduct farming" (Federal Bureau of

Investigation, 2013, p. 89). Equipment utilized in farming operations varies depending

upon the respective farm's production goals and resources. Common items falling under

this umbrella include tractors, combines, specialized tools, and various implements used

in conjunction with machinery to plant, maintain, and harvest crops (Wu & Perry, 2004).

Because farms are dependent upon this equipment for financial success, the sheer amount

of equipment present in rural areas provides ample opportunity for those individuals

motivated to acquire it through means of theft. For example, the 2012 version of the

Census of Agriculture—commissioned by the United States Department of Agriculture—

reveals that over 4.1 million tractors are currently in use on farms throughout the United

States (an average of approximately two per farm) (National Agriculture Statistics

Service, 2014). Although data is not gathered for smaller pieces of equipment, the

Census of Agriculture indicates that the 2.1 million farms under survey for the year 2012

claimed on average to hold approximately $115,000 worth of equipment (National

Agriculture Statistics Service, 2014).

Data on theft of farm equipment within the United States is relatively sparse

(Mears, Scott & Bhati, 2007), as no national-level study has been conducted seeking to

discern how many instances of theft occur on a yearly basis to date. However, some

estimates can be obtained through the partial data that is available. For example, the

National Equipment Register (NER)—in conjunction with the National Insurance Crime

Bureau (NICB)—annually collects data on equipment theft in the United States. The

NER includes thefts reported to insurance companies by the victims of large farm and

construction theft (e.g., tractors). Therefore, it is impossible to distinguish equipment

commonly used on farms from similar equipment being used on construction sites.

Furthermore, it is important to bear in mind that not all thefts are reported to insurance companies, as many victims likely do not have coverage for the equipment that is stolen. With these limitations in mind, for the year 2012, there were 1,459 tractors reported stolen within the United States (National Equipment Register, 2013). Considering the fact that slightly over 20 million ownership records are available within their database (number of individual pieces of equipment insured), this would suggest that the incidence of equipment theft is minimal in nature. However, the nature of the data collection (focused solely on large equipment and not distinguishing whether the equipment was taken from a farming operation) suggests that relying upon this data for an inference in the prevalence of farm equipment theft may not be the best gauge of the overall problem.

Perhaps a better measure of the prevalence of farm equipment theft can be obtained from law enforcement reports. Each year law enforcement agencies across the United States submit data on crime events to the Federal Bureau of Investigation through the Uniform Crime Report (UCR) Program and the National Incident-Based Reporting System (NIBRS). Though the UCR program does not allow for an assessment of farm equipment theft, the NIBRS program does present this potential. Law enforcement agencies entering data into the NIBRS system are provided with the opportunity to specify the type of property that is stolen in each theft incident. One option is classified as "farm equipment." Thus, by assessing the total number of incidents classified into this category, a rough estimate of the prevalence of farm equipment theft can be achieved. The most recent NIBRS database available for public dissemination is for the year 2012. A total of 10,276 incidents of farm equipment theft were reported for the year (Federal Bureau of Investigation, 2013).

Though this figure provides a rough estimate of farm equipment thefts, it may be slightly misleading for two separate reasons. First, not all law enforcement agencies within the United States are NIBRS certified, meaning that they do not distinguish between types of theft when submitting crime data to the Federal Bureau of Investigation. As of 2012, only 29% of law enforcement agencies were NIBRS certified (Federal Bureau of Investigation, 2013). Though it is difficult to determine how many farm equipment theft incidents actually occur on a yearly basis, it is likely that the true figure is significantly higher than the 10,276 known incidents cited above. A second concern revolves around the accuracy of NIBRS data. That is, though agencies may be NIBRS certified, the potential for underreporting is of concern. Past research has suggested that the crime data provided by some certified agencies lack detail in relation to the property taken in theft incidents, thus rendering a final count much lower than the true incidence rate (Thompson, Saltzman & Bibel, 1999). Thus, the actual number of thefts is likely to be higher than the number reported.

Only a handful of studies have been conducted within the United States seeking to discern the prevalence of theft through surveying farm operators (Barclay, 2001). The studies are limited to survey data collected from a small number of respondents, and most are relatively dated. However, the majority seem to suggest that the theft of farm equipment is a significant concern. To date, the only study that suggests a low prevalence of theft was conducted in Ohio in the early 1980s (Donnermeyer, 1987). Survey data provided by a sample of farmers within Ohio suggested that only 10% had been the victim of some type of theft, the majority of which was minor in nature (i.e., small equipment, batteries).

However, all other studies have arrived at an alternative conclusion: Theft of farm equipment is somewhat common. For example, Dunkelberger, Clayton, Myrick and Lyles (1992) sought to better understand victimization among a sample of farmers in Alabama in the early 1990s. A total of 428 farmers responded to the mailed survey, answering questions relating to a variety of victimization types, including the theft of farm equipment. Slightly over 4% of respondents reported having equipment stolen within the 12 months prior to survey completion. However, a significant increase was observed for a question regarding theft of farm equipment over their lifetime. Approximately 34% of farmers claimed to have been the victims of equipment theft at some point in the past, many of whom reported multiple victimizations. Targets of the thefts varied, ranging from small tools to larger pieces of equipment, such as tractors and other types of machinery.

Deeds, Frese, Hitchner and Solomon (1992) found similar results in surveying farmers in Mississippi. Though their sample size was comparatively small (n=144), survey data revealed that almost one-quarter of the farmers had experienced theft victimization. The targets of these thefts varied, but one of the most commonly cited stolen items was machinery used in farming operations. In fact, 43% of all thefts reported by the sample involved the theft of some type of farm equipment.

Cleland (1990) surveyed a sample of 531 farm operators in Tennessee in the late 1980s, seeking to determine how often these farmers had been victimized in the 12 months prior. Victimization levels were high in relation to a number of offense types, including incidents of theft. Approximately 17% reported being the victim of some form

of theft in the time frame in question. Though the target of these thefts varied by incident, farm equipment constituted the largest category of property lost.

More recently, Mears, Scott & Bhati (2007) surveyed 823 farm operators in eight California counties. The researchers were primarily concerned with discerning the incidence of various forms of farm-related theft in the 12 months prior to survey completion. Their results indicated that approximately 29% of those surveyed reported being the victim of small equipment theft (e.g., tools) during the time frame in question. Furthermore, 14% reported being the victim of more serious forms of theft (e.g., tractors).

Though a handful of studies do not allow for generalizations regarding the prevalence of farm equipment theft—or the risk level presented to each individual farm operator due to the fact that their findings are restricted to a single geographic area—their results suggest that farm equipment theft may be much more prevalent than suggested by data available through the National Incident Based Reporting System and the National Equipment Register. Thus, better understanding why such theft occurs should be of great interest to a variety of groups, among them academics, law enforcement agencies, and farm operators.

The Current Study

In light of the likely prevalence of farm equipment theft, and the lack of scholarly attention to it, this dissertation seeks to develop a better understanding of the county-level factors that contribute to the incidence of this form of offending. To date, no such study has been undertaken. Thus, by assessing these potential factors, a good deal of knowledge can be gained. The factors under assessment are based upon two criminological theories: Routine activity theory and social disorganization theory. Both

theories address the macro-level contextual factors that serve to condition levels of crime experienced by communities (or larger population units). Examining contextual effects is useful in relation to the current problem due to the fact that aggregate factors and processes may have a significant impact upon incidence of farm equipment theft. Specifically, certain counties may feature characteristics that make individual farming operations more likely to be victimized regardless of their own individual-level characteristics. For example, research on farm equipment theft tends to be focused at the micro-level and suggests that farmers can take steps to shelter themselves from potential thieves. Though these steps to protect their property are certainly beneficial, it is possible that contextual factors outside of their control may naturally lead to increased risk. The current study posits that social disorganization and aggregate farm characteristics may constitute such contextual factors. By seeking to better understand the applicability of the two theories to farm equipment theft, it is possible to distinguish the types of counties that are prone to higher incidence of it. As such, steps can be taken to address this risk through targeted programs, policies and educational initiatives.

Routine activity theory is based upon the notion of a rational calculus, and views offending and victimization as being influenced by opportunities (Cohen & Felson, 1979; Miethe & Meier, 1990). It has application at both the micro- and macro-levels of analysis. At the micro-level, it posits that a motivated offender must come into contact with a suitable target lacking in guardianship in order for an offense to take place (Cohen & Felson, 1979). At the macro-level, the theory suggests that aggregate patterns of movement, lifestyle choices, and production characteristics serve to influence the prevalence of crime (Cohen & Felson, 1979; Messner & Blau, 1987). Routine activity

theory has been employed at the micro-level to develop a better understanding of farm equipment theft in both the United States and other countries, with its application focused upon the characteristics of individual farms (i.e., presence of attractive targets, lack of guardianship) and their contribution to incidence of theft. On the whole, the literature appears to support the notion that theft incidents are at least partially dependent upon opportunities presented by the location and security measures unique to each farming operation (Barclay & Donnermeyer, 2011). Thus, it seems viable that a macro-level application of routine activity theory to such theft—by exploring the influence of farm characteristics at the county level— would be beneficial and potentially yield similar results. However, this remains an empirical question yet to be answered.

Social disorganization theory posits that characteristics associated with communities and/or larger population units serve to influence levels of informal social control, and thus the level of crime experienced by these population units (Bursik & Grasmick, 1993; Kasarda & Janowitz, 1974). In essence, it suggests that factors such as residential mobility, ethnic heterogeneity, and economic disadvantage make it difficult for residents to establish relationships with one another. Thus, their ability to band together in an attempt to intervene when problems arise is hindered, ultimately leading to higher rates of crime. To date, social disorganization theory has yet to be applied to farm equipment theft. However, past studies seeking to develop an understanding of the role that disorganization plays in offending at the county-level suggest that it likely has some applicability (Lee, Maume & Ousey, 2003; Osgood & Chambers, 2000). Thus, by seeking to discern its influence upon this form of theft, the generalizability of the theory can be better explored.

The application of these two theories to the problem of farm equipment theft requires developing measures that are derived from the core tenets of each, and regressing them upon theft incidence. Measures consistent with the routine activity approach (e.g., farm size, worker density, equipment value) are derived from previous applications of the theory to farm equipment theft at the micro-level, and rely upon available data on farming operations at the county level. Measures for social disorganization are derived from past applications of the theory at the county level, and include residential mobility, poverty, racial heterogeneity and household instability. Having introduced the problem of farm equipment theft and the key goals of this dissertation, attention is now turned to providing an overview of the chapters to follow.

Overview of Chapters to Follow

Chapter 2 provides a discussion of routine activity theory, with a focus upon its core tenets, applicability to both offending and victimization, and empirical support. Specifically, the chapter discusses the conceptualization of the theory by Cohen and Felson (1979), and the developments that have occurred since the theory's inception. Routine activity theory has relevance at both the macro- and micro-level, meaning that it can be utilized to explain specific crime incidents, or offending patterns at higher levels. Though both applications will be discussed, the current study is particularly interested in the applicability of the theory at the county level. That is, what routine activities occurring on farms throughout the county have influence on the incidence of farm equipment theft within that county? As such, previous attempts to apply routine activity theory at the macro-level will be given special attention.

Chapter 3 is designed to provide an overview of social disorganization theory, with a specific focus on the core tenets laid out by Shaw and McKay (1942), the manner in which the theory has evolved to the present day, and its empirical support. Specifically, discussions include the initial conceptualization of the theory, the development of the systemic model, and the replacement of social ties with a more accurate representation of community-level processes: collective efficacy. Because the current study seeks to apply social disorganization theory at the county level, the chapter concludes with a discussion on previous attempts to do so in relation to other forms of offending, and the applicability of the theory outside of urban communities.

Chapter 4 contains a discussion of the methodology for the current study. The manner in which the data is collected, the selection of a sample of counties to be analyzed, and the creation of measures associated with both routine activity theory and social disorganization theory are all discussed. Furthermore, the manner in which the data is analyzed is discussed in detail.

CHAPTER TWO: ROUTINE ACTIVITY THEORY

Introduction

Criminology, as a discipline, has historically been focused upon developing an understanding of the criminal offender. That is, it has sought to analyze the impact of social forces and individual-level characteristics on the decision to embark upon criminal activity (Coyne & Eck, 2015; Wortley & Mazerolle, 2008). The information that has resulted from this search is certainly beneficial to our understanding of criminal behavior. However, solely focusing upon offenders only sheds light upon a portion of the crime problem (Layock, 2005). It is also important to develop an understanding of the criminal event. Recently, a number of theorists and researchers have sought to rectify this situation by giving increased focus to the environmental factors that coincide with predisposition to make possible each criminal event (Brantingham & Brantingham, 1995; Felson & Clarke, 1998; Brantingham & Brantingham, 1981; Cohen & Felson, 1979). Stemming from their work, the notion that opportunities presented as a result of the daily activities of both potential offenders and potential victims serve to dictate the spatial and temporal nature of crime has emerged. Further, the notion that criminal events are dependent upon not only the existence of a motivated offender—but also the presence of opportunities that said offender can act upon—has also become apparent from this work.

Perhaps the most prominent work to arise out of this development is routine activity theory, as developed by Cohen and Felson in the late 1970s (Felson & Clarke, 1998). Routine activity theory stresses the importance of patterns of movement—and

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interaction between offenders and targets—in determining both the form of crime and its prevalence (Clarke & Felson, 1993; Cohen & Felson, 1979; Kennedy & Forde, 1990). Unlike many criminological theories, it can be utilized to explain crime at both the macro- and micro-levels (Felson, 2008; Felson & Clarke, 1998). Because the current study seeks to discern the potential applicability of the theory to farm equipment theft at the macro-level, attention is primarily dedicated to the theory's core tenets at this level of analysis.

Routine Activity Perspective

Routine activity theory is essentially a theory of opportunity, suggesting that the presence of opportunities within the built environment is critical to understanding the prevalence of offending (Felson & Clarke, 1998; Cohen & Felson, 1979). Its core tenets can be broadly classified into two separate hypotheses (Cohen & Felson, 1979). First, individuals who are motivated to offend are likely to act upon this motivation when a certain set of conditions are present. That is, at the micro-level (individual incidents of offending), specific factors converse to culminate in the commission of a criminal act. Specifically, a motivated offender must converge in time and space with an attractive target lacking in guardianship in order for a crime to occur (Cohen & Felson, 1979). Second, and in relation to the macro-level, broad patterns of movement and production serve to condition the level of offending seen within communities and larger areas (Cohen & Felson, 1979). Though the focus of the current study is at the macro-level, it is important to provide a brief overview of the theory's tenets at the micro-level as well. To date, the only attempts to understand the link between farm equipment theft and routine activities to date have focused upon this micro-level. Because the current study utilizes

these attempts as a foundation, discussing these micro-level tenets will allow for a better understanding of the framework for studying farm equipment theft at the macro-level.

Routine Activity Theory at the Micro-Level

At the micro-level, routine activity theory posits that three separate requirements must be fulfilled in order for a crime to occur: 1) The existence of a motivated offender; 2) the presence of an attractive target; 3) and a lack of guardianship (Cohen & Felson, 1979). A motivated offender simply refers to the existence of an individual who is willing to commit a criminal act. The rationale behind this motivation is of little importance theoretically, as routine activity theory assumes that potential offenders are motivated by a variety of factors better understood through theories relating to predisposition and social processes (Cohen & Felson, 1979; Eck & Weisburd, 1995).

In order for a criminal act to occur, the motivated offender must come into contact with an attractive target, be it a person, home or item. Levels of attractiveness are subjective in nature to the extent that each respective offender is likely to find certain targets more attractive than others (Monk, Heinonen & Eck, 2010; Wright, Logie & Decker, 1995). Attractiveness may relate to the monetary value of a potential target or simply to its desirability to the individual seeking to commit the criminal act (Meithe & Meier, 1994). Offenders oftentimes specialize to the degree that they commit a limited number of criminal offenses, and/or tend to seek out specific types of targets. Thus, though motivated offenders may come into contact with targets that other predisposed individuals would find attractive, their specific motivations may not define the circumstances encountered as being attractive.

Finally, the target must manifest a lack of guardianship. To be sure, guardianship is multi-faceted, and can take several different forms (Eck & Weisburd, 1995; Sampson, Eck & Dunham, 2010). Guardianship has commonly been associated with the watchful eye of a concerned party, be it a property owner or a friend/relative of an individual targeted for an offense (Hollis-Peel, Raynald, van Bavel, Elffers & Welsh, 2011). However, a range of interested parties may in reality work toward establishing guardianship of specific targets. Eck (1994) suggests that guardianship may be applied to three distinct entities: potential victims, places and potential offenders.

Guardianship over potential targets of criminal activity refers to individuals seeking to ensure that their property, or those whom they care about, do not fall victim to the actions of a predisposed offender (Cohen & Felson, 1979; Felson, 1995). For example, parents who maintain a watchful eye over their child are acting as guardians to the degree that they are working to protect the child from any danger that may present itself as a result of their daily activities. Similarly, a property owner who takes steps to observe individuals who may present a threat to their property, and works to prevent its theft and/or vandalism, is acting as a guardian. Essentially, routine activity theory posits that attractive targets are less likely to be acted upon when an adequate level of guardianship is provided in relation to the target in question (Cohen & Felson, 1979). This notion is rooted in the idea of a rational calculus, as offenders find guarded targets to present an increased opportunity of detection and apprehension (Cornish & Clarke, 2014). Thus, they are likely to move on to similarly attractive targets lacking in guardianship.

According to Eck (1994), places (e.g., businesses) within the built environment may feature a unique form of guardianship as well. Businesses and other institutions feature a sort of natural surveillance due to the sheer amount of individuals working there on a daily basis. Though these individuals are tasked with other duties during the course of their time within the place, they may become aware of potential concerns and seek to act in a manner that dissuades offenses being carried out within their workplace or its vicinity. For example, though the doorman at a hotel is primarily concerned with welcoming guests to the premises, he or she may also dissuade offenders from targeting either the property or its guests by his or her presence. Similarly, the manager of a bar is primarily concerned with guest satisfaction and improving the economic performance of the establishment. However, they may also concern themselves with any criminal activity occurring within the bar, or on the street in its vicinity. Because the threat of violence is counterproductive to running a successful business, they are likely to act independently—or in conjunction with law enforcement—to take steps that will ultimately limit actual risks or perceived risks that their patrons feel. Eck (1994) classifies these individuals—and others performing similar roles—as place managers due to their oversight and role in limiting criminal opportunities.

Finally, guardianship can exist in relation to the motivated offender (Felson, 1986). This entails an individual who is concerned with a potential offender's wellbeing and works to dissuade them from committing criminal acts. Individuals who perform this role are referred to as handlers (Eck, 1994; Felson, 1986; Felson & Boba, 2009; Hollis-Peel & Welsh, 2014; Reynald, 2010; Sampson, Eck & Dunham, 2010). These handlers, through a variety of tactics, monitor the individual and intervene before a crime can occur

(Hollis, Felson & Welsh, 2013; Tillyer & Eck, 2011; Felson, 1986). For example, parents of delinquent teens may place restrictions upon their freedom in an attempt to limit the potential for their associating with other delinquents. They do so knowing that this association is likely to lead to a scenario in which deviant behavior is likely to occur. Similarly, parole officers are handlers to the degree that they attempt to provide surveillance of parolees. Providing surveillance allows these individuals to become aware of any behavioral issues, or other signs that parolees are resuming their criminal careers (Felson, 1986). When these signs present themselves, the officer can take whatever steps they deem necessary to prevent crime from occurring—namely, creating conditions that suggest to the parolee that the risk of detection and revocation of parole is high should they recidivate.

It is important to stress the requirement that all three factors—a motivated offender, an attractive target, and a lack of guardianship—must converge in time and place (Cohen & Felson, 1979). That is, the motivated offender must become aware of an attractive target, and perceive guardianship to be lacking at the moment of offense. If any of these requirements are not fulfilled, then an offense will not be carried out. This conceptualization assists in making clear the specific nature of criminal opportunities. Attractive targets, which most would consider plentiful, are actually less common than assumed. Targets must meet relatively high standards to be appropriate. Furthermore, they must be out of the watchful eye of others. For example, Beauregard, Rossmo & Proulx (2007), studying the routine activities of sexual offenders, found that target suitability was the most significant factor in the choice of potential victims. More so than physical attractiveness or personality, a lack of guardianship or surveillance was the most

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likely predictor of victimization. Thus, the notion that offenders primarily seek opportunities with low potential for detection appears to be of merit.

Routine Activity Theory at the Macro-Level

Of note, routine activity theory at the macro-level is not wholly unique from its micro-level counterpart. That is, it suggests that the overall prevalence of criminal opportunities is dictated by the aggregate convergence in time and space of motivated offenders, attractive targets, and a lack of guardianship (Cohen & Felson, 1979). Thus, conditions that exist within communities, counties, and larger areas serve to structure the number of attractive targets located within the awareness space of offenders, as well as the ability for interested parties to take guardianship over property, places, or those motivated to offend.

Specifically, routine activity theory at the macro-level posits that collective patterns of movement and changes in lifestyle will have significant effects on both the prevalence and form of crime (Cohen & Felson, 1979). Ultimately, the effects of these patterns and changes will be manifested in the number and types of opportunities available to offenders (Messner & Blau, 1987). For example, societal changes that lead to more individuals leaving the home on a regular basis—for work or entertainment— will influence offending in two significant ways (Cohen & Felson, 1979). First, the presence of these individuals on the street offers many potential victims for street-level crimes such as assault and robbery. Second, homes that are unattended on a regular basis, and for sufficient periods of time, are attractive to burglars seeking an "easy score" (Wright & Decker, 1994). Technological changes that reduce public participation will have the opposite effect, as will collective advancements in home security. Ultimately,

opportunities are dependent upon both societal structure and levels of innovation, and as a result are constantly changing (Cohen & Felson, 1979; Felson & Cohen, 1980). Thus, they can be viewed as being influenced by the routine activities of society at large.

In addition to concerns with aggregate movement and lifestyles, the theory also suggests that the value and mobility of property may have some influence on offenders' perceptions of attractiveness (Cohen & Felson, 1979). Property that is easier to transport, and higher in value, likely constitute more attractive targets to motivated offenders than does property that does not fit these classifications. Thus, as innovation and market-dynamics culminate in products that are either more transportable, or of higher value, the theory suggests that the theft of these products will increase.

This suggestion is supported by recent attempts to better understand the characteristics of items that offenders view as being attractive. Clarke (1999) developed the CRAVED model as an attempt to relay these characteristics. The model suggests that items which are concealable, removable, available, valuable, enjoyable and disposable are likely to be viewed as more attractive than those which do not fit these characteristics. As such, aggregate trends in production that create more items fitting these characteristics are likely to correspond to higher incidence of offending. Recent attempts to test this proposition offer support for it in regards to a wide range of theft types (Petrossian & Clarke, 2014; Smith, Bowers & Johnson, 2006; Whitehead, Mailey, Storer, McCardle, Torrens & Farrell, 2008). Of interest, this support extends to crimes typically associated with rural areas. For example, the CRAVED model has been found applicable to timber theft and livestock theft in recent years (Baker, 2003; Petrossian & Clarke, 2014; Sidebottom, 2013).

Providing support for their conceptualization of routine activity theory at the macro-level, Cohen and Felson (1979) suggest that the introduction of females into the workplace in the 1970s served to create an environment in which home burglaries were more common. At the micro-level, families in which the husband and wife both worked were more likely to become victims of burglary than their counterparts featuring a spouse who remained at home during the day. At the macro-level, areas with a higher rate of dual-spouse employment were more likely to experience higher rates of burglary than areas featuring lower rates of such employment. In essence, routine activity theory at the macro-level can be conceptualized as a theory predicting rates of offending for communities or areas based upon the aggregate risk presented by phenomena occurring at the micro-level.

Messner and Blau (1987) provide support for this argument. The researchers examined macro-level data for 124 metropolitan statistical areas in the early 1980s in an attempt to discern whether routine leisure activities at the aggregate level have influence upon rates of various types of offending. Leisure activities under analysis were amount of time spent watching television, and the density of sports and entertainment venues. Messner and Blau (1987) posited that statistical areas featuring a higher proportion of the population spending substantial time watching television would experience lower levels of crime due to individuals residing within the safety of their home. On the other hand, they hypothesized that a higher density of sports and entertainment venues would suggest that more individuals venture out on a regular basis, thus increasing the number of suitable targets in the awareness space of offenders. These hypotheses were tested utilizing available data for 124 metropolitan statistical areas (MSAs) located throughout

the United States. Controlling for other potential correlates of crime (i.e., male population, percent of individuals between the ages of 18 and 24 living within the MSA), Messner and Blau (1987) found that television viewing shared a negative correlation with a variety of crime types (i.e., forcible rape, robbery, burglary). Furthermore, they found that a positive relationship existed between these crimes and the density of entertainment venues within each MSA. Thus, their results were supportive of their initial hypotheses, and suggest that aggregate lifestyle choices have influence on the prevalence of a variety of offense types.

Bennett (1991) found similar results in his examination of the applicability of routine activity theory to both property and personal crime in a longitudinal sample of 52 countries. The study focused upon a variety of factors, including motivation (as measured by factors such as income inequality), target attractiveness (gauged by the average value of common consumer items), the accessibility of targets (measured by the nation's gross domestic product), and the presence of informal social control (gauged by labor participation of females). Utilizing time-series analysis, the researchers found that routine activity theory—as measured—was not especially useful in understanding incidence of violent crime, as only their measures relating to motivation shared a relationship with the outcome variable. More promising findings were seen in their model assessing property crime. Both target attractiveness and accessibility shared a positive relationship with incidence of property crime. However, motivation emerged as being negatively correlated with property crime, suggesting that attractiveness and accessibility may be more useful in understanding such crime from a routine activities perspective.

More recently, Copes (1999) took a similar macro-level approach in attempting to understand the applicability of routine activity theory to understanding automobile theft at the census-tract level. Available data were assessed for 41 such tracts in the Southeastern United States. Copes (1999) operationalized suitable targets as road density and car density, positing that higher levels indicated the presence of more opportunities for motivated offenders. Guardianship was operationalized as the proportion of multi-housing units and population density. He posited that population density would have a negative effect upon theft incidence due to increased surveillance, whereas multiple-housing units would make guardianship more difficult due to the fact that more individuals would be parking their automobiles in lots away from their direct line of site. Results of the study suggest that guardianship—as operationalized—did not share a negative relationship with incidence of motor vehicle theft. In relation to the population density component of the guardianship measure, Copes (1999) points to prior studies finding similar results, and posits that motor vehicle theft may not be influenced by levels of surveillance to the degree that other property crimes are influenced. In relation to the multiple-housing units component, he suggests that the finding may be attributable to the fact that a large proportion of vehicle thefts occur when the vehicle is parked somewhere other than the owner's home (e.g., business parking lots). Thus, housing type may not be all that influential in establishing guardianship.

With that said, the target suitability measures performed as expected (Copes, 1999). A combined measure (created by summing z-scores for both road density and car density) shared a statistically-significant, positive relationship with motor vehicle theft. Thus, tracts with higher densities of roads and cars were more likely to suffer from higher

levels of theft. This provides further support for the notion that macro-level characteristics serve to condition the number of opportunities available for motivated offenders.

Based upon the results of these studies, it appears as if routine activity theory at the macro-level is a useful framework with which to understand offending rates; specifically, the incidence of property crime. Thus, application of the theory to farm equipment theft seems to offer the potential to increase our understanding of the issue. With that in mind, attention is turned to discussing past attempts to explore the relationship between routine activities and such theft at the micro-level, and how similar research questions can be answered in relation to macro-level data.

Applying Routine Activity Theory to Farm Equipment Theft

To date, only two attempts to explicitly apply routine activity theory to agricultural theft have been conducted, one of which relies upon data collected outside of the United States. It is important to note that both of these attempts place focus on the micro-level. That is, they seek to discern what factors work to make individual farms more likely to be victimized than others. On the whole, these two studies provide a moderate amount of support for the theory and its core tenets (Barclay & Donnermeyer, 2011).

The first, conducted by Mears, Scott and Bhati (2007), utilized data from 823 farmers in eight California counties in an attempt to apply routine activity theory to agricultural theft based upon a tailored set of questions provided to the participating farmers. The questions gauged such things as victimization, characteristics of the individual farm, and security measures taken to prevent theft. Specifically, they sought to

discern if measures associated with target attractiveness, exposure, proximity and guardianship played a role in the likelihood of theft incidence.

Property attractiveness was operationalized as whether equipment was tagged with an identifiable marking (i.e., unique serial number associated with ownership records). Exposure was operationalized as the presence (or lack thereof) of trees and shrubs that could serve to hide equipment from the observation of potential offenders, the terrain of the farm (flat terrain constituting better visibility), and the size of the farm. Larger farms were hypothesized to employ more equipment, thus making exposure more likely. Proximity was operationalized as whether the farm was positioned on a dead-end road, accessibility of the farm and its equipment to nearby roadways, and the number of workers employed by the farm. Finally, guardianship was measured as the use of surveillance equipment, locks, and surveillance on the part of the farm owner.

Results of the study provided partial support for the role that opportunity plays in farm equipment theft. Theft of smaller equipment (targets more portable in nature) was more likely than theft of larger equipment (e.g., tractors). Farms employing a higher number of workers were more likely to suffer from victimization, suggesting that workers may become aware of attractive targets through close contact with machinery and other equipment, leading to theft incidents. In addition, farms lacking in guardianship were more likely to be victimized by theft than those which employed a high number of security and surveillance measures. Finally, bivariate analysis suggested that larger farms may be more likely to be victimized than those featuring smaller total acreage.

The second direct test of the theory, conducted in Kenya, suggested that routine activity theory has some applicability to agricultural theft in other nations as well. Bunei,

Rono & Chessa (2013) utilized survey data from 200 farmers in order to discern what factors lead to a higher likelihood of victimization. They found that farms located closer to densely populated areas were more likely to be victimized than those located in remote locations. Furthermore, they found that large farms suffered from higher theft incidence than did small farms, and that farms employing a higher number of workers were more likely to experience theft than those without hired labor, or a relatively low number of workers. These findings are consistent with those revealed by Mears, Scott and Bhati (2007), and generally supportive of the importance of guardianship and offender awareness in conditioning the victimization risk of individual farming operations.

In addition to these two explicit tests of routine activity theory, a number of studies that have taken a different focus in exploring crime incidence are also relevant to the current study. Although the following studies are not direct tests of routine activity theory, their findings are consistent with this perspective (Barclay, 2001). For example, though Dunkelberger, Clayton, Myrick and Lyles (1992) were primarily concerned with understanding the prevalence of agricultural victimization, they also sought to determine what factors made victimization more likely. Based upon survey data for 428 farmers, they found that, among other factors, large farms were more likely to be victimized than smaller ones. From a routine activity perspective, this finding indicates that increased acreage may present a lower likelihood of adequate surveillance. Furthermore, it is in line with findings relating to farm size and victimization detailed in the two previously-mentioned studies.

Farmer and Voth (1989) surveyed 442 farmers in Arkansas during the 1980s. They found that certain factors increased the likelihood of victimization for farming

operations. Thefts were more likely to occur on farms located near areas of dense population (i.e., cities, larger towns), and for farms that were large in size. As discussed above, large acreage farms likely make surveillance and guardianship more difficult. Furthermore, proximity to densely populated areas may increase the likelihood that motivated offenders will become aware of attractive targets located on farming operations.

Findings from international studies depict similar conclusions. Results from the 1998 Scottish Farm Crime Survey echo these findings (George Street Research, 1999). Surveying over 1,000 farmers located throughout the Country, the research team found that approximately 32% had experienced some type of property victimization in the five years prior to survey completion. Furthermore, and of interest to the current study, they found that a variety of factors worked to condition the rate of theft experienced by individual farms. Supportive of routine activity theory, farms positioned near roads featuring high traffic and farms located near urban areas were more likely to experience theft than those featuring those characteristics. Once again, proximity and being in the awareness space of motivated offenders likely contributed to this increased level of risk.

The 2001-2002 Australian National Farm Survey offers even further support (McCall, 2003). Survey data was collected for a total of 1,309 farms, located throughout the Country. In addition to offering data regarding the prevalence of crime committed against farming operations, researchers created questions that allowed for inferences to be made regarding farm characteristics and their likelihood of victimization. Ultimately, they found that having more workers was positively associated with an increase in victimization. Furthermore, bivariate correlations revealed that large farms claimed

higher incidence of victimization than those smaller in nature, though this findings was not statistically significant in their final analysis.

Barclay and Donnermeyer (2011) surveyed owners of 393 unique farms in New South Wales, seeking to determine what factors were related to victimization, including theft of equipment. They found that approximately 69% of respondents had been the victim of a property crime within the two years prior to survey completion. Furthermore, their results suggested that tools and other small equipment were the most commonly-stolen items. Analysis revealed that farms surrounded by other plots of land that were unoccupied were more likely to be the victims of theft than those surrounded by occupied homes, suggesting that guardianship may be lower as a result of the lack of watchful eyes. However, other measures relating to routine activity theory (i.e., proximity to towns, visibility of equipment from roadways) were not found to play a significant role in incidence of theft.

The results of the two direct tests of routine activity theory, as well as the other studies discussed, suggest that the core tenets of the theory have application to agricultural victimization, specifically farm equipment theft. On the whole, it appears as if large farms, farms located near densely-populated areas and/or near major roadways, and farms employing workers are at the greatest risk of victimization. Based upon these findings, the continued application of routine activity theory to such theft seems to offer a strong avenue for research. Thus, this study builds upon the previous work in an attempt to answer several testable research questions regarding the relationship between theory and farm equipment theft.

Key Research Questions

The current study seeks to determine whether routine activity theory has applicability to farm equipment theft from a macro-level approach. That is, what factors rooted within the theory's framework serve to influence incidence of theft at the county level. Though no study to date has attempted to assess this potential relationship, Barclay and Donnermeyer (2011) suggest that a macro-level approach may allow for a better understanding of farm equipment theft. They conclude that several recent developments may make such theft more likely. For instance, improved road systems in rural areas may lead to greater visibility of equipment. Previously, farming operations were secluded from the majority of the population and visibility of such equipment from major roadways was not possible. Furthermore, the increased value of farm equipment may render it more attractive to motivated offenders seeking financial gain. Recent research suggests that the cost of machinery and other equipment has increased nearly 100% in the last 35 years (Briggeman & Mickelsen, 2013). Finally, Barclay and Donnermeyer (2011) posit that the urbanization of many historically rural areas (the establishment of subdivisions outside of population centers) may also create a scenario in which motivated offenders are now more aware of criminal opportunities regarding farm equipment theft than in times past.

With this in mind, an empirical assessment of the applicability of the routine activity theory to farm equipment theft at the macro-level seems to offer the next step in improving our understanding of the phenomenon. Doing so requires an understanding of the available data, and a testable set of hypotheses upon which to base the analysis. Several of the findings revealed by the micro-level studies exploring the relationship are

difficult to test at the macro-level. For example, no publically available dataset provides an overview of the miles of road contained within each county in the United States. Thus, determining whether the accessibility provided by road frontage has bearing upon theft at the macro-level is virtually impossible at the current time. Similarly, without surveying all farmers within each county, no inference can be made regarding the security measures employed by farmers operating within them. With that said, there are still a number of research questions that can be answered through available data that are in line with the literature, and rooted in a routine activity framework.

Research Question #1: Does the proportion of land dedicated to farming operations within a county serve to condition the level of farm equipment theft experienced within that county?

Hypothesis #1: Counties featuring a higher proportion of land dedicated to farming operations will feature higher counts of farm equipment theft than counties featuring a lower proportion of land dedicated to these operations.

Routine activity theory suggests that patterns of movement and lifestyles serve to influence the levels of offending seen at the macro-level (Cohen & Felson, 1979). In relation to the current study, it would suggest that counties comprised of a higher proportion of farmland would experience higher counts of farm-related thefts than those counties which are comprised of a lower proportion of farmland. In essence, more farmland equates to the presence of more equipment. Thus, the opportunities present for equipment theft should be higher in those counties featuring a higher proportion of land dedicated to farming.

Research Question #2: Does the average size of farms contained within a county influence the number of farm equipment thefts seen within that county?

Hypothesis #2: Counties featuring farms of higher average acreage will experience higher counts of farm equipment theft than those featuring farms of lower average acreage.

As discussed in the proceeding section, the literature suggests that larger farms are at a greater risk of being victimized than those smaller in acreage (Dunkelberger, Clayton, Myrick & Lyles, 1992; Farmer & Voth, 1998; Mears, Scott & Bhati, 2007). Based upon this finding, it seems plausible that counties featuring farms of higher average acreage would be most at risk of victimization.

Research Question #3: Do counties that are more densely-populated experience higher counts of farm equipment theft than counties less densely-populated?

Hypothesis #3: Counties featuring higher levels of population density will experience higher counts of farm equipment theft than counties featuring lower levels of population density.

The literature on farm equipment theft at the micro-level indicates that farms in proximity to densely populated areas are at greater risk of victimization than those located away from these areas (Bunei, Rono & Chessa, 2013; George Street Research, 1999). At the county level, this would suggest that farms located within counties featuring higher population density will suffer from higher incidence of theft than counties featuring lower population density. Routine activity theory would posit that more densely populated counties present the potential for more motivated offenders to

become aware of attractive targets on farming operations, rendering the higher incidence of theft.

Research Question #4: Do counties featuring a higher on-average number of hired workers per farm experience a higher count of farm equipment theft than counties featuring a lower on-average number of hired workers per farm?

Hypothesis #4: Counties featuring a higher on-average number of hired workers per farm will experience a higher count of farm equipment theft than counties featuring a lower on-average number of hired workers per farm.

Past research has suggested that farms employing workers are at greater risk of being the victims of farm equipment theft than those not employing workers (Dunkelberger et al., 2013; Mears, Scott & Bhati, 2007; McCall, 2003). Furthermore, the higher the number of workers employed, the higher the risk of victimization. Because those working on farming operations become fully aware of the equipment in use on them, the manner and location in which they are stored, and the patterns of the farm owner, they are in a unique position to act upon an attractive target if they are motivated to offend. Even if they are not, they may reveal details of the farms operations to someone who is, in effect providing the information necessary regarding the offense opportunity to others. It would follow that counties featuring a higher on-average number of workers per farm may suffer from higher incidence of farm equipment theft than those featuring a lower on-average number of workers employed on farms within them.

Research Question #5: Do counties featuring a higher aggregate value of farm

equipment suffer from increased incidence of theft?

Hypothesis #5: Counties featuring a higher aggregate value of farm equipment on

farming operations will experience higher counts of theft compared to those

counties featuring a lower aggregate value of equipment on farming operations.

Routine activity theory would suggest that criminal offending is more prevalent

when attractive targets are more plentiful in nature, or when available targets are of high

monetary value (Cohen & Felson, 1979). In line with this suggestion, it would seem

likely that those counties featuring a higher aggregate value of equipment would

experience a higher incidence of victimization than counties with lower aggregate

equipment values. In essence, higher equipment values suggest either more equipment in

use on farming operations, or equipment that is of high value being utilized on these

operations. High value equipment constitutes increased attractiveness for potential

offenders, whereas more equipment in operation entails an increase in criminal

opportunities.

CHAPTER THREE: SOCIAL DISORGANIZATION THEORY

Introduction

Social disorganization theory emerged out of the work of the Chicago School, a group of sociological scholars based at the University of Chicago in the early to mid-1900s (Deegan, 2001). This group, spearheaded by Robert Park and W.I. Thomas, was primarily interested in seeking to better understand the issues confronting urban areas through empirical research and ethnography (Bulmer, 1986). They were motivated by the changing natures of urban areas at the time, as both industrialization and immigration had served to contribute to an expanding and ever-changing population (Bursik, 2006). For example, Chicago was considered a small town in the middle portion of the 19th Century. However, by 1930 it was home to over 3 million residents. (Bulmer, 1986). Many had migrated from southern states, while others had emigrated from various countries in Europe. The majority of these individuals were drawn to the city by the promise of jobs in the manufacturing industry. Though this development was beneficial in many ways, it was accompanied by several negative side effects. Notably, crime and other social-ills became widespread (Bulmer, 1986). Thus, urban areas—such as Chicago—became a primary focus of those seeking to better understand the structure of society and its contribution to the well-being of individuals and communities.

One of the most well-known ideas to emerge from the School is the notion of concentric zones. Ernest Burgess (1925) posited that urban areas are in a state of continual growth, with said growth involving expansion from inner-city areas to areas

further from the center. That is, because population in urban areas such as Chicago was increasing exponentially in the early 1900s, the city was in a state of constant expansion outward. Though many benefits emerged from this growth, the manner in which cities developed as a result led to a sort of segregation of class and industry.

Concentric Zones

Burgess (1925) better identified this development through his theory of concentric zones. A total of five zones were conceptualized. The first was comprised of the central business district, which contained factories and other forms of industry. The second, coined the "zone in transition," was the residence of those individuals of lower-class status, namely individuals newly arrived to the city and those working low wage jobs in the central business district. The third zone, further from the center of the city than the zone in transition, was posited to be the area in which working class families resided. These individuals had escaped the relatively poor conditions present in the zone in transition, and as such, could afford to live further away from the central business district. The fourth zone, even further from the city's center, was the area in which middle-class families established homes, and as such, featured a better overall environment. Finally, the fifth zone was defined as the outermost portion of the city, and served as the area in which those who were financially able to commute to work would reside. Burgess (1925) posited that the composition of the five zones were constantly changing as new individuals immigrated to the city, and those who had established themselves were able to move further away from the central business district.

In the early 1900s, cities such as Chicago were the destination of a number of newly arriving immigrants from Europe and other areas of the world (Burgess, 1925;

Shaw & McKay, 1942). Newly arriving individuals were primarily employed in low wage jobs in the central business district. As such, they tended to reside in the zone in transition. However, after some time, these individuals were able to establish themselves and as a result, their ethnic group. As each group attained improved status and employment within the city, their membership would move outward into the other zones identified by Burgess. Their place in the "social hierarchy" would then be replaced by newly arriving ethnic groups, who would take up residence in the zone in transition. This pattern is especially important to later work by Shaw and McKay (1942), whose findings indicated that the ethnic composition of the high-crime communities was of less importance than the location and social conditions contained within.

Shaw and McKay

Shaw and Mckay (1942), credited with the conceptualization of social disorganization theory, borrowed heavily from Burgess's (1925) concentric zone model. They believed that the zone in transition was of great interest due to the poor living conditions present and the ever-changing makeup of its residents. Focusing on juvenile delinquency, they sought to see if certain areas of Chicago featured a higher prevalence of delinquency than seen within other areas, hypothesizing that it may be highest in areas in and around the zone in transition.

Ultimately, this hypothesis was supported by data available for three separate time periods in the early 1900s. Shaw and McKay (1942) found that rates of delinquency were not equally distributed across communities. Instead, delinquency appeared to be concentrated in certain communities within each of the cities under investigation. Though some variation was present, these high-delinquency communities tended to be

located near inner-city areas that featured a high concentration of businesses and manufacturing facilities. Rates of delinquency tapered off in communities further removed from these districts, with communities on the outskirts of a city (e.g., the modern day suburb) claiming little to no significant issues with juvenile delinquency.

In light of this inequality in rates of offending, Shaw and McKay (1942) sought to better understand why the phenomenon was present. Ultimately, they determined that high-delinquency communities were markedly different from low-delinquency communities in terms of community-level structural characteristics. Specifically, high-delinquency communities tended to feature a high percentage of individuals reliant upon some type of government assistance, high rates of young adult crime, higher concentrations of immigrants, racial heterogeneity, and high rates of outward mobility (i.e., individuals leaving the community in question in the recent past). Attempting to place these findings into a theoretical framework, Shaw and McKay (1942) posited that the structural characteristics discussed above indicated a lack of social organization. This lack of organization created an environment in which deviant behavior (in this case juvenile delinquency) was all the more likely.

Shaw and McKay (1942) presented a mixed model to the degree that they viewed both culture and social control as having an influence upon offending (Kornhauser, 1978). That is, they posited that disorganization within communities not only lessened the potential for control, but promoted an environment in which a subculture conducive to offending would develop. That is, criminal values would be transmitted from generation to generation through social learning mechanisms. Adolescents coming of age, in disorganized communities, would witness firsthand the benefits that arise from

deviant behavior, and as such, would seek to mimic that behavior. Furthermore, they would be taught the various techniques by which such behavior could be carried out. Shaw and McKay (1942) based this hypothesis upon the relative stability of crime rates throughout the first half of the 20th Century. Though various ethnic groups moved in and out of urban communities, those communities which featured high rates of offending in the early 1900s also featured high rates toward the middle-portion of the century. Thus, they felt that crime was less attributable to certain groups of individuals than to the fact that each new generation learned the motivations and techniques of offending from the prior generation.

Kornhauser's Critique

Though the work of Shaw and McKay (1942) did much to place the focus of criminologists on community-level factors, their theory suffered from both a lack of clarity and specification. That is, they presented a mixed model that included concepts of control, strain and cultural (social learning) theoretical perspectives, which some would argue have competing propositions and cannot be integrated.   These issues were thoroughly discussed by Kornhauser (1978) in her critique of their work. Essentially, Kornhauser (1978) viewed Shaw and McKay's (1942) work as a mixed model containing aspects of both social control and social learning (through cultural transmission). She suggested that these two premises were incompatible to the degree that they feature opposing views of human nature. That is, the social learning perspective suggests that crime is learned through establishing bonds with individuals involved in a deviant lifestyle, while the social learning aspect of the theory suggests that deviance is more likely when bonds are not established.

Kornhauser's (1978) work did not completely dismiss the work of Shaw and McKay (1942). Rather, she asserted that social disorganization should be framed from a control perspective, eliminating any reference to the role that community-level norms play in offending. Furthermore, she suggested that much work remained to be done in linking structure to crime. Shaw and McKay's (1942) model failed to specify such a link, rendering an understanding of community-level processes impossible. Kornhauser (1978), though refraining from developing her own model of disorganization, suggested that social bonds may constitute the mediator between the two.

The Systemic Model

Though the popularity of social disorganization waned after enjoying prominence in the 1950s and 1960s, the work of Kornhauser (1978) resulted in increased attention to social disorganization in the 1980s with the development of the systemic model. Kornhauser (1978) was not alone in here critique of Shaw and McKay's (1942) conceptualization. As discussed in the work of Bursik (1988), several issues were presented by critics of the social disorganization model in the years after its conceptualization. First, the bulk of criminologists in the middle portion of the 20th Century were focused on studying the influence of individual predispositions on crime. The lack of direct insight into the role of these predispositions present within the social disorganization model presented by Shaw and McKay (1942) thus led to its dismissal as a viable theory of crime. Second, many criminologists were concerned with the lack of stability present within many communities at the time (Bursik, 1988). Though Shaw and McKay (1942) found that within-community change in societal structure and rates of offending changed little in the early 1900s, post-World War II alterations in land use and

migration patterns rendered this finding tennable (Bursik, 1988; Schuerman & Kobrin, 1986). Thus, structural considerations were considered invalid as a primary means of understanding community-level offending.

Third, and perhaps most importantly, serious issues were present within the model presented by Shaw and McKay (1942). Though the work was largely exploratory, their findings suggested that certain structural factors (i.e. economic disadvantage, racial heterogeneity, residential mobility) served to create disorganization within society, and thus higher levels of crime in impacted neighborhoods. Ultimately, this model fails to differentiate between disorganization and the outcome in question—the presence of crime—as crime can be considered disorganization in and of itself (Kornhauser, 1978). In sum, the presence of each of these three criticisms of the theory largely rendered Shaw and McKay's (1942) conceptualization as little more than a novelty for researchers for some time.

The revitalization of social disorganization theory can be directly tied to the development of a systemic model focused on the role that certain community-processes have in mediating the relationship between indicators of disorganization and crime (Bursik & Grasmick, 1993). As discussed by Bursik and Grasmick (1993), the systemic model essentially views communities as complex network systems in which relationships, community ties and socialization processes influence overall rates of offending. Essentially, it hypothesizes that communities which feature close ties between residents, high levels of community involvement and effective socializing of young persons will feature lower incidence of crime than those which do not (Kasarda & Janowitz, 1974). The systemic model proposes that the same structural characteristics as

Shaw and McKay (1942) proposed—poverty, heterogeneity, and mobility—lead to higher levels of social disorganization, which in turn, leads to higher crime rates. However, the major contribution that the systemic model makes to the social disorganization perspective is that it places social disorganization within a control model and identifies the mechanism by which these structural characteristics influence crime—social ties (Bursik & Grasmick, 1993; Kasarda & Janowitz, 1974; Wilcox, Land & Hunt, 2003).

Communities which are "well-organized" under the systemic framework are viewed as being able to exert control on the activity that occurs within them (Kasarda & Janowitz, 1974). In other words, structural characteristics serve to condition the level of informal social control exhibited by the community, which in turn determines the level of crime experienced by it. Thus, those communities that feature structural characteristics conducive to "organization" are more likely to exert informal social control than disorganized communities. Informal social control is generally conceptualized as social ties, with ties functioning at three separate levels (Bursik & Grasmick, 1993; Hunter, 1985).

The first, a "private level" of control, suggests that criticism and ridicule employed by primary friendship groups is effective in keeping group members from committing criminal acts (Kasarda & Janowitz, 1974). Thus, individuals who belong to close-knit groups should be less likely to offend due to their fear of sanctions from other group members. The second level of control, coined "parochial order," refers to the role that broader social institutions have in regulating behavior. The systemic model hypothesizes that those communities which feature strong, active organizations (e.g.,

schools, churches) will be better able to regulate the behavior of community members more so than those which do not (Kasarda & Janowitz, 1974). Furthermore, those community members who are active participants in these organizations will be even less likely to offend due to the increased connectedness that they have with societal networks. The third and final level of control, the "public level," suggests that external factors also play a role in community crime (Kasarda & Janowitz, 1974). That is, those communities which are able to draw upon outside resources (i.e. police, social service agencies), in their attempts to address needs, will be more successful in controlling criminal behavior than communities which are unable or unwilling to seek them out.

Though the initial conceptualization of the systemic model is a positive extension of the work of Shaw and Mckay (1942), significant questions remained to be answered regarding the within-community factors that make connectivity and social ties possible. That is, what structural characteristics render themselves to "organized communities"? Two competing theories are discussed in the work of Kasarda and Janowitz (1974). The first, based upon the postulations of Toennies (1887) and Wirth (1938), suggests that increases in population size and population density are the primary considerations in relation to community attachment. The second, advocated initially by both Thomas (1967) and Park and Burgess (1921), suggests that the key factor to community attachment is the length in which an individual has resided in a neighborhood. Kasarda and Janowitz (1974) tested both of these assumptions utilizing data for local government units in Great Britain, finding that length of residence more fully explained social bonds and participation in community activities—indicating that the longer an individual resides in a community the more connected that they will be to it. Thus, a key component of the

systemic model of social disorganization is residential stability. More stable

communities (those with little turnover in population) likely have better odds of

establishing strong social bonds, and thus an improved ability to regulate behavior

through the control mechanisms discussed above.

Empirical Tests of the Systemic Model

The first true test of the systemic model can be seen in the work of Sampson and

Groves (1989). It is important to note that prior to their study the nature and role of

social ties was commonly treated as implicit within early formulations and tests of social

disorganization theory (Bellair, 1997). That is, it was simply assumed that communities

featuring higher levels of poverty, residential mobility, and racial/ethnic heterogeneity

also experienced high rates of crime. In essence, it was assumed that these communities

were socially disorganized (Bellair, 1997; Warner &Wilcox Rountree, 1997).   It was not

until the work of Sampson and Groves (1989) that actual measures of social

disorganization were included. Seeking to rectify this shortcoming, their analysis sought

to test two separate (but interrelated) hypotheses concerning this revised view of social

disorganization. This was achieved utilizing data from 238 communities in Great Britain

(Sampson and Groves, 1989). First, they sought to understand whether the indicators of a

disorganized community advanced by Shaw and McKay (1942) serve to predict levels of

community attachment. Second, they desired to determine the impact that levels of

community attachment have in mediating the relationship between structure and crime.

Three separate mediating variables were employed in the study: extent of friendship

networks, presence of unsupervised teenage groups, and organizational participation.

Ultimately, support was found for both relationships. Communities which featured

indicators of disorganization tended to feature fewer social bonds than those featuring structural conditions that lent themselves to organization. Furthermore, the mediating variables explained over 50% of the relationship between structural indicators and crime, with friendship networks emerging as the most influential of these variables. In essence, the empirical support for the systemic model was strong in relation to the sample assessed.

Empirical tests of the systemic model require complex data that is difficult to gather due to the need to collect a number of variables for enough individuals representative of each community (as well as from a minimally-sufficient number of communities) (Kaylen & Pridemore, 2012). Thus, replication of the work of Sampson and Groves (1989) was somewhat slow in coming. However, Lowenkamp, Cullen and Pratt (2003) ultimately provided support for their conclusions in analyzing data from the 1994 British Crime Survey. Their findings indicated that community structural characteristics were influential in the ability of community members to establish bonds and exert social control, and those communities with poor structurally supported bonds were more likely to experience higher rates of crime than those which did not.

In sum, the above-described work assisted in moving the field toward a better understanding of the influence of social ties in mediating the effects of structural characteristics on crime. However, post-World War II developments in society served to alter community structures (Bursik, 1988), and rendered initial measures of the structural characteristics of social disorganization in need of further exploration. The concept of concentrated disadvantage emerged as a result of this exploration, ultimately contributing to new ways of measuring these structural characteristics.

Concentrated Disadvantage

The systemic model suggested that poverty plays a unique role in influencing the incidence of crime (Bursik & Grasmick, 1993; Sampson & Morenoff, 1997; Warner & Wilcox-Rountree, 1997). Initial attempts to empirically test this role featured mixed results, however (Warner & Pierce, 1993). In response to these results, as well as the changing nature of urban communities in the latter half of the 20th Century (Kasarda, 1983; Wilson & Wu, 1993), the concept of concentrated disadvantage was introduced (Wilson, 1987). Wilson (1987) provided a comprehensive summary of concentrated disadvantage in his work on underclass populations residing in inner-city areas. Disadvantage in his mind represented not only high levels of poverty, but a lack of employment opportunities, little accessibility to organizations and external assistance, and a degree of social isolation. Such disadvantage became concentrated when the majority of individuals residing in a community were suffering from these deprivations. Concentration made informal social control difficult to achieve, in turn creating an atmosphere in which crime and other social issues were all the more likely.

A detailed understanding of concentrated disadvantage and its effect on community outcomes requires an understanding of how disadvantage becomes concentrated in inner-city areas. Wilson (1987) posited that the disadvantaged state of these communities could be traced to a history of discrimination and changing economic structures. Though Wilson (1987) suggested that discrimination in the current sense was not entirely applicable to our understanding of the phenomenon, historical discrimination did in his mind play a role. That is, the majority of inner-city areas featuring high levels of concentrated disadvantage were comprised of a high percentage of African-American

residents. Borrowing from the work of Shaw and McKay (1942), he suggested that African-Americans who migrated to urban areas were ultimately restricted to low-rent, pre-defined areas as a result of the occupations that they initially pursued. In other words, the majority of African-Americans who arrived in urban areas in the early-to-mid 1900's did so with few professional skills. As such, they took jobs in production-facilities—jobs that seldom featured high pay. This restricted their housing opportunities and the distance in which they could live from their places of work (generally concentrated in downtown manufacturing districts).

To be sure, similar patterns were observed for a variety of immigrant groups. However, these groups tended to feature outward mobility as a result of their improved occupational status (Wilson, 1987). Thus, their concentration in these areas was short in duration. This mobility was not equally achieved by African-Americans as a result of both overt and covert racial prejudices. Not only did these prejudices restrict them from upward mobility in the workplace, but kept those who did feature success from transitioning into predominately White middle-class neighborhoods. In essence, regardless of the levels of success which they achieved, flourishing African Americans tended to remain concentrated in less than ideal inner-city neighborhoods along with the majority who had yet to achieve similar success (Wilson, 1987).

Changing economic structures in the mid 1900's only further magnified the problem. As mentioned, the majority of inner-city residents were employed in the manufacturing industry. Though the industry had experienced great success in the period after World War II, corporations began to alter the manner in which they did business during this time. Key among these alterations was the movement of manufacturing

centers from the inner-city to more suburban locations (Kasarda, 1983; Wilson, 1987; Wilson & Wu, 1993). This created an employment vacuum in neighborhoods where the majority of African-American residents resided. Though this vacuum was eventually filled by the emergence of technological and service industry positions, few inner-city residents featured the education or work experience necessary for such employment (Wilson, 1987). Thus, rates of joblessness rose exponentially. Somewhat commonsensical, rising joblessness correlated with an increase in already significant rates of poverty (Wilson, 2011; Wilson, 1987).

Furthermore, joblessness created a scenario in which family structure was negatively influenced. Wilson (1987) suggested that a lack of males with stable employment led to a reduction in the number viewed as being of "marriage material" by young women. Thus, though birthrates remained constant—and in some cases increased—the number of two-parent homes decreased substantially. In addition, the presence of financial assistance for mothers allowed them to establish their own homes separate from their parents or other relatives. Though many would view this as a beneficial outcome, Wilson (1987) contended that it had created an environment in which socialization became difficult. Many single parents were ill-equipped to effectively raise children on their own, meaning that a lack of supervision and direction in some cases led to young person's being more likely to exhibit deviant behavior. Such deviant behavior made education and job-acquisition difficult, further contributing to the levels of joblessness seen in these communities (Wilson, 1987).

In addition, the lack of a middle-class in these communities made the transmission of prosocial values from third parties difficult. Individuals who had attained

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success provided role models which young persons could look up to. Because the areas in which Wilson (1987) described featured very few success stories, role models took different forms. For example, young persons may have looked up to gang members or other criminal elements due to the status that they held or the material possessions that they had gained as a result of deviant acts. Because they had no connection to legitimate success or individuals who could direct them toward it, these young persons oftentimes embarked on their own "life of crime." Thus, not only did deviance in adolescence hinder job acquisition, a lack of proper role models made lifelong deviance all the more likely (Wilson, 1987).

The concentration of impoverished and jobless individuals in these communities had in Wilson's (2011; 1987) mind also created a sort of isolation from the outside world. Communities which were able to exert strong informal social control over resident behavior typically relied on both social organizations and external agencies in achieving this control. Strong community organizations created an environment in which interconnectedness was more likely, making control more attainable. Deprived inner-city communities seldom featured such strong organizations as they are dependent upon individuals with significant resources in maintaining their operations. The lack of middle-class residents described above made such resource obtainment nearly impossible. Furthermore, and as a direct result of this division from the outside world, inner-city residents tended to be wary of agencies designed to protect them (e.g., the police). They viewed them as an extension of a government that cared little for their safety or success, and thus failed to turn to them when needed. Indirect social control—

for example, calling the police to report suspicious behavior—was thus undermined in the process (Wilson, 1987).

This lack of control as a result of isolation only served to exacerbate already high rates of crime (as well as other social ills). Thus, disadvantaged communities—arising from economic structures and policy—were associated with crime by many outsiders. Though many of these outsiders turned to racially-based theories in attempting to understand levels of crime (as these communities are predominately African-American in composition), Wilson (1987) posited that concentrated disadvantage was solely to blame. Recent empirical tests lend credence to this position.

Warner and Pierce (1993) provided a partial test of Wilson's hypothesis in assessing the relationship between crime and indicators of economic deprivation (i.e., poverty, family disruption) in 60 Boston neighborhoods. Utilizing calls to police as an unbiased measure of community-level offending, the researchers found that both poverty and disruption played a significant role in between-community variations in crime. Communities featuring a higher percentage of individuals living in poverty and a higher percentage of female-headed, single-parent homes tended to feature much higher rates of crime than those which did not. Furthermore, poverty was found to have its greatest influence on crime in those communities which featured low residential mobility. Communities with a stable (and thus likely isolated) but impoverished population exhibited the highest rates of crime for any of the 60 neighborhoods assessed—a finding especially supportive of Wilson's propositions.

The work of Warner and Pierce (1993) did much to establish the role that concentrated disadvantage plays in community crime, yet significant questions remained.

Primary among these questions was the potential for race to play a unique role in rates of crime above and beyond that played by concentrated disadvantage. Fortunately, the work of Krivo and Peterson (1996) provided a better understanding of this potential. Assessing data on communities located within Columbus, Ohio, the researchers found that disadvantaged neighborhoods featured rates of crime much higher than those seen in non-disadvantaged neighborhoods. Furthermore, they found that those communities which featured the highest levels of concentrated disadvantage (as indicated by joblessness, family disruption and occupational composition) were those in which crime was most rampant. However, they key contribution from this work rested in its dismissal of race as an explanation for crime. Utilizing interaction terms designed to concurrently assess the role that racial composition and indicators of economic disadvantage played in community crime rates, the researchers found that race plays a small role in variation in these rates. Ultimately, the bulk of variation was attributable to indicators of disadvantage as posited by Wilson (1987) and supported in the work Warner and Pierce (1993).

In sum, economic disadvantage—as advanced by Wilson (1987)—appears to offer much to our understanding of urban crime at the macro-level. However, and of interest to the current study, it may have applicability to rural areas as well (Bouffard & Muftic, 2006). Rural communities, though seemingly different than their inner-city counterparts, are also prone to isolation and high levels of poverty (Lee, Maume & Ousey, 2003). Impoverished residents may find themselves detached from traditional societal institutions, either due to a lack of resources or the sheer distance in which they reside from population centers (Bouffard & Miftic, 2006; Lee, Maume & Ousey, 2003).

As such, their ability to establish informal social control may be weakened, leading to increased crime. To date, research has not been supportive of this proposition that high poverty levels (and the isolation that comes with it) are correlated with crime in rural areas (see Osgood and Chambers, 2000 for an example). However, the limited number of tests of social disorganization theory and its components outside of urban areas limits the conclusiveness of this finding. The potential may still exist for poverty and isolation to have influence upon certain forms of offending in rural communities, with elements of Wilson's (1987) propositions being relevant to the study of crimes unique to them.

The development of concentrated disadvantage, in combination with the emerging importance of social ties and the systemic model, did much to advance the social disorganization tradition. However, issues soon emerged in relation to social ties and their influence across communities. Based upon the work of Sampson and Groves (1989), and the replication of their findings by Lowenkamp, Cullen and Pratt (2003), it was assumed that social ties had a negative influence upon crime in all types of communities and under all possible conditions. However, results from other studies led researchers to question this claim (see Bellair, 1997; Warner and Wilcox-Rountree, 1997 for examples). That is, they posited that the effectiveness of social ties may in fact be conditional in nature, and/or that they may vary in intensity.

The Conditionality of Social Ties

Bellair (1997) constituted one of the first attempts to discern whether the intensity of these social ties play a role in their effectiveness. As mentioned, it was generally assumed under the systemic model that strong social ties required frequent interaction on the part of residents in order to effectively promote informal social control.

Analyzing data on 60 urban neighborhoods, Bellair (1997) reached strikingly different

conclusions. Constructing multiple measures for social ties—ranging from interacting

with neighbors once a day to once a year—he found "weak ties" or infrequent ties were

as effective in promoting social control as those which were stronger in intensity.

Essentially, a cumulative percentage of individuals who interacted with neighbors at least

once a year featured a stronger negative correlation with rates of crime than any of the

measures focused on more frequent interaction alone. Thus, the longstanding belief that

social ties were required to be intense in nature to achieve strong informal social control,

and (thus lower crime rates) was challenged. Bellair (1997) argued that this finding

indicated that even weak ties between community members created the opportunity for

shared values and collective action when necessary, and that the systemic model should

be re-conceptualized as such.

Though the notion that weak social ties are effective shed light on their role as a

mediating variable in the systemic model, questions lingered regarding their effectiveness

in all types of communities. That is, is the systemic model a general theory to the extent

that it can predict rates of crime regardless of community composition? This was one of

the key focuses of the work of Warner and Wilcox-Rountree (1997), in which they found

that the racial composition of communities did in fact condition the impact that social ties

have on offending. The researchers found that social ties were more applicable to our

understanding of the link between structural characteristics and crime in predominately

white communities, where the presence of ties correlated with a substantial decrease in

crime. However, in predominately minority or mixed neighborhoods (no one racial

group accounting for more than 30% of the population) social ties were found to have a non-significant effect on rates of crime.

This finding is inconsistent with the systemic models stance as having general effects across various types of neighborhood contexts. The findings of Warner and Wilcox-Rountree (1997) raised questions regarding why social ties would function differently in predominately minority and mixed neighborhoods. The work of Patillo (1998) served to illuminate these issues. Conducting an ethnographic study of the Groveland community in Chicago—a predominately Black middle-class neighborhood—Patillo (1998) found that the dynamics present in minority communities served to condition the effect that social ties have upon crime. The average Groveland resident owned their own home, had resided in the neighborhood for a significant amount of time, and felt connected to other community members—all factors that would indicate strong ties being present between residents. Furthermore, through interviews with community members, Patillo (1998) found that the majority of Groveland residents claimed to be well-connected to both social organizations and other residents. However, crime in Groveland was still present at a higher rate than typically seen in White middle-class communities. Drug use was common, as was membership in street gangs. In essence, social ties were not working in the manner posited by the systemic model to reduce problem behaviors.

Patillo (1998) suggested that in Groveland—and potentially other minority communities—social ties to some degree had a contrary effect, exposing individuals to deviant lifestyles. Young people grew up in an environment where gang members interacted with non-gang members on a regular basis. Furthermore, the leadership of the

gangs present in the community sought to curtail problem behavior within their own community. They chose instead operating their vices in other parts of the city. Thus, they were much closer in appearance to middle-class workers than that of "hardened criminals." The fact that these gang members participated in community organizations and contributed to prosocial events and interactions only further eliminated the negative connotation typically associated with such groups. In essence, gang membership in Groveland was not viewed as an entirely negative phenomenon, leading to a sort of norm confusion for young persons. This finding was reminiscent of earlier work by Shaw and McKay (1942) and others (Sutherland, 1934; Wirth, 1931) who stressed the importance of cultural conflict and the presence of deviant subcultures in influencing offending. These researchers posited that behaviors perceived as "criminal" by the majority of society were not viewed in the same light by other groups, which appeared to be the case in the Groveland community. Furthermore, community members were hesitant to intervene when gang-related crimes did occur, as they not only considered themselves to be friends of these individuals, but understood the beneficial outcomes (i.e., the ability to make money, the ability to insulate themselves from other gangs through protection) that could be associated with their presence. In sum, the work of Patillo (1998) suggested that while social ties might be prominent in Groveland, the outcome of close social ties did not always result in the enactment of informal social control. Instead, social ties may actually facilitate deviant behavior if the community atmosphere and composition is conducive to this process, such as it was in Groveland.

Not only does the empirical research indicate that social ties are conditioned by the racial composition of communities, but by gender-specific dynamics as well. Wilcox-

Rountree and Warner (1999), assessed data on 100 Seattle neighborhoods; and found that though the level of ties claimed by female and male residents were relatively similar across communities, only female ties led to a direct decrease in the prevalence of crime. They thus posited that the relationships that female residents have with other community members may be more conducive to fostering informal social control than those featured by men. However, it is important to note that this finding did not hold for communities featuring a high number of female-headed single parent homes. In these communities the relationship between female social ties and crime became non-significant. Though a full understanding of this phenomenon is difficult to develop, Wilcox-Rountree and Warner (1999) suggested that the influence of female social ties may be somewhat dependent upon the presence of males and the ties that they developed with the community as well (as they were more likely to be enforcers when misbehavior occurred among young persons).

In sum, the above-described work assisted in moving the field toward a better understanding of the influence of social ties in mediating the effects of structural characteristics on crime. In addition, it revealed the potential for these ties to perform differently depending upon the context of the community in question. This ultimately contributed to the development of collective efficacy, a multi-component measure designed to better understand social processes and their impact upon crime (Sampson, Raudenbush & Earls, 1997).

Replacing Social Ties with Collective Efficacy

Due to the conditional nature of social ties and their impact upon offending within communities, several researchers posited that it may be important to move beyond these

ties in explaining the linkage between structure and crime by replacing them with the concept of collective efficacy (Kubrin & Weitzer, 2003; Sampson, Raudenbush & Earls, 1997). Collective efficacy, initially presented by Sampson, Raudenbush and Earls (1997), is comprised of two separate concepts working in conjunction with one another: social cohesion and expectations for informal social control (Browning, Feinberg & Dietz, 2004). The concept of social cohesion, though somewhat complex in nature, essentially refers to the existence of bonds and relationships between community members. Communities with high levels of social cohesion feature residents who both trust one another and who are willing to assist fellow community members in times of need (Sampson, Raudenbush & Earls, 1997). Those communities lacking in cohesion, on the other hand, feature residents with few bonds to neighbors, a lack of trust, and a general unwillingness to assist others.

Though cohesion is important, it must be accompanied by expectations for control in order to constitute the concept of collective efficacy. Expectations for control, simply put, refers to a collective understanding on the part of community members that they will actively band together in order to control deviant behavior when it arises (Morenoff, Sampson & Raudenbush, 2001). Thus, for efficacy to be present, mobilization or the willingness to act on the part of community members must be present (Sampson, 2002; Sampson, 1997; Sampson, Morenoff & Earls, 1999).

Cohesion can perhaps best be viewed as the social capital that makes mobilization more likely (Browning, 2002; Sampson, 2002; Sampson, Raudenbush & Earls, 1997). For example, should deviant behavior present itself, it is much easier to mobilize residents if relationships between them are already present. Community members can

trust one another to assist in exerting control, and know that they will not be confronting a problem on their own. Generally speaking, communities lacking in cohesion will face a somewhat difficult path in attempting to activate informal control through collective action, thus contributing to the higher rates of crime oftentimes seen within them (Duncan, Duncan, Okut, Strucker & Hix-Small, 2003; Hirschfield & Bowers, 1997; Sampson, 2002). It is important to note, however, that high levels of cohesion are not necessarily mandatory in order for informal social control to be exerted (Browning, Feinberg & Dietz, 2004). That is, some communities feature weak cohesion between members while still maintaining the ability to activate their collective resources in confronting issues. Thus, it appears to be most important that community members desire to exert control—and share a willingness to participate when problem behavior is exhibited—as opposed to simply stockpiling resources in the form of ties and cohesion. It can thus be argued that the key component of collective efficacy is the potential for purposive action on the part of community members (Kubrin & Weitzer, 2003).

With this knowledge in mind, the concept of collective efficacy may constitute a more appropriate linkage between structure and crime in the systemic model than do social ties (Morenoff, Sampson & Raudenbush, 2001; Sampson, 2002; Sampson, Morenoff & Gannon-Rowley, 2002; Sampson, Raudenbush & Earls, 1997). Though such ties are in some ways comparable to the social cohesion component of collective efficacy, they fail to account for a community's willingness or ability to mobilize when problem behavior is exhibited. The combination of cohesion and potential for purposive action into a single mediating variable thus better specifies the processes at play in the formulation of informal social control.

Whereas social ties proved to feature contradictory findings in the research literature, initial tests of collective efficacy have been more promising (Kubrin & Weitzer, 2003). For example, Sampson, Raudenbush and Earls (1997) assessed crime in Chicago neighborhoods, and found that collective efficacy served as a strong mediating variable between structure and crime across communities. Not only did collective efficacy feature a negative correlation with both homicide and perceived violence, but it mediated over 70% of the influence that structural characteristics (i.e., concentrated disadvantage, immigrant concentration, residential stability) had on offending. Morenoff, Sampson and Raudenbush (2001) reached similar conclusions in a later study of violence across Chicago neighborhoods. Specifically, they found that collective efficacy was among the strongest and most consistent predictors (negative correlation) of violent crime variation between communities. In fact, it was more influential than such factors as population density, residential stability, and concentrated immigration—all hallmarks of the social disorganization paradigm. In addition to this consistency, they found that the impact of collective efficacy upon crime was most pronounced in Black neighborhoods. This is of special interest due to the above-detailed research regarding the conditional impact that social ties have upon crime by community racial composition (Warner & Wilcox-Rountree, 1997). Therefore, collective efficacy appears to be a sufficient mediating variable in this regard. At this point, it does not appear to be conditional in nature, and thus offers a more consistent understanding of community-level processes that influence the exertion of informal social control. Having provided an overview of the development of the social disorganization tradition, it is important to consider the potential for the theory to explain offending outside of urban areas.

Examining Social Disorganization Outside of Urban Areas

Social disorganization theory has evolved considerably since Shaw and McKay's (1942) initial conceptualization. The development of the systemic model, conceptualization of concentrated disadvantage, and later movement toward replacing social ties with collective efficacy have provided urban researchers with a better framework with which to assess the impact of social structure and community-level processes on criminal offending. However, the theory was developed with a specific focus upon these urban environments—environments where it is much easier to gather data appropriate to theory-related testing. For example, empirical tests of either the systemic model or collective efficacy require survey data querying individuals on their connections to other members within their general area. Such an undertaking would require extensive resources outside of urban areas within the United States, which currently lacks a funded study/survey seeking to discern such connections. Thus, the application of social disorganization theory in rural areas generally relies upon an assessment of factors consistent with those originally posited by Shaw and McKay (1942).

Several attempts have been made to empirically test the theory in these areas, and are worthy of discussion. It is important to note that all of these studies have utilized counties as the level of analysis, as opposed to communities (Kaylen & Pridemore, 2012). This is likely due to the fact that data on structural characteristics are difficult to gather for smaller units of measurement outside of urban areas. Furthermore, rural areas are unique to the extent that multiple law enforcement agencies (i.e., municipal police, county agencies, state police) respond to calls for service. Thus, determining offense

counts for a small segment would be difficult using the aggregate-level data that is currently available (e.g., the Uniform Crime Report).

Petee and Kowalski (1993) are credited with the first attempt to assess the viability of social disorganization theory to explain crime in rural areas. Utilizing a sample of 630 rural counties, they found that indicators of disorganization were positively related to incidence of both assault and robbery. For example, counties characterized by a higher percentage of low income residents were more likely to have higher rates of offending, as were counties lacking residential stability, counties with higher levels of family disruption, and counties with a more racially-heterogeneous population.

Perhaps the most influential study of social disorganization in nonmetropolitan areas is the work of Osgood and Chambers (2000). The researchers sought to discern whether the core tenets of Shaw and McKay's (1942) social disorganization framework could be generalized to juvenile violence in rural counties. Their sample included a total of 264 counties contained within four states. Utilizing residential instability, ethnic heterogeneity, family disruption and poverty as their measures of disorganization, they found a good deal of support for the theory. All of the measures, with the exception of poverty, were shown to play a significant role in incidence of juvenile violence, with higher rates seen in counties featuring higher levels of residential instability, ethnic heterogeneity and family disruption.

More recent studies have attempted to replicate the work of Osgood and Chambers (2000) in relation to other forms of offending. On the whole, these attempts are consistent with their findings that social disorganization is applicable in rural areas.

For example, Barnett and Mencken (2002) assessed the core tenets of the theory in relation to both property and violent crime in nonmetropolitan counties in the contiguous United States. Utilizing data from the Uniform Crime Report (UCR), they found that resource disadvantage had a statistically-significant, positive relationship with both property and violent crime, though the impact was conditioned by the stability of a counties population. Rates of property crime were not influenced by disadvantage in stable communities. However, when population was either rising or falling, those counties featuring greater disadvantage tended to experience higher rates of property offenses.

Lee, Ousey and Graham (2003) sought to explore the relationship of social disorganization with homicide rates in 2,524 counties throughout the United States (both metropolitan and nonmetropolitan counties). Their approach was influenced by the work of Wilson (1987), and attempts to discern the impact of social isolation (as measured by poverty concentration) and socioeconomic disadvantage upon these rates. They found that both disadvantage and isolation significantly and positively impacted rates of homicide in metropolitan counties. That is, metropolitan counties with higher levels of disadvantage and social isolation experienced higher rates of homicide. However, differential effects were indicated for nonmetropolitan counties. Only disadvantage was a positive and statistically-significant predictor of homicides in nonmetropolitan counties.

Bouffard and Muftic (2006) sought to assess whether the theory could be utilized to explain a range of violent offense types in 221 counties located in the Mid-Western United States. Their results suggest that residential mobility, racial diversity, and proportion of households headed by a single mother were all significantly and positively

related to incidence of both aggravated assault and other forms of assault. Similar to the findings of Osgood and Chambers (2000), only poverty failed to perform in a manner posited by Shaw and McKay (1942). In fact, contradictory to theory, those counties which featured a higher percentage of individuals residing in poverty featured lower incidence of each form of assault.

In sum, attempts to assess the impact of social disorganization upon crime outside of urban areas and at the county level suggest that the theory has relevance explaining rates of criminal offending. With this in mind, attention is turned to the potential applicability of the theory to the study of farm equipment theft.

Social Disorganization and Farm Equipment Theft

To date, no study has assessed the potential for social disorganization theory to explain incidence of farm equipment theft. However, past research has suggested that factors associated with the theory may be useful in explaining various types of property crime at the county level (Kposowa, Breault & Harrison, 1995). Thus, it is plausible that similar results may be seen in relation to the focus of the current study. Measurement of social disorganization variables paralleling the work of Osgood and Chambers (2000) are utilized in the current study. The analysis seeks to answer the set of research questions that are described below.

Research Question #6: Do counties featuring a higher percentage of their residents residing in poverty experience higher rates of farm equipment theft than counties with a lower percentage of residents residing in poverty.

Hypothesis #6: Counties featuring a higher percentage of their residents residing in poverty will not feature higher incidence of farm equipment theft than counties featuring a lower percentage of residents residing in poverty.

Past research relating to social disorganization theory outside of metropolitan areas suggests that poverty may not have a significant impact upon offending (Bouffard & Muftic, 2006; Osgood & Chambers, 2000). This is partially due to the fact that many of these counties are rural in nature. On the whole, research suggests that poverty may not influence offending in rural areas to the degree that it does in inner-city environments (Weisheit, Falcone & Wells, 2005). Thus, the current study hypothesizes that poverty will not have a significant effect on rates of farm equipment theft.

Research Question #7: Do counties featuring higher levels of residential mobility experience higher rates of farm equipment theft than counties with lower levels of residential mobility?

Hypothesis #7: Counties featuring higher levels of residential mobility will experience higher incidence of farm equipment theft than counties featuring lower levels of residential mobility.

Residential mobility is posited to render the opportunity for the establishment of cohesion and bonds between residents more difficult to achieve (Kasarda & Janowitz, 1974; Sampson & Groves, 1989; Sampson, Raudenbush & Earls, 1997). Thus, the social disorganization perspective views high rates of mobility conducive to higher rates of

offending. This has been supported in past attempts to apply the theory at the county

level in relation to other crime types (Bouffard & Muftic, 2006; Osgood & Chambers,

2000; Petee and Kowalski, 1993). Thus, the current study hypothesizes that a similar

effect will be observable for incidence of farm equipment theft.

Research Question #8: Do counties featuring a more ethnically heterogeneous

population experience higher incidence of farm equipment theft than do counties

featuring a more ethnically homogenous population?

> Hypothesis #8: Counties featuring a more ethnically heterogeneous population
>
> will experience higher incidence of farm equipment theft than do counties
>
> featuring a more ethnically homogenous population.
>
> Similar to residential mobility, the results of past studies indicate that ethnic

heterogeneity may serve to influence levels of crime experienced at the county level

(Bouffard & Muftic, 2006; Osgood & Chambers, 2000). Of note, these findings are all

based upon an assessment of the effect of heterogeneity upon violent offenses. However,

it is plausible that such an impact may occur in relation to farm equipment theft as well.

Research Question #9: Do counties featuring greater levels of household instability

feature higher incidence of farm equipment theft than counties featuring lower levels of

household instability?

> Hypothesis #9: Counties featuring greater levels of household instability will
>
> feature higher incidence of farm equipment theft than counties featuring lower
>
> levels of household instability.
>
> The results of prior studies suggest that family disruption serves as a predictor of

offending rates at the county level (Bouffard & Muftic, 2006; Osgood & Chambers,

2000; Petee and Kowalski, 1993). Though these studies do not focus on property offenses, the consistent nature of their findings indicates that disruption may have a general impact upon a variety of crime types. Thus, the current study hypothesizes that counties featuring a higher proportion of female-headed, single-parent homes will suffer from higher incidence of farm equipment theft than those on the other end of the spectrum.

Research Question #10: Do interactions exist between social disorganization measures in terms of their influence upon incidence of farm equipment theft?

Hypothesis #10: Social disorganization measures—apart from their unique impact upon incidence of theft—will work in conjunction with one another to further influence counts of theft witnessed at the county-level.

The literature suggests that interactions exist between elements of social disorganization theory, with these variables working in conjunction with one another to influence crime and other social ills beyond their own unique impact (Shaw & McKay, 1942; Warner & Pierce, 1993). It is possible that such a phenomenon will be seen in relation to farm equipment theft. The current study posits that such effects will be seen with all variables excluding poverty (as poverty has been found to have little effect upon rates of crime in rural areas). It is hypothesized that counties exhibiting the following characteristics will be at greater likelihood of experience higher counts of farm equipment theft:

- High household instability/High racial heterogeneity
- High household instability/High residential mobility
- High residential mobility/High racial heterogeneity

Research Question #11: Do interactions exist between routine activity and social

disorganization measures in terms of their impact upon farm equipment theft?

Hypothesis #11: Elements of routine activity theory and social disorganization

theory will work together to have multiplicative effects upon farm equipment

theft in addition to their own unique impacts.

Research suggests that integrating components of routine activity theory and

social disorganization theory may be beneficial at the macro-level, as both theories seek

to address the influence of contextual factors and processes upon crime (Kennedy &

Forde, 1990; Meithe & Meier, 1990; Rountree, Land & Miethe, 1994; Smith, Frazee &

Davison, 2000). In addition, employing the two theories in conjunction with one another

allows for an understanding of both motivation (social disorganization components) and

opportunity (routine activity components) in conditioning incidence of crime (Smith,

Frazee & Davison, 2000). It is thus possible that routine activity measures may have

differential impacts upon farm equipment theft based upon the level of disorganization

(as evidenced by social disorganization measures) present within each county. For

example, the effect of average farm size upon incidence of theft may be conditioned by

the rate or residential mobility within a county. A series of interaction terms will be

created in order to test these various potential relationships.

It is important to note that the current application of the theories may present the

potential for them to compete with one another. For example, those counties which have

strong agricultural economies may be naturally inclined to more "organized" in nature.

In other words, the stability associated with a strong economy may lend itself to low

levels of poverty, mobility and household instability. Thus, the dual application of the

theories to farm equipment theft may be somewhat problematic, as they would not be complementary to the extent seen in urban research. This potential will be explored in the analysis section prior to the inclusion of measures relating to both theories in the same multivariate models.

Summary of Hypotheses

The following chapter discusses the data and analytical techniques employed to answer these research questions, as well as those laid out in the discussion of routine activity theory and its potential relevance to farm equipment theft. Before proceeding, however, it is important to restate the key hypotheses to be answered in the current study.

In relation to routine activity theory, the current study seeks to understand what county-level characteristics, relating to farming structure and patterns, influence rates of farm equipment theft. Higher incidence of theft is predicted for counties with on-average larger farms, counties featuring a higher on-average number of workers per farm, counties featuring higher monetary values of equipment in use on farming operations, counties featuring a higher proportion of land dedicated to farming, and more densely-populated counties.

In relation to the social disorganization perspective, the study seeks to discern the applicability of indicators of disorganization to farm equipment theft. Hypotheses are based upon past studies that have applied the perspective to other forms of offending at the county level. As these studies tend to find no significant effect of poverty on crime, the current study hypothesizes that the prevalence of poverty within each county will have no statistically-significant influence on incidence of farm equipment theft. Because other disorganization measures tend to be supported by this literature, it is hypothesized

that counties featuring higher levels of residential mobility, household instability and

ethnic heterogeneity will all feature higher incidence of theft than those counties not

falling under these classifications. Finally, it is hypothesized that interactions will exist

between measures, with multiplicative effects emerging in addition to unique impacts.

CHAPTER FOUR: METHODOLOGY

Data

Data for this dissertation are derived from three separate sources and combined into a single user-created dataset utilizing the Statistical Package for the Social Sciences (SPSS) Version 22.0. Measures for the dependent variable, *farm equipment theft*, are derived from the 2011 and 2012 iterations of the National Incident Based Reporting System (NIBRS). Measures for farm-related characteristics by county (constituting the routine activity variables under analysis) are acquired from the 2007 version of the United States Department of Agriculture's quinqennial Census of Agriculture. Finally, measures for elements of social disorganization theory, as well as population density, are acquired from the 2010 version of the United States Census.

NIBRS. The National Incident Based Reporting System (NIBRS)—managed by the Federal Bureau of Investigation (FBI)—contains detailed information on all crime incidents investigated by law enforcement agencies that provide NIBRS certified data. Agencies receive NIBRs certification if they submit crime data in a manner that is consistent with the reporting guidelines set forth by the FBI (United States Department of Justice, 2013). Historically, law enforcement agencies have collected and submitted crime incident data to the FBI through the Uniform Crime Reports (UCR). UCR data, though beneficial, contains limited information regarding the details of each incident reported by these agencies (Addington, 2009; Faggiani & McLaughlin, 1999; Reaves, 1993). For example, though data on property theft is provided, the type of property that

is stolen is not indicated. NIBRS was developed in response to the need for more

detailed data (Rantala & Edwards, 2000; Roberts, 1997), and among other incident

details, includes a measure relating to the type of property stolen in each incident of theft.

One type of property classification available for this measure is theft of farm equipment.

Farm equipment is defined by the NIBRS Reporting Guide as "any kind of machinery

used on a farm to conduct farming" (United States Department of Justice, 2013, p. 89).

Thus, all cases involving a piece of equipment falling within this definition are coded as

theft of farm equipment and constitute "incidents" for the purposes of the current study.

The most recent versions of the NIBRS dataset available for public use are for the years

2011 and 2012. Thus, data on incidence of farm equipment theft are drawn from these

two versions.

United States Census. The United States Census—conducted by the United States

Census Bureau every 10 years—provides information relating to the population and

housing characteristics of states, counties and lower-level population units (e.g., census

tracts) nationwide. These characteristics are inclusive of a wide range of topics, and

allow for the construction of measures relating to social disorganization. Because the

current study seeks to test the applicability of social disorganization theory to incidence

of farm equipment theft at the county level, each of the social disorganization measures

employed relies upon county-level Census data. In order to provide for a valid link

between these measures and incidence of theft (measured for the years 2011 and 2012),

data were drawn from the most recent (2010) version of the U.S. Census.

Census of Agriculture. The Census of Agriculture—administered by the United

States Department of Agriculture (USDA) every five years—provides an overview of

farming operations within the United States. It relies upon the completion of surveys by

farm operators throughout the nation in a manner similar to the U.S. Census. Survey

findings are broken down by both states and the counties included within them. Because

the goal of Census of Agriculture is to arrive at a comprehensive understanding of

farming operations, all agricultural operations (defined as any operation that will produce

or sell at least $1,000 worth of agricultural products in a given year) known to the USDA

are included within the sampling frame (National Agriculture Statistics Service, 2014).

Though 100% cooperation is sought, each year a substantial number of surveys are

classified as un-returned. In order to account for potential bias in the data created by this

lack of cooperation, the USDA utilizes various statistical techniques to arrive at a final

dataset that closely approximates the actual characteristics of farming operations for each

state and county within the United States (National Agriculture Statistics Service, 2014).

Each Census of Agriculture contains information on a number of variables,

ranging from operator characteristics to operation characteristics. These variables allow

for measures relating to routine activity theory to be created at the county level for use in

the current study. Because the most recent Census was conducted in 2012, use of this

version is problematic in relation to the current analysis—as farm equipment theft data is

assessed for the years 2011 and 2012. Thus, measures employed in the current study are

drawn from the results of the 2007 version of the Census of Agriculture.

Construction of a Final Sample of Counties

The purpose of the current study is to explore the applicability of social

disorganization theory and routine activity theory to farm equipment theft at the county

level. The selection of counties to comprise the final sample for the current analysis

requires four considerations: 1) NIBRS certification status of agencies within the county; 2) NIBRS certification status of counties within a state; 3) the quality of data present for farm equipment thefts by state; and 4) the geographic proximity of counties to one another. Regarding the first consideration, it is important to note that only a portion of law enforcement agencies within the United States are currently NIBRS certified. As of 2012, approximately 29% of agencies had achieved NIBRs certification (Justice Research and Statistics Association, 2013). Because the current project seeks to assess predictors of farm equipment theft at the county level, it is important to generate a sample of counties for which all law enforcement agencies are NIBRS certified (i.e., county sheriff's departments, local municipal agencies).

Furthermore, and in relation to the second consideration, it is beneficial to select these counties from a sample of states in which all counties (and the agencies contained within them) have received NIBRS certification. This is due to the fact that state-level agencies sometimes respond to incidents of farm equipment theft. Including counties located in states that do not feature NIBRS participation on the part of state agencies may present the potential for theft counts that are not indicative of the true count of thefts attributable to them. Counties eligible for the final sample will thus be restricted to those in which all included agencies are NIBRS certified, and contained within states featuring 100% NIBRS certification. Table 1 contains a complete list of states currently featuring 100% of law enforcement agencies having received NIBRS certification, and thus eligible for consideration in the current study.

Table 1.

States Featuring 100% NIBRS Certification for All Law Enforcement Agencies

State	Number of Agencies Within State
Arkansas	285
Colorado	249
Delaware	58
Idaho	109
Iowa	248
Michigan	648
Montana	110
New Hampshire	195
North Dakota	106
South Carolina	503
South Dakota	137
Tennessee	466
Vermont	90
Virginia	422
West Virginia	426

Source: Justice Research and Statistics Association (2013)

Having determined the states (and counties within them) eligible for the current analysis based upon NIBRS certification, it is important to consider the quality of farm equipment theft data that is available for them. Because analysis of data for a single year presents potential concerns in relation to the validity of findings—as a single year may represent an anomaly in terms of the number of farm equipment thefts reported—NIBRS data are acquired for both 2011 and 2012. For 2011, a total of 10,879 incidents were recorded by law enforcement agencies across the country. Slightly fewer were recorded for the year 2012 (10,276). However, the similarity of theft counts for each year suggests

that neither year represents an anomaly. As such, counts for both years should be suitable for the needs of the current analysis.

Though each of the 15 states listed in Table 1 feature 100% NIBRS reporting among their included agencies, it is important to consider the potential for a lack of variation between counties to create issues in the current analysis (Table 2). With this in mind, it is necessary to select states (and the counties within them) for which enough variation exists in the number of thefts between counties to make the final analysis meaningful in nature. Several states feature theft counts of less than 200 for both 2011 and 2012. Two potential factors may play a role in these low counts. First, the state may not feature an extensive agricultural-economy (e.g., few farms), resulting in few opportunities for the theft of farm equipment. Second, the agencies within these states may be underreporting incidence of such theft. That is, though they categorize the incident as a theft, they may simply be classifying it as "other" as opposed to designating the target of the theft as farm equipment.

Past research has suggested that NIBRS suffers from missing data to the extent that certain sections are simply not filled out by officers filing reports (Thompson, Saltzman & Bibel, 1999). This possible explanation seems particularly applicable to the low theft counts present for Montana, North Dakota, and South Dakota. Each of these states features a high percentage of land dedicated to farming operations, but relatively low incidence of farm equipment theft. An analysis of the theft data available for these states reveals that a significant percentage of counties contained within them report no incidents of farm equipment theft for either 2011 or 2012. Because these counties, on average, contain a similar percentage of land dedicated to farming as those reporting

numerous thefts for each year, it is plausible to assume that the agencies contained within these counties may not be classifying thefts by the type of property being stolen. Though such an assumption is impossible to validate, these counties—and thus the states that they are contained within—present validity issues if included within the final sample for the current study, as the true counts of thefts attributable to them may be different than the counts available in the data. As such, they are excluded from the sampling frame for the current study.

Table 2.

Farm Equipment Theft Incidents by State

State	Number of Thefts for 2011	Number of Thefts for 2012
Arkansas	1187	1261
Colorado	116	156
Delaware	41	33
Idaho	279	222
Iowa	573	524
Michigan	590	514
Montana	57	62
New Hampshire	80	102
North Dakota	90	92
South Carolina	1145	1074
South Dakota	53	70
Tennessee	1760	1475
Vermont	3	10
Virginia	873	611
West Virginia	156	177

Excluding states with potential reporting issues leaves the following states eligible for inclusion: Arkansas, Idaho, Iowa, Michigan, South Carolina, Tennessee, and Virginia. Each of these states features at least 200 theft incidents reported for each year in question, allowing for meaningful variation between counties. Furthermore, they feature few counties (and thus the agencies contained within them) reporting no thefts for either 2010 or 2011. Though underreporting is likely to still be an issue—as it would be with any type of detailed crime data contained within the NIBRS datasets—the impact of underreporting appears to be lessened for the counties contained within this group of states.

It is important to note that differences in agricultural structure and production techniques exist between geographic regions. For example, a preliminary analysis of Agricultural Census results suggests that counties located within Southern States (Arkansas, South Carolina, Tennessee and Virginia) tend to feature smaller farms than do counties located within the other states eligible for analysis. This may be due to the fact that states such as Iowa, Idaho and Michigan tend to feature large commercial farming operations. In addition, the counties located within Iowa, Idaho and Michigan claim noticeably higher aggregate values of equipment on operation. A significant portion of this increase can likely be tied to the utilization of large combines (designed to assist in grain harvesting) on commercial operations in these states. A single combine typically costs in the vicinity of $500,000. This may prove problematic to the current study due to the fact that combines are unlikely to be stolen, as they are difficult to remove and equipped with advanced anti-theft systems. Thus, including the counties located within these three states in the current analysis may bias any findings relating to aggregate

equipment values and incidence of theft. Due to this fact, analysis is restricted to the 311 counties located within Arkansas, South Carolina, Tennessee and Virginia. These states all fall within the Southern Region of the United States as defined by the United States Census Bureau.[2]

As mentioned previously, missing data is still of concern due to the fact that a small number of counties (six) included within the final sample feature no reported thefts for either year under analysis. These counties on average feature approximately 22% of their total land area dedicated to farming operations. Thus, it is unlikely that no farm equipment thefts occurred within them in either year. This suggests that the agencies within these counties are not classifying thefts by the type of item being stolen. As such, these six counties are removed from the final analysis, rendering a final sample of 305 counties.

<div align="center">

Measures

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Dependent Measure

The dependent measure for the current study is count of *farm equipment thefts* at the county level. The NIBRS dataset provides two indicators by which theft incidents can be attributed to the county in which they occurred. First, it provides the abbreviation for the state in which each incident occurred. Second, it contains the name of the agency responsible for filing the report for the incident. Utilizing the Statistical Package for the Social Sciences (SPSS), farm equipment theft incidents are extracted for the counties under analysis from the complete NIBRS dataset for each year. The files for each year are then sorted in order to group theft incidents by the state in which they occurred.

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[2] See https://www.census.gov/geo/maps-data/maps/pdfs/reference/us_regdiv.pdf for a detailed map of census regions within the United States.

Next, each incident is assessed to determine the law enforcement agency that reported it. In the case of county police agencies, attributing farm equipment thefts to the appropriate county is a relatively straightforward task. In the event that the reporting agency is a municipal police department or other agency, an internet search was undertaken to identify the county in which that agency operates. As such, the final count of *farm equipment thefts* for each county is inclusive of not only those reported by county-level agencies, but by municipal and state agencies operating within them as well.

Utilizing theft counts for any one year (2011 or 2012) as the dependent variable presents the potential for bias in the findings, as counts for a single year may be abnormally high or low. Specifically, a county may experience a one year aberration in theft incidents that is not indicative of the normal theft rate. Thus, it may be useful to treat the average yearly count of thefts over the two-year window as the dependent variable in the current study. Creating this measure involves taking the aggregate count of thefts for each county over the two year window, and then dividing the resulting number by two. Such a tactic will allow for potential aberration that is present within a single year to be accounted for, and is a technique frequently utilized in social science research (see Roman, Reid, Bhati & Tereschenko, 2008; Roncek & Maier, 2000; Smith, Frazee & Davidson, 2000; Wilcox, Quisenberry, Cabrera & Jones, 2004 for examples). In essence, utilizing the two-year average allows for increased stability in the dependent variable (Roman et al., 2008). Thus, any relationships that emerge between the independent predictors and the two-year average dependent variable should be viewed with greater confidence than relationships between these variables and the counts available for a single year (either 2011 or 2012).

Routine Activity Measures

Measures in line with routine activity theory at the macro-level are primarily drawn from the available literature on farm equipment theft at the micro-level. Though not all micro-level correlates of such theft can be assessed at the macro-level, several measures are available: population density, average farm size, proportion of land within the county that is classified as farmland, average number of workers per farm, and total value of equipment owned by farms within the county. The measure for *population density* is derived from the 2010 version of the U.S. Census, and is calculated as the number of individuals residing in the county divided by the total square miles of property contained within it. Thus, population density is measured as the number of individuals per square mile.

All other routine activity measures are calculated primarily from data provided by the 2007 version of the Census of Agriculture. *Average farm size* is calculated as the total acreage of farmland present within a county divided by the total number of farms contained within it. Thus, values for this measure represent average farm size in terms of acres. *Worker density* is calculated as the total number of workers reported by farms within each county divided by the total number of farms present—and can be interpreted as the average number of workers per farm within the respective county. The *total value of equipment* attributable to each county is the aggregate value (in dollars) of equipment reported by each individual farming operation contained within it. Because values are large (the lowest value of equipment contained in any one county is approximately $2

million), the raw value is divided by $10,000 in order to provide a measure that is more easily interpretable in the multivariate analysis.[3]

The creation of the measure for proportion of land within each county that is classified as farmland requires utilizing data contained both within the 2010 version of the U.S. Census and the 2007 Census of Agriculture. Because farmland is measured in acres by the Census of Agriculture, and total land within each county is measured in square miles by the U.S. Census, it is necessary to standardize the level of measurement before calculating the measure of *proportion farmland*. Because one square-mile is equivalent to 640 acres, the measure for total farmland in acres within each county is multiplied by 640 in order to create a measure of total farmland in square miles. The resulting value for each county is then divided by the total land in square miles contained within that county to gain the final measure for proportion of land that is dedicated to farming operations.

Social Disorganization Measures

The social disorganization measures employed in the current study are drawn from the literature. In line with past research focusing upon the impact of social disorganization on rural offending (Bouffard & Muftic, 2006; Jobes, Barclay, Weinard & Donnermeyer, 2004; Osgood & Chambers, 2000), four measures of social disorganization are included: poverty, residential mobility, household instability, and ethnic heterogeneity. Data for each of these measures are drawn from the 2010 version of the U.S. Census. *Poverty* is measured as the percentage of households within each county claiming incomes that fall below the federally-defined poverty line. *Residential*

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[3] For example, a county featuring a total of $8,350,000 in equipment on operation will receive a value of $8.35 for the computed measure. Because a good deal of variation is present in total values across counties, this alteration should not bias the findings in a significant manner.

mobility is measured as the percentage of individuals residing within each county who had moved to their current residence within the last five years. *Household instability* is measured as the proportion of all households within each county that are headed by a single female parent, and feature children under the age of 18 residing within the home.

The measure for *ethnic heterogeneity* is a computed variable that utilizes data for total households and their ethnic composition. The measure is computed in line with the methodology of past research regarding the impact of social disorganization on crime and deviance in rural counties (Osgood & Chambers, 2001):

$$1 - (\Sigma p_i^2)$$

In this formula, p_i represents the proportion of households represented by each respective ethnic group. Non-metropolitan researchers oftentimes include only the proportion of White and non-White populations in this measure. However, recent years have seen an influx of Hispanics into rural America (Lichter, 2012; Lichter, Johnson, Turner & Churilla, 2012). Thus, the current study divides the population into four separate groups: Non-Hispanic White, Non-Hispanic African American, Hispanic, and other. The proportion of households falling into each group is first squared, and then summed. The resulting number is then subtracted from one in order to create the final measure of ethnic heterogeneity. A value of "0" on this measure indicates a perfectly homogenous county. On the other hand, higher values represent a county that is more ethnically-heterogeneous in composition.

Plan of Analysis

Analysis for this study proceeds in four separate steps. The first step involves the presentation of descriptive statistics for both the dependent and independent measures to

be included within the multivariate analysis. Presentation of these statistics will allow for a better understanding of their distribution. Furthermore, it will present the opportunity to assess the potential for the dependent measure be non-normally distributed (Hao & Naiman, 2010; Oja, 1983). The second step involves the presentation of bivariate correlations. These correlations will provide initial insight into the relationships that exist between the measures employed in the analysis. Assessing bivariate correlations will also allow for an initial determination of multicollinearity, as correlation coefficients that are abnormally high suggest that two independent variables may be measuring a similar concept (Berry & Feldman, 1985; Fox, 1991).

Step three involves the presentation of a series of regression models designed to determine the unique impact that each independent measure has upon county-level incidence of farm equipment theft. Because the farm equipment theft is measured as count data, traditional ordinary least squares regression (OLS) is unsuitable for the analysis. OLS regression rests upon the assumption that the dependent variable is measured continuously and is normally distributed (Hardin & Hilbe, 2012; Hilbe, 2011; Piza, 2012). Furthermore, it presents the potential for predicted values to be negative in orientation (Gardner, Mulvey & Shaw, 1995; Hilbe, 2011). Farm equipment theft counts cannot be negative for any county under analysis—violating this assumption. In addition, many counties feature relatively low counts of thefts, whereas a handful has especially high counts. Thus, normal distribution of the dependent measure is unlikely. With this in mind, two options are available for analysis of the data: Poisson regression or negative-binomial regression. Both are considered suitable for count data. However, negative-binomial regression is most appropriate when the dependent measure is over-dispersed

(i.e., featuring a variance that is higher than the mean) (Cameron & Trivedi, 2013; Hilbe, 2011). Initial analysis of the data suggests that over dispersion is present, rendering negative-binomial regression most suitable for the current study.[4]

A total of five regression models will be presented. The first will explore the relationship between the routine activity measures and farm equipment theft. The second will explore the relationship between the social disorganization measures and such theft. The third will be a combined model in which both the routine activity and social disorganization measures are simultaneously regressed upon incidence of farm equipment theft. This model will allow for a determination of each theory's unique impact after controlling for measures associated with the other theory.

The fourth model explores the potential for social disorganization measures to have multiplicative effects through the inclusion of three interaction terms. Interaction terms allow for a determination of the combined effects of the social disorganization measures upon farm equipment theft, while still accounting for their own unique impacts and the impact of the routine activity measures. That is, in addition to the unique impact that a variable has upon theft, it may also work in conjunction with another variable to have some manner of additional influence (Jaccard & Turrisi, 2003). The fifth and final model will retain all unique measures, as well as any significant interactions between the social disorganization measures, while also exploring potential interactions between measures across theories. This allows for a test of the hypothesis that the two theories are complementary in better understanding incidence of farm equipment theft.

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[4] OLS regression will still be utilized to assess the potential for multicollinearity between the independent measures utilized in the negative-binomial analysis.

Interaction terms are created by first mean-centering each measure to be included within them, and then multiplying the resulting values (Jaccard & Turrisi, 2003). For example, an interaction term seeking to discern the combined influence of residential mobility and poverty on farm equipment theft would appear as follows:

[Residential Mobility (Mean-Centered)] x [Poverty (Mean Centered)]

This process will be undertaken for each potential interaction to be tested in the fourth and fifth models. Having summarized the methods to be employed in the current study, attention is turned to discussing the results of the analysis.

CHAPTER FIVE: RESULTS

Descriptive Statistics

A full summary of the descriptive statistics for each of the included measures (both dependent and independent) can be found in Table 3. In relation to the dependent measure, the average county claims approximately 15 theft incidents (M=15.21). However, a good deal of variation exists in the measure, with *farm equipment theft* counts ranging from one (1) to 109. With this in mind, it is important to assess the normality of the data for the measure. Analysis indicates that the variance (264.40) is larger than the mean, suggesting overdispersion. As discussed within the methodology, negative binomial regression is most appropriate for conducting multivariate analysis of overdispersed count data (Cameron & Trivedi, 2013; Hilbe, 2011). Thus, the current analysis will utilize negative binomial regression as a means of understanding the relationship between *farm equipment theft* and the various measures associated with the two theoretical frameworks.

In relation to the routine activity measures, the average county features a *population density* of 133.11 individuals per square mile of land, approximately $45 million in *total equipment value* in use by the farms contained within it, and 36.62% of its land dedicated to farming operations (*proportion farmland*). In relation to *worker density*, each county features an average of less than one hired worker per farm (M=0.21). Finally, the counties in the sample have an *average farm size* of approximately 236 acres.

It is important to note that the distribution of the *population density* measure presents potential issues for the multivariate analysis. As discernible from Table 3, the measure is highly skewed (skewness=6.09; kurtosis=47.86). Kline (2005) suggests that a skewness value of 3 or higher, and/or a kurtosis value of 10 or higher indicates that a measure is non-normally distributed. The values for the *population density* measure are significantly higher than these thresholds. Most counties feature less than 300 individuals per square mile (N=273). A handful, however, claim over 1,000 individuals per square mile of land. Though negative binomial regression does not assume normality in relation to the distribution of the independent measures, the skewness and kurtosis statistics indicate that transformation may still be beneficial. Because including the measure in the multivariate analysis in its raw form may present the potential for bias in the findings, it is important to address the issue. The current study does so by taking the natural log of the measure. The descriptive statistics for the logged *population density* measure are also included within Table 3. As witnessed by the skewness and kurtosis values for the new measure, the log transformation resulted in a normal distribution.

In relation to the social disorganization measures, the average county features 12.87% of its residents residing in *poverty*, 25.04% of its residents having moved to their current residence within the past five years (*residential mobility*), and 29.06% of all households being headed by a single mother with children under the age of 18 residing in the home (*household instability*). The measure for *ethnic heterogeneity* shows a mean value of 0.31. This indicates that the average county is neither perfectly heterogeneous nor homogenous in terms of ethnic composition. Having provided an overview of the data, attention is turned to a discussion of bivariate correlations.

Table 3.

Descriptive Statistics

Measure	Mean	SD	Minimum	Maximum	Skewness	Kurtosis
Equipment Thefts	15.21	16.26	1.00	109.00	2.33	7.08
Poverty	12.87	5.26	1.90	35.70	0.47	0.87
Residential Mobility	29.06	6.45	9.20	49.50	0.50	0.27
Household Instability	0.25	0.08	0.10	0.53	1.07	0.96
Ethnic Heterogeneity	0.31	0.18	0.03	0.67	0.05	-1.50
Population Density	133.12	258.61	8.54	2766.77	6.09	47.86
Worker Density	0.21	0.09	0.03	0.77	2.63	10.54
Proportion Farmland	0.37	0.19	0.02	0.98	0.48	-0.34
Equipment Value	45.23	31.64	1.99	167.31	1.29	1.80
Average Farm Size	235.91	231.24	28.89	1550.91	3.33	12.35
Population Density (Log)	4.25	0.99	2.14	7.93	0.82	0.96

Bivariate Correlations

Step two of the analysis involves the presentation of bivariate correlations that represent the relationships that exist between the measures to be included within the multivariate analysis. Table 4 contains a full summary of these correlations. Correlations between the dependent and independent measures are typically discussed at this stage. However, interpreting the correlations between these measures offers little of substantive value in the current study. Because the dependent measure is overdispersed count data, the resulting Pearson correlation coefficients may be biased. This is due to the fact that Pearson correlations assume that the two measures being compared are both normally distributed (Chen & Popovich, 2002; de Vaus, 2002). The measure for *farm equipment theft* does not satisfy this requirement. For this reason, they do not accurately portray the relationship between it and the independent measures. Accordingly, the coefficients that are depicted in Table 4 between *farm equipment theft* and the independent measures should be viewed with caution.

Assessing correlations between the independent measures is useful in two regards. First, it allows for an understanding of the relationships that exist between the measures themselves. This is especially important due to the potential for the measures associated with each theory to be competing with one another. Recall that it was hypothesized that counties with strong agricultural economic structures may naturally feature structural characteristics conducive to "organization," as high levels of poverty, residential mobility and household instability may be less likely to be seen in these counties. Second, it provides an assessment of the potential for multicollinearity to be an issue in the multivariate analysis (Berry & Feldman, 1985). Multicollinearity exists when two

separate measures are gauging a similar phenomenon. Put differently, they are so closely associated with one another that they are essentially measuring or tapping the same concept. Including measures that are too highly associated with one another in the multivariate analysis creates the potential for biased coefficients (as standard errors are inflated) (Berry & Feldman, 1985).

In regards to whether routine activity theory and social disorganization theory compete against one another in the current study, bivariate correlations suggest that this may not be the case. Both *poverty* and *residential mobility* are positively-associated with *worker density*, *proportion farmland*, *total equipment value* and *average farm size*, whereas *household instability* and *ethnic heterogeneity* are positively associated with *proportion farmland* and *total equipment value*. It appears as if counties with strong agricultural economies are also likely to experience structural characteristics conducive to disorganization and a lack of informal social control. This suggests that the two theories may work together in explaining incidence of farm equipment theft. As such, the combined models featuring predictors associated with each theory should allow for a more thorough understanding of the two theory's applicability to such theft.

Table 4.

Bivariate Correlations

Measure	1	2	3	4	5	6	7	8	9	10
1. Farm Equipment Theft	--									
2. Poverty	.06	--								
3. Residential Mobility	.44***	-.11	--							
4. Household Instability	.11	.61***	.01	--						
5. Ethnic Heterogeneity	.14*	.04	.18**	.62***	--					
6. Population Density	.41***	-.41***	.58***	-.12*	.17*	--				
7. Worker Density	-.11	.23***	-.05	.33***	.28***	-.18**	--			
8. Proportion Farmland	.12*	.21***	.13*	.12*	-.10	-.17**	.30***	--		
9. Equipment Value	.39***	.16**	.33***	.05	-.08	-.01	.16**	.72***	--	
10. Average Farm Size	-.08	.38***	-.03	.54***	.34***	-.35***	.55***	.49***	.20**	--

Note: ***p<.00; **p<.01; *p.05

As evidenced in Table 4, multicollinearity appears to be an issue in the current study. Several sources suggest that Pearson correlation coefficients above .80 constitute the threshold for determining whether measures are too closely related to one another to be included separately in multivariate analyses (see Berry & Feldman, 1985; Kennedy, 2003 for examples). However, this threshold is conditional upon sample size, with smaller samples requiring a more conservative cutoff point (Berry & Feldman, 1985; Hansen, 2008). Because the current study is limited to 306 counties, a threshold of .60 may constitute a better gauge of the potential for multicollinearity to exist. Three separate relationships feature correlation coefficients above .60 in the current study: The relationship between *household instability* and *ethnic heterogeneity* (r=.62); the relationship between *household instability* and *poverty* (r=.61); and, the relationship between *proportion farmland* and *total equipment value* (r=.72).

In order to improve confidence in the findings of this study, decisions must be made regarding the inclusion of each of these measures in the multivariate analysis that is to follow. It is somewhat understandable that such a high correlation exists between *proportion farmland* and *total equipment value*. Because farms are dependent upon a wide array of machinery and tools for economic success, it should follow that higher proportions of farmland would entail higher values of equipment on operation at the county level. In line with this logic, it appears as if the two measures are tapping a similar phenomenon. A decision—based upon the theoretical framework being utilized—must be made as to which is more integral to the goals of the current study. Ultimately, each measure attempts to assess the prevalence of criminal opportunities in the form of attractive targets. Though *proportion farmland* is useful, *total equipment*

value is a better measure in this regard because it is a more proximate measure of the presence of the targets of farm equipment theft. The multivariate models to follow will not include the measure for *proportion farmland* based upon this logic.

A decision relating to the inclusion and exclusion of social disorganization measures is somewhat more difficult. Each of the two relationships features correlation coefficients that are close to falling under the threshold for inclusion in the multivariate analysis. With this in mind, it is important to conduct a preliminary investigation of collinearity diagnostics by assessing the performance of the measures in multivariate models. This is achieved by running an ordinary least squares (OLS) regression model including only the four social disorganization measures. The most commonly used diagnostics of multicollinearity in OLS models are tolerance values and values for the variance inflation factor (VIF) (Mansfield & Helms, 1982; O'Brien, 2007).

Traditionally, tolerance values below .20 and VIF values above 10 are suggestive of the existence of multicollinearity (Menard, 1995; Neter, Wasserman & Kutner, 1989). Preliminary investigation of collinearity diagnostics in the multivariate models reveals a relatively low tolerance value (.27) for *household instability*.[5] Its inclusion contributes to relatively low tolerance values for both *residential mobility* and *poverty* as well. Moreover, the standard error associated with the coefficient for *household instability* is quite large. Some researchers have suggested that large standard errors are an additional indicator of multicollinearity (Grapetine, 2000; Grewal, Cote & Baumgartner, 2004). Hence, though the tolerance value is not below the .20 threshold, the proximity of it to this threshold—in combination with the abnormally large standard error of the

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[5] Tolerance values were assessed utilizing ordinary least squares regression, as negative binomial regression does not present the opportunity to determine whether multicollinearity is an issue of concern.

coefficient—suggests that multicollinearity is likely a problem. As such, the removal of household instability from the multivariate models appears to be justifiable.[6] Having discussed the bivariate correlations, the non-competing nature of the two theories, and the removal of two measures (*proportion farmland* and *household instability* from the analysis due to multicollinearity issues, attention is now turned to the multivariate analysis.

Multivariate Analysis

Step three of the analysis involves the presentation of five negative binomial regression models designed to discern the influence that the independent theory-based measures have upon incidence of *farm equipment theft*. The initial model assesses the influence of the routine activity measures on theft incidence. The second focuses upon the relationship between theft incidence and the social disorganization measures. The third is a combined model that simultaneously regresses measures from both theories upon the dependent measure. This model will allow for a more conclusive understanding of the support for the study's main hypotheses, as the influence of each measure is examined while controlling for the effects of predictors associated with the other theory. The fourth model is a combined model with the addition of interactions between the social disorganization measures. This model is designed to test the hypothesis that measures will work in conjunction with one another to further influence farm equipment theft above and beyond their own unique impacts. The fifth and final model retains all unique predictors, in addition to any significant social disorganization interaction terms, while adding interaction terms between the routine activity measures and social

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[6] Alternative models employing the *household instability* measure were tested in order to ensure that removing it provided the best means by which to test the applicability of social disorganization theory to farm equipment theft. *Household instability* was non-significant in each of these models.

disorganization measures. This model will allow for a test of the final hypothesis—that elements of the two theories will work together to influence incidence of farm equipment theft.

Model One—Routine Activity Measures

A summary of the results for the initial negative binomial model can be found in Table 5. This model is designed to test the following hypotheses:

1. Counties featuring farms of higher average acreage will experience higher counts of farm equipment theft than those featuring farms of lower average acreage.

2. Counties featuring higher levels of population density will experience higher counts of farm equipment theft than counties featuring lower levels of population density.

3. Counties featuring a higher on-average number of hired workers per farm will experience a higher count of farm equipment theft than counties featuring a lower on-average number of hired workers per farm.

4. Counties featuring a higher aggregate value of farm equipment on farming operations will experience higher counts of theft compared to those counties featuring a lower aggregate value of equipment on farming operations.

Findings related to the model provide an initial indication as to whether these hypotheses are supported by the data. However, they should be viewed with caution, as the model does not control for the potential impact of social disorganization measures upon theft incidence. As such, a more complete understanding of the support for these hypotheses will be provided by the combined model.

Prior to a discussion of the specific findings, it is important to provide a brief overview of both the suitability of the model and model fit. In relation to suitability, two issues must be addressed: 1) the appropriateness of employing a negative-binomial model (as opposed to a Poisson model); and 2) the results of the likelihood ratio chi-square ($\chi2$) test. Discerning whether a negative binomial model best fits the data is achieved by assessing the dispersion parameter (α) (Cameron & Trivedi, 1998). An α value that is larger than zero "0" suggests that the dependent measure is overdispersed, and that a negative binomial model fits the data better than a Poisson model. The α parameter for the current model is .52. Based upon the results of the prob>$\chi2$ test ($\chi2$=1632.18; p<.00), this value is significantly larger than zero. Thus, the negative binomial model is appropriate.

The second consideration of model suitability requires an assessment of the likelihood ratio chi-square test. The likelihood ratio is calculated by the following formula (Hilbe, 2007; Schwarz, 1978):

$$\text{Likelihood ratio} = -2\,(L_{\text{Reduced}} - L_{\text{Full}})$$

Where L_{Reduced} represents the likelihood statistic of the intercept-only model and L_{Full} represents the likelihood statistic for the model with predictors included. The computed likelihood ratio for the current model is 135.76. Based upon the significance of the likelihood ratio chi-square test (χ^2=135.76; p<.00), this value indicates that at least one of the four routine activity measures is a statistically significant predictor of the dependent measure. Consequently, the model is of value in better understanding farm equipment theft incidence.

Model fit is assessed by utilizing the Bayesian Information Criterion (BIC). The BIC is calculated in the following manner (Hardin & Hilbe, 2012):

$$BIC_£ = -2L + \rho\ln(n)$$

Where ρ represents the total number of independent measures included within the model (inclusive of the intercept), $-2L$ represents the -2 log likelihood, and (n) represents the total number of cases or observations. Lower BIC values are suggestive of better overall model fit (Hilbe, 2007). The current model features a value of 2168.44 for the BIC. This value will be compared to the BIC values for the combined models in order to discern whether adding predictors improve the ability to predict incidence of farm equipment theft.

Table 5.

Routine Activity Theory Negative Binomial Model

Measure	β	SE	p>|z|
Worker Density	-0.86	0.52	0.10
Average Farm Size	0.00	0.00	0.52
Population Density	0.37**	0.05	0.00
Equipment Value	0.01**	0.00	0.00
-2 Log Likelihood	-1067.08		
ln α	-0.65		
α	0.52**		
LR χ^2	135.76 (p<.00)		
BIC	2168.44 (df=6)		

Note: *p<.05; **p<.00

The results of the initial model suggest a lack of support for the first hypothesis, as *average farm size* is not a statistically-significant predictor of *farm equipment theft* (β=.00; p=.52). However, support is found for the second hypothesis, as *population density* features a significant and positive relationship with theft incidence (β=.37; p<.00). This indicates that counties featuring higher levels of population density are likely to experience higher incidence of farm equipment theft. In relation to the third hypothesis, the results indicate that the impact of *worker density* (β=-1.15; p=.10) on theft is opposite of that which was predicted, though the measure is not statistically-significant. As such, this model fails to find support for the hypothesis. Finally, the fourth hypothesis appears to be supported by the results of the initial model, as *total equipment value* is a statistically-significant and positive predictor (β=.01; p<.00) of *farm equipment theft*. This indicates that counties with higher total values of equipment contained within them are more likely to suffer from theft than those featuring lower aggregate values of equipment. In sum, the initial model renders mixed results in relation to the applicability of routine activity theory to explain farm equipment theft at the macro level, as only two of the four hypotheses are supported.

Model Two—Social Disorganization Measures

A summary of the results for the second negative binomial model can be found in Table 6. This model is designed to test the following hypotheses relating to the potential applicability of social disorganization theory to farm equipment theft:

1. Counties featuring a higher percentage of their residents residing in poverty will not feature higher incidence of farm equipment theft than counties featuring a lower percentage of residents residing in poverty.

2. Counties featuring higher levels of residential mobility will experience higher incidence of farm equipment theft than counties featuring lower levels of residential mobility.

3. Counties featuring a more ethnically heterogeneous population will experience higher incidence of farm equipment theft than do counties featuring a more racially homogenous population.

Similar to the initial routine activity model, the results of the second model provide an initial understanding of the support for these hypotheses. However, a more meaningful understanding will be provided in the combined model to immediately follow.

Model diagnostics suggest that negative binomial regression is suitable for the current analysis. The significance ($\chi2=2095.31$; $p<.00$) of the dispersion parameter ($\alpha=-.48$) indicates that the dependent measure is overdispersed and that a Poisson model is not appropriate. Furthermore, the likelihood ratio is statistically-significant (LR $\chi2=91.79$; $p<.00$), suggesting that at least one of the social disorganization measures is a statistically-significant predictor of farm equipment theft incidence. Also of note, the model features a value of 2206.69 for the BIC. As was the case with the routine activity model discussed above, this value will be compared to the corresponding value in the combined model to discern whether additional predictors provide a better overall understanding of theft incidence.

Table 6.

Social Disorganization Theory Negative Binomial Model

Measure	β	SE	p>|z|
Poverty	0.04**	0.01	0.00
Residential Mobility	0.07**	0.00	0.00
Ethnic Heterogeneity	0.30	0.28	0.30
-2 Log Likelihood	-1089.06		
ln α	-0.49		
α	0.62**		
LR χ^2	2095.31 (p<.00)		
BIC	2206.69		

Note: **p<.00

Results of the model suggest that the initial hypothesis regarding the influence of poverty on theft incidence is not supported. Contrary to what was predicted, *poverty* (β=.04; p<.00) is a statistically-significant predictor of *farm equipment theft* in the model. The positive nature of the relationship suggests that counties suffering from higher levels of poverty are also more likely to experience higher incidence of farm equipment theft. Support is found for the second hypothesis regarding the impact of mobility on theft. Results indicate that counties featuring higher levels of *residential mobility* also feature higher theft counts than those with a more stable population (β=.07; p<.00). Finally, the analysis shows a lack of support for the final hypothesis. Though the direction of the relationship is in the expected direction (positive), a statistically-significant relationship between *ethnic heterogeneity* and *farm equipment theft* is not present (β=.30; p=.30).

Similar to the routine activity model, the social disorganization model features mixed results, as only one of the hypotheses is supported by the results. However, the findings do appear to be supportive of the social disorganization literature. The statistical-significance and positive direction of *poverty* is in line with the core tenets of the theory. Furthermore, *ethnic heterogeneity*—though not significant—appears to influence *farm equipment theft* in the appropriate direction. This suggests that the theory may have applicability to such theft.

Model Three—Combined Model

The third negative binomial model serves as a combined test of the two theories. All seven predictors are simultaneously regressed upon the dependent measure. Accordingly, the results of the model provide a better means by which to gauge the merits of the study's hypotheses. A full summary of the results of this combined model can be found in Table 7. Model diagnostics reveal that negative binomial regression constitutes a better means of analysis than Poisson regression (α=.41; $\chi2$=1289.67; p<.00). In addition, the likelihood ratio is significant (LR $\chi2$=203.60; p<.00), suggesting that at least one of the included measures is a statistically significant predictor of farm equipment theft incidence.

Table 7.

Combined Negative Binomial Model

Measure	B	SE	p>|z|
Worker Density	-1.44**	0.51	0.00
Average Farm Size	-0.00**	0.00	0.00
Population Density	0.32**	0.06	0.00
Equipment Value	0.01**	0.00	0.00
Poverty	0.07**	0.01	0.00
Residential Mobility	.02*	.01	0.04
Ethnic Heterogeneity	1.10*	0.28	0.02
-2 Log Likelihood	-1033.16		
ln α	-0.89		
α	0.41**		
LR χ^2	203.60 (p<.00)		
BIC	2117.74		

Note: *p<.05; **p<.00

Prior to interpreting the results of the current model, it is useful to compare it to each of the standalone models previously discussed. Doing so is achieved by comparing the BIC values for each model. The combined model features a value of 2117.74 for the BIC. As previously mentioned, lower BIC values are indicative of better model fit. Both standalone models featured BIC values (BIC $_{\text{Routine Activity Theory}}$=2168.44; BIC $_{\text{Social}}$

Disorganization Theory= 2206.69) that are larger than seen for the combined model. This suggests that combining measures associated with both theories allows for a better understanding of farm equipment theft incidence. However, differences in BIC values should be interpreted in accordance with the magnitude of difference that is present (Hardin & Hilbe, 2012). Raftery (1995) suggests the following: A difference of 0-2 represents a "weak" preference for the more complex model, a difference of 2-6 represents a "positive" preference, a difference of 6-10 represents a "strong" preference, and a difference greater than 10 represents a "very strong" preference for the more complex model. The BIC for the combined model features a difference greater than 10, providing support for its superiority to the two standalone models.

Unlike the results seen in each of the separate models discussed above, all measures included within the combined model are statistically-significant. This suggests that controlling for the measures associated with the alternative theory renders each of the measures that are not statistically-significant in the prior models influential in farm equipment theft incidence.

The routine activity relationships present in the single-theory model remain consistent in terms of direction. Both *population density* (β=.32; p<.00) and *total equipment value* (β.01; p<.00) appear to increase incidence of theft, even when controlling for elements of social disorganization theory. As previously discussed, these findings are supportive of the study's hypotheses. Although *average farm size* and *worker density* are not statistically-significant in the standalone routine activity model, they do exhibit such relationships with *farm equipment theft* in the combined model. However, the direction of these relationships is counter to that which was hypothesized

based upon the literature on farm equipment theft at the micro-level. The combined model suggests that counties with higher levels of *worker density* (β=-1.44; p<.00), and larger on-average farms (β=-.00; p<.00) experience lower incidence of farm equipment theft. Micro-level researchers suggest that the presence of workers entails exposure to motivated offenders, and that larger farms are more susceptible to victimization due to difficulties in providing surveillance for larger properties. The results detailed here indicate that this may not be the case at the macro level. These findings—and the theoretical rationale for them—will be expounded upon in the discussion section.

Both *poverty* and *residential mobility* are found to be statistically-significant, positive predictors of *farm equipment theft* in the standalone social disorganization model. Similar findings are exhibited in the combined model. As previously discussed, *residential mobility's* (β=.02; p<.05) positive impact upon theft incidence is supportive of the study's hypothesis. However, it was hypothesized (based upon the results of past research) that *poverty* would have no impact upon theft incidence. The statistically-significant relationship witnessed in the combined model (β=.07; p<.00) further suggests a lack of support for this hypothesis. It appears as if poverty may indeed play a role in farm equipment theft incidence at the macro-level.

Ethnic heterogeneity is found to have no influence on theft incidence in the standalone social disorganization model (contrary to the study hypothesis). However, once routine activity measures are taken into account, a statistically-significant relationship is present (β=1.10; p<.05). This model indicates that counties which are more heterogeneous tend to experience higher incidence of farm equipment theft. This finding is supportive of the hypothesis that higher rates of farm equipment theft would

occur in less homogenous counties. In sum, although all measures are statistically-

significant predictors of *farm equipment theft*, the combined model provides mixed

support for the study's hypotheses. Only four of the seven hypotheses are backed by the

results of the model.

Though the results of the combined model allow for a better assessment of the

viability of the study hypotheses, two questions remain to be answered. That is, do

interactions exist between the social disorganization measures themselves, and/or

between social disorganization and routine activity measures? The next model presented

includes three interaction terms between the social disorganization measures. This is

followed by a presentation of the results for a fifth and final model, which includes an

exploration of interactions between the social disorganization and routine activity

measures.

Model Four—Combined Model with Social Disorganization Interactions Included

Model four is designed to test the hypothesis that social disorganization measures

will exhibit interactive effects in relation to incidence of farm equipment theft. Three

separate interaction terms are included within model four: 1) The interaction between

poverty and *residential mobility*; 2) the interaction between *residential mobility* and

ethnic heterogeneity; and 3) the interaction between *ethnic heterogeneity* and *poverty*.

The results of this model can be found in Table 8.

Table 8.

Combined Negative Binomial Model with Social Disorganization Interactions

Measure	B	SE	p>|z|
Worker Density	-1.46**	0.51	0.00
Average Size	-0.00**	0.00	0.00
Population Density	0.36**	0.07	0.00
Equipment Value	0.01**	0.00	0.00
Poverty	0.07**	0.01	0.00
Residential Mobility	0.02*	0.01	0.02
Ethnic Heterogeneity	0.95**	0.29	0.00
Heterogeneity x Poverty	0.07	0.05	0.19
Poverty x Mobility	0.00	0.00	0.63
Mobility x Heterogeneity	-0.07	0.04	0.12
-2 Log Likelihood	-1030.57		
ln α	-0.91		
α	0.40**		
LR χ^2	208.79 (p<.00)		
BIC	2129.70		

Note: *p<.05; **p<.00

     As is the case with all previous models, the combined model with social disorganization interactions included is best analyzed through means of negative binomial regression (α=.40; χ^2=1232.80; p<.00). Moreover, at least one of the included

predictors continues to be statistically-significant (LR χ^2=208.79; p<.00). The model

features a value of 2129.70 for the BIC. This value can be compared with the BIC value

for the combined model without interaction terms (BIC=2117.74) in order to discern

whether the inclusion of interaction terms improve our understanding of farm equipment

theft incidence. Because the BIC for the current model is higher than that seen when

interaction terms are not included, it can be surmised that the inclusion of the three

interaction terms do not constitute such an improvement.

Of note, inclusion of the social disorganization interaction terms does not alter the

significance or direction of the relationships between the other measures and incidence of

farm equipment theft. Potentially foreseeable due to the lack of improved model fit—and

contrary to the expectations laid out in the hypotheses—none of the included interaction

terms are statistically significant predictors of farm equipment theft. Though each of the

social disorganization measures maintain their significant main effects on theft incidence,

they do not appear to have any additive effects when working in conjunction with one

another. Hence, no support is found for the hypothesis that this would be the case. With

this in mind, these interactions will not be included in the model to follow.

Model Five—Combined Model with Interactions between Theories Included

The final model is designed to test the hypothesis that routine activity measures

and social disorganization measures will work in conjunction to influence farm

equipment theft incidence, above and beyond their own unique impacts. Doing so

requires creating interaction terms between these measures and including them with the

nine standalone predictors. Because there are a large number of possible interaction

terms, they are included piecemeal and removed if no statistically-significant impact is

present. The final model includes only those interaction terms which are found to have a significant impact upon theft incidence: The interaction between *residential mobility* and *average farm size*, and the interaction between *residential mobility* and *worker density*.

The alpha value associated with this model ($\alpha=.40$; $\chi^2=1197.29$; p<.00)—as was the case with all other models employed—indicates that negative binomial regression is the most appropriate means of analysis. In addition, the likelihood-ratio (LR $\chi^2=211.82$; p<.00) suggests that at least one of the included measures continues to be a statistically-significant predictor of farm equipment theft incidence. The final model features a value of 2120.95 for the BIC statistic. This value is slightly higher than the BIC statistic present in the combined model without interaction terms included (BIC=2117.74). Thus, it appears as if the addition of the two interaction terms does not improve overall model fit, and thus does not necessarily offer a significantly improved understanding of farm equipment theft incidence.

Though improved fit is not present, it may still be useful to discuss the findings of the model, as they provide unique insight into the potentially complementary nature of the two theoretical premises. A complete summary of the results can be found in Table 9. The model is consistent with the results of the prior model without interaction terms, as all main effects retain their statistical significance and direction of influence.

Table 9.

Combined Negative Binomial Model with Interactions between Routine Activity

Measures and Social Disorganization Measures Included

Measure	B	SE	p>|z|
Worker Density	-2.35**	0.60	0.00
Average Size	-0.00*	0.00	0.02
Population Density	0.34**	0.06	0.00
Equipment Value	0.01**	0.00	0.00
Poverty	0.06**	0.01	0.00
Residential Mobility	0.02*	0.01	0.04
Ethnic Heterogeneity	1.08**	0.28	0.00
Mobility x Worker Density	-0.27*	0.10	0.01
Mobility x Average Size	0.00*	0.00	0.02
-2 Log Likelihood	-1029.05		
ln α	-0.93		
α	0.40**		
LR χ^2	211.82 (p<.00)		
BIC	2120.95		

As mentioned above, two interaction terms are found to have a statistically-significant impact upon incidence of farm equipment theft: 1) The interaction between *residential mobility* and *average farm size* (β=.00; p<.05); and 2) the interaction between *residential mobility* and *worker density* (β=-.27; p<.01). The significant and positive interaction between *residential mobility* and *average farm size* suggests that average farm size moderates the relationship between mobility and theft incidence. *Residential mobility* features a positive main effect on incidence of theft in the model. Thus, it appears as if the positive impact of residential mobility on farm equipment theft is exacerbated in counties featuring larger on average farms. This finding is unique due to the fact that *average farm size* features a negative main effect on incidence of theft. The implications of the contradictory nature of the findings relating to the influence of average size are addressed in the discussion section.

The interaction between *residential mobility* and *worker density* indicates a significant and negative effect on incidence of farm equipment theft. As mentioned, *residential mobility* has a positive impact upon theft incidence in the model. On the other hand, *worker density* features a negative relationship with theft incidence. The negative nature of the interaction terms suggests that counties characterized by higher levels of worker density, and higher levels of residential mobility, experience lower levels of theft. Accordingly, it appears as if worker density may serve to partially mitigate the role of residential mobility in increasing incidence of theft. This too is elaborated upon in the discussion section. Because the current study employs several models in order to test its hypotheses, it is important to briefly review the findings prior

to discussing their relevance to both routine activity theory and social disorganization theory.

Summary of Findings

This dissertation tests a number of hypotheses related to the applicability of routine activity theory and social disorganization theory to understanding the incidence of farm equipment theft at the macro level. It does so by utilizing five negative binomial regression models. The first model, designed to assess the influence of routine activity measures upon *farm equipment theft*, provides mixed results for the dissertation's hypotheses. Both *total equipment value* and *population density* are found to increase incidence of theft, as predicted. However, *worker density* and *average farm size* are non-significant predictors in the model, contrary to expectations. The second model— designed to test the applicability of social disorganization measures to theft incidence— features similarly mixed results. *Residential mobility* is the only measure that performs as hypothesized, with results indicating that it serves to increase theft. *Poverty* was hypothesized to share no relationship with incidence of theft. However, it is a statistically-significant, positive predictor in the model. *Ethnic heterogeneity*, counter to that which was hypothesized, is non-significant in the model.

Results of the combined model suggest that all measures are statistically-significant predictors of *farm equipment theft*. With that said, they do not all behave in the manner that was predicted, rendering mixed support for the dissertation's hypotheses. *Total equipment value*, *population density*, *residential mobility*, and *ethnic heterogeneity* are all positively-associated with the dependent measure, indicating that they serve to increase theft. These findings are in line with that which was predicted in the respective

hypothesis for each measure. *Average farm s*ize and *worker density* are negatively-associated with theft incidence, counter to that which was hypothesized. Finally, *poverty* is found to increase incidence of theft. It was contended that *poverty* would have no relationship with *farm equipment theft*, rendering a lack of support for this hypothesis.

The combined model with interaction terms between social disorganization measures included fails to provide support for the hypothesis that multiplicative effects would exist between these measures. Though the main effects maintain consistent with the combined model, none of the included interaction terms are statistically-significant. However, the final model—a combined model with interactions between routine activity and social disorganization measures included—suggests that interactions do exist between measures associated with each theory. The interaction between *residential mobility* and *worker density* is statistically-significant and negative in orientation, suggesting that *worker density* serves to temper the impact of *residential mobility* upon farm equipment theft. The interaction between *residential mobility* and *average farm size* is statistically-significant and positive in orientation. This indicates that the impact of *residential mobility* upon theft incidence is greater in counties that feature larger on-average farms. All main effects remain consistent in terms of statistical-significance and orientation in this final model. Having provided an overview of the results of the analysis, attention is turned to a discussion of these findings. Specifically, focus is placed upon understanding them from a theoretical framework. In addition, implications relating to theory and policy are addressed, as are study limitations and concluding remarks.

CHAPTER SIX: DISCUSSION AND CONCLUSION

The purpose of this dissertation is to discern whether routine activity theory and social disorganization theory are applicable to our understanding of farm equipment theft at the macro level. A series of hypotheses associated with each theory were developed and tested utilizing data from three separate sources: The National Incident Based Reporting System, the United States Census, and the Census of Agriculture. Measures designed to capture aspects of each theory were created from this data, and regressed upon incidence of farm equipment theft. Results of the multivariate negative binomial models suggest that the two theories are useful in explaining incidence of theft. This chapter discusses the findings of the study, and attempts to expound upon them from a theoretical vantage point. In addition, it provides an overview of the implications that can be derived from the findings, the limitations associated with the study, directions for future research, and concluding remarks.

Routine Activity Theory

At the macro level, routine activity theory suggests that aggregate patterns in movement and production characteristics serve to influence the number of criminal opportunities present within a geographical area (Cohen & Felson, 1979). Past research has found support for the theory in relation to a variety of crime types (Bennett, 1991; Cohen & Felson, 1979; Copes, 1999; Messner & Blau, 1987). Thus, it was hypothesized that it may have applicability to the crime of farm equipment theft. This notion is supported by research on theft at the micro level (i.e., individual farming operations),

which tends to find that certain characteristics make farms more likely to suffer from theft victimization (Bunei, Rono & Chessa, 2013; Mears, Scott & Bhati, 2007). As discussed in the review of the literature, these characteristics (e.g., farm size, presence of workers, and proximity to offenders) can all be understood from a routine activity framework. The current study sought to identify measures that could be associated with routine activity theory at the macro level, and examine their impact upon incidence of farm equipment theft. Results of the analysis are supportive of the theory's application to the problem. In order to best understand the findings, it is important to discuss them in relation to each of the hypotheses tested in the analysis.

The initial hypothesis posited that counties featuring farms of higher average acreage would experience higher counts of farm equipment theft than those featuring farms of lower average acreage. This hypothesis was based upon the findings of micro-level studies. Multiple studies have found that large farms are at greater risk of victimization than small farms (Dunkelberger, et al., 1992; Farmer & Voth, 1998; Mears, Scott & Bhati, 2007). This conclusion is perhaps best understood from a guardianship perspective. Guardianship entails a concerned party taking proactive steps to watch over property that they have some investment in, such as a home owner maintaining a watchful eye over his or her possessions (Cohen & Felson, 1979; Felson, 1995). Large farms may present complications in this regard, as it is more difficult to provide surveillance over large areas of land. It would follow that motivated offenders are more likely to find attractive targets lacking in guardianship on farms of greater acreage.

The findings of the current study, however, fail to provide support for the hypothesis that average farm size is positively-associated with farm equipment theft. In

fact, all models that include the measure suggest that counties with larger on-average farms suffer from fewer theft incidents than those with smaller, on average farms, controlling for other predictors. Whereas larger farms may impede effective surveillance, they may also work to the advantage of the farm operator due to the fact that equipment can be stored beyond the view of passing motorists and individuals living in homes located along the perimeter of the property. In other words, larger farms may create the potential for areas of land to exist that are beyond the awareness space of motivated offenders. Should the farm operator store equipment in locations that are hidden from view, it may be less likely that offenders will become aware of these targets (even when they are lacking in guardianship). This logic may explain the findings of the current study.

The second routine activity hypothesis posited that counties featuring higher levels of population density would also experience higher incidence of farm equipment theft. This hypothesis is supported by the results of the analysis. Understanding the impact of population density from a routine activity framework is somewhat complex due to the fact that it can theoretically be hypothesized to increase or decrease criminal offending. High-density areas feature more individuals interacting with the built environment on a regular basis. Increased interaction may culminate in more criminal opportunities being within the awareness space of offenders (Wilcox, Land & Hunt, 2003). For example, the higher the number of potential offenders within an area, the more likely an unguarded property may be burglarized. On the other hand, high levels of population density may present the potential for increased guardianship (Copes, 1999; Felson, 1994). Guardianship is dependent upon surveillance by both invested parties and

others who may happen to be in the vicinity at the time. It would follow that surveillance—and as a result, guardianship—may be increased when more individuals are present.

In relation to the current problem, it appears as if population density serves to increase farm equipment theft prevalence—indicating that high density areas may present higher potential for motivated offenders to become aware of farm equipment that is left unguarded. This may be due to the geographical placement of farms, as they are typically located outside of populated business and housing districts. Even though a county may be densely-populated, the targets in which the offenders are acting upon are generally not within the surveillance area of a significant number of people. Nonetheless, they may still be located within the awareness space of offenders. Recent trends in housing have left many farms in proximity to housing developments located outside of population centers (Brown, Johnson, Loveland & Theobald, 2005; Knight, Wallace & Riebsame, 1995; Redman & Foster, 2008). Consequently, they are located along roadways that experience a larger volume of daily traffic than was the case in the past (Barclay & Donnermeyer, 2011). Most individuals traversing these roadways have no inclination to offend. However, some who are predisposed may become aware of an attractive target as a result of their daily commute. This target can then be acted upon if the motivated offender perceives guardianship to be lacking.

Additionally, high population density may also present increased potential for specialized offenders to become aware of theft opportunities. Though no study to date has examined the motivations and characteristics of individuals who commit farm equipment theft, it is likely that some individuals and/or groups specialize in such theft.

For example, recent years have seen law enforcement organization uncover numerous theft rings that focus primarily upon agricultural goods (e.g., equipment, livestock).[7] Furthermore, the National Equipment Register (2013) suggests that areas featuring large amounts of equipment and high levels of population density are likely to witness the emergence of theft rings seeking to take advantage of these conditions. Thus, it is possible that densely-populated areas are not only more likely to present opportunities for everyday offenders, but for those specializing in theft of farm equipment as well.

Regardless, a relationship between population density and farm equipment theft at the macro level emerges in the current work, suggesting that counties with higher levels of population density suffer from higher levels of theft. Findings from micro-level studies offer additional support for this assessment. Locations near densely-populated areas are consistently found to increase an individual farming operations' risk of being victimized (Bunei, Rono & Chessa, 2013; George Street Research, 1999). This suggests that these farms are within the awareness space of more motivated offenders than are farms located in less-populated areas. The current study's findings—that population density at the macro-level serves to increase aggregate theft incidence—offers continued support for this notion.

The third routine activity hypothesis predicted that worker density would increase incidence of farm equipment theft. In other words, it posited that counties with a higher number of average workers per farm would experience higher counts of theft. This hypothesis is not supported by the results of the analysis. On the contrary, worker density is found to be negatively associated with theft incidence. Counties with higher

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[7] A simple google search reveals numerous news stories dedicated to law enforcement agencies uncovering farm equipment theft rings across the United States in recent years.

levels of worker density appear to experience reduced counts of farm equipment theft, controlling for other relevant predictors.

The hypothesis that worker density would be positively associated with theft is based upon the results of past attempts to understand farm equipment theft at the micro level. Studies on the whole have found that farms employing workers are at a greater risk of theft victimization than those operated solely by the owner and his or her family members (Dunkelberger et al., 2013; Mears, Scott & Bhati, 2007; McCall, 2003). From a routine activity perspective, this finding would advocate that employing workers increases the proximity of attractive targets to motivated offenders. In other words, more individuals will be aware of the equipment present on a farm; some of whom may be inclined to commit theft themselves or to notify others of its whereabouts and a deficiency in guardianship. The lack of support present in the current study indicates that this assumption may not be accurate at the macro level.

The negative association between worker density and farm equipment theft may be best understood from a guardianship perspective. Whereas employing workers may increase proximity to potential offenders, it may also present the possibility of increased guardianship. Workers who are invested in the well-being of a farm and its operator(s) are likely to take a proactive approach in ensuring that equipment is maintained in a secure manner. Put differently, they may take steps to prevent theft by providing surveillance and/or ensuring that equipment is properly stored in a protected environment (e.g., locked barns). This premise is in line with the notion of place management developed by Eck (1994).

Place managers are individuals who provide guardianship over a location as a result of their position (Clarke & Bichler-Robertson, 1998; Eck, 1994; Mazerolle, Kadleck & Roehl, 1998). For example, a hotel clerk is not only tasked with performing administrative tasks and ensuring guest satisfaction, but also with ensuring that no unwanted persons enter onto the premises. Should they be made aware of such persons, the clerk will either confront them or contact the appropriate authorities. By doing so they are providing guardianship over the property. Likewise, farm workers may also provide guardianship over a farming operation and its equipment. If questionable persons are seen along the perimeter of the property, the worker can confront the individual or notify the property owner. The worker can also take proactive steps to ensure that equipment is returned to a secure location at the end of each workday, or to suggest increased security measures should they believe current practices are lacking. In essence, it is likely much easier to secure equipment when multiple parties are working together to provide effective guardianship.

The fourth and final routine activity hypothesis predicted that counties featuring a higher total value of equipment on farming operations would experience higher counts of theft, compared to those counties on the opposite end of the spectrum. This hypothesis is supported by the results of the analysis. Total equipment value is positively associated with theft incidence in all models utilizing it as a measure. From a routine activity perspective, higher total values of equipment suggest the presence of more attractive targets (as the measure is a gauge of the amount of equipment present within a county). Past attempts to explore the applicability of routine activity theory at the macro level have found that areas featuring more attractive targets are at the greatest risk of

experiencing crime (see Copes, 1999 for an example). This appears to be the case in relation to farm equipment theft as well. Even when controlling for indicators of social disorganization—as well as measures targeting guardianship and proximity—it appears as if theft prevalence is influenced by the sheer number of opportunities present within a county.

In sum, the current analysis provides mixed support for the routine activity theory hypotheses. Only two of the four hypotheses—the hypothesis relating to population density and the hypothesis relating to total equipment value—are backed by the results of the multivariate models. However, the contradictory findings for average farm size and worker density can both be explained from a theoretical perspective. As such, it appears as if routine activity theory is applicable to our understanding of farm equipment theft.

Social Disorganization Theory

Social disorganization theory was initially conceptualized by Shaw and McKay (1942) as a means of explaining the distribution of juvenile delinquency in Chicago and other metropolitan areas in the early to mid-1900s. The researchers found that communities in which delinquency was most prevalent tended to feature similar structural characteristics. These communities claimed higher proportions of their residents residing in impoverished conditions, high rates of mobility, and an ethnically-heterogeneous population. Shaw and McKay (1942) posited that these conditions worked to promote offending in two distinct ways. First, they created an environment in which a deviant culture was transmitted from one generation to the next. Second, they led to disorganization within the community, rendering informal control difficult to establish. Though both hypotheses have been explored over the years, modern incarnations of

social disorganization theory tend to focus upon the lack of informal social control that is present in "disorganized" communities, and are thus rooted solely in the control framework advocated by Kornhauser (1978).

The creation of the systemic model (Kasarda & Janowitz, 1974) of social disorganization—as well as the utilization of collective efficacy (Sampson, Raudenbush & Earls, 1997) as the mediating mechanism between structure and crime—has allowed researchers to further develop Shaw and McKay's (1942) initial conceptualization. Due to data limitations, attempts to explore the relationship between social disorganization and crime outside of metropolitan areas tend to rely solely upon structural characteristics as a means of examining whether disorganization—and thus a lack of informal social control—contributes to a higher prevalence of offending (Bouffard & Muftic, 2006; Osgood & Chambers, 2000; Petee and Kowalski, 1993).[8] The limited amount of research focused on the matter offers support for the theory's application to these nonmetropolitan areas.

The current study seeks to discern whether social disorganization theory is generalizable to a form of offending unique to nonmetropolitan environments—the crime of farm equipment theft. Hypotheses were derived from past applications of the theory to these environments, and focused upon the potential relationships that exist between the structural conditions associated with social disorganization and incidence of theft. On the

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[8] Relatively few studies have been able to test the systemic model in rural areas. For example, Kaylen and Pridemore (2013) utilized data from British Crime Survey to assess the potential for community organization to constitute the intervening variable between structural characteristics and crime in rural communities. Similarly, Chilenski, Syvertsen & Greenberg (2015) assessed the potential for social trust and collective efficacy to mediate the relationship between structure and crime in a handful of rural communities in Iowa and Pennsylvania. Though these studies are beneficial, they rely upon the availability of data that allows for the measurement of mediating mechanisms. To date, such data is not attainable for a large number of communities (or counties in the case of the current work).

whole, support is found for the application of social disorganization theory to the problem, suggesting that a lack of informal social control contributes to increased incidence of farm equipment theft. This support is discussed in relation to each of the study hypotheses.

The initial social disorganization hypothesis predicted that poverty would not have a significant impact upon incidence of farm equipment theft. This hypothesis was based upon the results of past attempts to explore social disorganization theory outside of metropolitan areas. These attempts feature mixed results in relation to the impact of poverty, with some researchers suggesting that poverty may impact rural areas differently than urban locales (where poverty is consistently found to be positively-related to crime) (Bouffard & Muftic, 2006; Osgood & Chambers, 2000). Specifically, they suggest that rural areas may not experience higher rates of crime solely as a result of higher prevalence of poverty, as they are somewhat protected from its negative impact due to other societal factors. Contrary to the study hypothesis, poverty is found to be significantly and positively related to farm equipment theft incidence in the current study. It appears as if counties featuring a higher percentage of their residents residing in poverty are at greater likelihood of experiencing farm equipment theft than their less-impoverished counterparts, when controlling for other relevant factors.

It may be worthwhile to note that the changing nature of rural communities may have some influence upon the relationship between poverty and rates of offending (Donnermeyer, Jobes & Barclay, 2006). Rural communities have historically been perceived to feature higher levels of cohesion than their urban counterparts (Elder & Conger, 2014; Wilkinson, 1991). This cohesion has likely guarded against the impact of

poverty upon crime. In the past, those rural areas suffering from high levels of poverty

were relatively uniform in terms of household income (Donnermeyer, Jobes & Barclay,

2006). Put differently, the majority of individuals residing in these communities shared

an economically-marginal status. However, recent decades have seen an attenuation of

the division between urban and rural America (Lichter & Brown, 2011), as suburbs are

now located further from inner-city areas (Dwyer & Childs, 2004).[9] This attenuation

may create scenarios in which class heterogeneity is more common, with divisions

existing between the majority of rural residents and those who are of higher

socioeconomic status (Donnermeyer, Jobes & Barclay, 2006). Because this is an

impediment to cohesion, the potential exists for poverty to influence rates of rural

offending in a manner similar to urban offending in modern America. This logic may

explain the positive impact of poverty upon incidence of farm equipment theft witnessed

in the current study, though much more work needs to be done in this area of research.

The second social disorganization hypothesis predicted that residential mobility

would be positively associated with incidence of farm equipment theft. Past attempts to

explore social disorganization theory in nonmetropolitan areas consistently find that

counties with less stable populations are at greater likelihood of experiencing a variety of

crime types (Bouffard & Muftic, 2006; Osgood & Chambers, 2000; Petee & Kowalski,

1993). This finding appears to be generalizable to farm equipment theft as well, as

residential mobility is positively associated with theft incidence in all models utilizing it

as a measure. Social disorganization theory suggests that communities suffering from

high levels of mobility will have difficulty in establishing informal social control

(Kasarda & Janowitz, 1974; Sampson & Groves, 1989; Sampson, Raudenbush & Earls,

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[9] This can be attributable to both improved transportation systems and technological advances.

1997). Population turnover impedes the ability of individuals to make connections with those around them. A lack of connections makes organization difficult, and thus limits the ability of individuals to work together for their collective good. Because informal social control relies upon community members working together to monitor behavior—and act to curtail behavior that is deemed concerning—its influence is limited in communities suffering from high levels of mobility (Sampson, Raudenbush & Earls, 1997).

This logic seems applicable to the crime of farm equipment theft. As mentioned, rural areas in which the majority of farms are located are typically viewed as being close-knit in nature (Glendinning, Nuttall, Hendry, Kloep & Wood, 2003; Weisheit & Wells, 1996). In other words, their residents are perceived to feature connections with one another through family ties, friendships, participation in community groups (e.g., Church groups), and a shared heritage. These connections in theory promote the ability of rural community members to exert informal social control. However, recent developments have likely rendered this idealized view of rural America less than applicable. Whereas farming communities were largely located away from populated areas in the past, they are now scattered among small cities and large towns (Conger, 1997). Moreover, outward migration has shown to be an issue in many rural areas. As traditional forms of employment—such as factories and ownership of small family farms—become less commonly available, some individuals choose to migrate to areas in which employment is more easily attainable (Johnson, 2001). These developments undoubtedly lessen the connections that are present between rural community members, and as a result, make informal social control more difficult to achieve. As shown in the results of the current

study, low levels of residential mobility appear to be associated with lower levels of farm equipment theft, whereas higher levels of mobility have the opposite effect. Thus, it appears as if mobility may influence informal control, and in turn, condition the prevalence of farm equipment theft at the county level.

The third social disorganization hypothesis predicted that more ethnically-heterogeneous counties would experience higher incidence of farm equipment theft. This hypothesis was based upon the results of past attempts to discern the applicability of social disorganization theory to crime problems in nonmetropolitan areas. These studies consistently find a positive relationship between heterogeneity and a variety of crime types (Bouffard & Muftic, 2006; Osgood & Chambers, 2000). Similar findings emerge in the current study. Counties which are more heterogeneous tend to experience higher incidence of farm equipment theft when controlling for other relevant predictors.

Ethnic heterogeneity, similar to residential mobility, is posited to lessen the potential for informal social control (Meithe & Meier, 1994). Heterogeneity may contribute to a lack of community participation (Alesina & La Fererra, 1999), the presence of value systems that are in competition with one another (Altheimer, 2007), and lower levels of trust (Alesina & La Ferrara, 2002). Each of these phenomena reduces the connections between community members and organizations located within communities. Because connections are vital to the exertion of informal control, more heterogeneous areas are hypothesized to naturally feature lower levels of such control. In turn, a lack of control manifests itself in higher incidence of crime (Sampson, Raudenbush & Earls, 1997). The current study suggests that incidence of farm

equipment theft are not immune to this process, as more heterogeneous counties are at greater likelihood of experiencing theft.

This finding is especially noteworthy when taking into account the changing nature of rural areas. Recent decades have witnessed an influx of immigrants—the majority of which are Hispanic—to rural America (Dalla, Villarruel, Cramer & Gonzalez-Kruger, 2004; Marrow, 2011; Taylor, Martin, Fix & Alarcon, 1997). Though some research indicates that this population influx may have beneficial economic impacts (see Coates & Gindling, 2013 for an example), it may also have negative effects in relation to levels of informal social control. Immigration likely contributes to the impediment of communication and social cohesion; and therefore, potentially exacerbating incidence of all forms of offending (including farm equipment theft). Based upon this logic, it is plausible that rural areas may witness an increase in crime prevalence in the near future.

Two hypotheses were focused upon the interactions that potentially exist between measures. The first posited that interactions would exist between the social disorganization measures themselves. That is, in addition to the unique impact that each measure has upon incidence of farm equipment theft, measures would also work in conjunction with one another to further influence theft incidence (Shaw & McKay, 1942; Warner & Pierce, 1993). Results of the analysis suggest that interactions between social disorganization measures do not exist in relation to farm equipment theft, as the three interaction terms explored are not significant. It thus appears as if multiplicative effects are not influential in conditioning farm equipment theft incidence at the county level.

The second interaction-based hypothesis sought to explore whether interactions exist between routine activity measures and the social disorganization measures. Researchers suggest that integrating components of the two theories may be beneficial due to the fact that both seek to explain the prevalence of crime within geographical areas (Kennedy & Forde, 1990; Meithe & Meier, 1990; Rountree, Land & Miethe, 1994; Smith, Frazee & Davison, 2000). Furthermore, past attempts to integrate the theories have been met with a moderate amount of success (Andresen, 2006; Rice & Smith, 2002; Smith, Frazee & Davison, 2000). The current study offers continued support for integration, as two statistically significant interactions emerge in the analysis.

First, the interaction between residential mobility and average farm size is significantly and positively associated with incidence of farm equipment theft. This suggests that average size serves to moderate the relationship between residential mobility and theft incidence. Specifically, the impact of residential mobility on incidence of farm equipment appears to be higher in counties featuring larger farms. In other words, high-mobility counties are at an even greater likelihood of experiencing farm equipment theft when farms are on-average larger in size. This interaction at the macro level is partially supportive of the findings of micro-level attempts to understand farm equipment theft. Micro-level studies tend to find that larger farms are at greater risk of victimization due to the increased difficulty of providing surveillance to large areas of land (Dunkelberger et al., 1992; Farmer & Voth, 1998; Mears, Scott & Bhati, 2007). In the current study, it appears as if larger average size at the macro level serves to increase the risk of farm equipment theft in counties suffering from high levels of residential mobility.

The interaction between residential mobility and worker density has a significant and negative relationship with incidence of farm equipment theft. Similar to the relationship between mobility and average farm size discussed above, this indicates that worker density moderates the relationship between residential mobility and theft incidence. Specifically, worker density appears to temper the effects of residential mobility on theft. Whereas counties suffering from high levels of mobility are more likely to experience theft, those high-mobility counties that also have a larger on-average number of workers per farm are somewhat protected from this increased likelihood. Recall that worker density features a negative main effect on incidence of theft. Thus, not only does it work to decrease theft prevalence alone—as workers may serve to function as place managers—it also serves to limit the impact of mobility on theft. As discussed previously, this finding is counter to that which is seen in micro-level attempts to understand farm equipment theft. This suggests that further research into the ability of farm workers to serve as place managers is vital to our continued comprehension of the factors that work to condition the victimization risk of farming operators.

It is important to review the potential for routine activity theory and social disorganization theory to serve as competing theories in the current study, as opposed to complementary theories with the potential to be integrated. As previously discussed, it is possible that counties featuring a robust agricultural industry will naturally be less-disorganized in relation to the measures employed in the current study. Specifically, robust agricultural economies will in theory make it less likely that a county will suffer from poverty and high levels of residential mobility. Results of the analysis suggest that this is not a concern in the current study. Bivariate analysis reveals that counties which

feature robust agricultural economies also suffer from structural characteristics conducive to disorganization and a lack of informal social control. Accordingly, the results of the analysis should be viewed with greater validity than would be the case had a negative relationship existed between measures of disorganization and measures of economic robustness.

<div align="center">**Implications of the Current Study**</div>

Theoretical Implications

The results of the current study have implications for both routine activity theory and social disorganization theory. In relation to routine activity theory, they offer further support for the suggestion that macro-level processes have influence upon the incidence of offending within geographical areas. Though routine activity theory has been well-researched at the micro level, applications at the macro level are less prevalent within the literature. Those studies which have sought to apply the theory to various forms of offending at the macro level have generally found support for its core tenets (Cohen & Felson, 1979; Copes, 1999; Messner & Blau, 1987). The current study does as well. Measures of proximity, guardianship, and the presence of attractive targets are found to have influences upon incidence of farm equipment theft at the county level.

In addition to providing further support for the theory, the current study also adds to the routine activity perspective in three other major ways. First, it suggests that routine activity theory is applicable to a rather unique form of offending. As opposed to applying the theory to broad crime types (e.g., all property offenses)—as is oftentimes the case in this line of research—the current study focuses upon a single type of offending. Hence, it allows for a better understanding of the generalizability of routine activity theory at the

macro level. Second, it suggests that offense-specific measures of routine activity concepts are a beneficial means of testing the theory. Past studies have measured routine activities by assessing workforce characteristics and entertainment choices, among other things (Cohen & Felson, 1979; Messner & Blau, 1987). These measures allow for some insight into the processes that influence opportunity structures. However, they do not specifically focus upon the factors that influence the specific crime type(s) in question. Similar to the methodology of Copes (1999), the current study utilizes characteristics unique to the problem under investigation to capture macro-level processes. The findings offer support for the utilization of these crime-specific measures in routine activity-oriented research.

Third, the results of the study call into question whether some of the routine activity measures in micro-level attempts to understand farm equipment theft function the same at the macro level. Though consistent results are found in relation to population density and total equipment value, the influence of average farm size and worker density are contrary to what was expected based upon these prior micro-level studies. These differences are potentially attributable to the inclusion of social disorganization measures within the analysis. Whereas micro-level studies tend to focus solely upon farm characteristics, the current study includes measures associated with the social disorganization perspective. Controlling for indicators of disorganization may reveal the true impact of farm characteristics on farm equipment theft. The differences may also be attributable to the limited amount of research into the problem. Most studies focusing upon the relationship between farm characteristics and theft are relatively dated. Moreover, they utilize rather limited samples in conducting their analysis; therefore, it is

possible that their findings are not truly indicative of the impact that certain characteristics have upon theft incidence. Future research examining the problem at both levels of analysis—through multi-level modeling—should allow for a better understanding of whether this is the case.

The current study also advances social disorganization theory in three key ways. First, it allows for a better understanding of the generalizability of the theory. Most efforts to understand the relationship between disorganization and crime are conducted in urban locales. Comparatively, few attempts have been made to apply the theory to nonmetropolitan areas (Kaylen & Pridemore, 2012). Moreover, the attempts that have been made are generally focused upon relatively broad forms of offending, such as all property offenses or all violent offenses. The current study focuses solely upon farm equipment theft, a form of offending unique to nonmetropolitan locales. The fact that all measures of social disorganization are statistically significant in the analysis suggests that the theory is generalizable to rural America and the unique crime problems that face it. Accordingly, attempts to apply the theory to other unique forms of rural offending may be beneficial.

Second, the current study finds that poverty is a statistically significant predictor of farm equipment theft. As discussed, past attempts to explore social disorganization theory outside of urban areas have found mixed results in relation to the impact of poverty on prevalence of offending . Some studies suggest that it may not be as influential in these areas as is the case in urban environments (Bouffard & Muftic, 2006; Osgood & Chambers, 2000). However, the findings of the current study indicate that—at least in relation to farm equipment theft—poverty does significantly and positively

impact offending. Higher levels of poverty are associated with increased incidence of farm equipment theft, controlling for other relevant predictors. Though the findings of one study should not be interpreted as "proving" that poverty contributes to disorganization in rural areas, they do offer continued support for those who suggest that a relationship does exist. Additionally, the changing nature of rural communities and their economic structures may contribute to increased economic heterogeneity, rendering cohesion more difficult to achieve within them—and thus altering the impact of poverty upon rural offending (Donnermeyer, Jobes & Barclay, 2006). Future research exploring this potential relationship may allow for a better understanding of whether this is the case.

Finally, the results of the analysis suggest that social disorganization measures and routine activity measures work in conjunction with one another to influence prevalence of farm equipment theft. This is supportive of the literature that proposes that the two theories are compatible in explaining crime (Bursik & Webb, 1982; Kennedy & Forde, 1990; Miethe & Meier, 1994; Smith, Frazee & Davison, 2000) due to the fact that they are both at least partially rooted in a control perspective (Rice & Smith, 2002). It is important to note that past attempts to test an integrated theory tend to focus upon the relationship between social disorganization theory and routine activity theory at the micro-level (see Smith, Frazee & Davison, 2000 for an example). These studies more often than not find that the presence of opportunities work to condition the impact of a lack of informal social control has on offending. The current study reaches similar conclusions in terms of exploring the relationship between the two theories at the macro level. The finding that interactions between measures exist should be viewed as further

support to this field of study. Having summarized the theoretical implications associated with the findings of the current study, attention is turned a discussion of potential policy implications.

Policy Implications

To date, a minimal amount of attention has been dedicated to understanding farm equipment theft within the United States. This is partly due to the fact that crime problems associated with rural areas are viewed with less interest than those associated with urban locales (Weisheit & Wells, 1996). It may also be attributable to the mistaken belief that rates of offending are inconsequential in rural America (Weisheit & Donnermeyer, 2000; Weisheit, Falcone & Wells, 2005). Regardless of the rationale, dedicating scholarly attention to the crime of farm equipment theft presents the potential for a wider audience to become aware of its prevalence and the factors that work to contribute to its occurrence. By gaining a wider audience, those who have the power to address the problem may gain the knowledge and resources to effectively do so.

The current study provides valuable insight into the applicability of routine activity theory and social disorganization theory to explain incidence of farm equipment theft at the county level. Aside from the theoretical value associated with it, the findings also provide increased evidence that the prevalence of farm equipment theft is not random in nature. This non-random nature suggests that steps can be taken to address the factors and characteristics that increase incidence of theft. Based upon the apparent applicability of the two theories utilized in the current application to explain incidence of theft, these steps should revolve around measures designed to reduce theft opportunities and increase informal social control.

Opportunity Reduction. Routine activity theory suggests that the prevalence of offending within geographic areas is dependent upon aggregate characteristics and social processes (Cohen & Felson, 1979). The results of the current study indicate that incidence of farm equipment theft is conditioned by agricultural characteristics at the county level.   Certain characteristics appear to be conducive to high theft incidence, such as denser population and larger amounts of equipment being present. Others, such as high worker density and large average farm size, appear to mitigate theft incidence. This information can be utilized to discern which counties are at highest risk of theft incidence, and to target interventions where they are likely to be most beneficial.

Counties featuring agricultural structures conducive to high levels of theft may benefit from taking proactive steps to prevent it. Put differently, crime prevention strategies may offer a viable means by which to reduce theft counts. Prevention should begin with individual farms and their operators. Research suggests, that farmers on the whole, fail to take simple steps to ensure that their property is protected from theft (Barclay, Donnermeyer, Doyle & Talary, 2001). This is especially true of family-owned farms and farms operated by younger individuals (Mears, Scott & Bhati, 2007). The rationale behind failing to take guardianship measures undoubtedly varies among farmers, but may be related to a lack of resources or a general belief that risk of victimization is low (Mears, Scott & Bhati, 2007; Sugden, 1999). Researchers have found that proactive guardianship measures are generally undertaken only when the farm operator has been victimized in the past, or when they perceive risk of victimization to be high (Barclay et al., 2001; Mears, Scott & Bhati, 2007).

Based upon this logic, it would be beneficial to better educate farmers regarding the prevalence of farm equipment theft. Doing so, however, may be difficult due to a lack of trust in agencies most able to provide this education. It is well-established that mistrust of government entities—including law enforcement agencies—is high in rural America (Weisheit, Falcone & Wells, 2005). This lack of trust appears to apply to farmers as well. For example, it has been found that farmers are leery of working with law enforcement agencies when they are victimized due to the perception that officers have little understanding of agricultural operations (Donnermeyer & Barclay, 2005). Consequently, it would follow that attempts by these agencies to promote crime prevention measures may fall upon deaf ears. Overcoming this obstacle is a difficult task; and therefore it may be beneficial for officers to seek external assistance in promoting prevention measures. One possible avenue would be to enlist agricultural extension agents in promoting the merits of security measures and advising farmers of the risks that they face.

Agricultural extension agents are state-level employees that assist farmers in learning innovative production techniques, gaining access to resources, and finding new markets for their products (Franz, Piercy, Donaldson & Westbrook, 2010; Leeuwis, 2013). The positive nature of their interaction with farmers likely creates relationships built upon mutual trust. Such relationships would increase the likelihood that farmers would be open to input from them regarding crime prevention techniques. Because extension agents interact with farmers on a near-constant basis, it is plausible that adding theft prevention education to their job description would not constitute a significant impediment to the execution of their other duties.

In addition to coopting with agricultural extension agents, law enforcement agencies may be well-served to establish specialized agricultural crime units in counties that experience high incidence of farm equipment theft. Employing officers whose primary occupation is to work with farmers to solve crimes and relay prevention techniques may overcome the lack of trust that currently hinders the relationship between the two parties. Recent years have witnessed the establishment of such units in several counties within the United States.[10] Though no research study to date has assessed their effectiveness, it is plausible that these units may have positive impacts in counties that choose to adopt them.

One additional option is for law enforcement agencies to join forces in creating task forces whose sole focus is to combat agricultural crime. Several states with extensive agricultural economies have been proactive in establishing state-level agricultural crime units.[11] These units employ officers who work independently—or in conjunction with county-level agencies—to investigate farm equipment theft and develop intervention tactics in high-theft areas. Counties located within states who have not yet adopted this approach may seek to create partnerships with adjacent counties that allow for the creation of similar units on a smaller scale. This eases the financial burden associated with creating an independent unit, and allows for the transmission of information between agencies.

The Agricultural Crime, Technology, Information, and Operations Network (ACTION) program may serve as a model example of multiple agencies partnering

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[10] See http://www.polksheriff.org/InsidePCSO/LE/SOD/BOSO/SupportSect/Pages/ACU.aspx for an example of one such agency.
[11] Examples include Oklahoma, Tennessee and Alabama. See http://www.tn.gov/agriculture/general/acu.shtml for an overview of Tennessee's Agricultural Crime Unit.

together to combat farm equipment theft (Mears, Scott, Bhati, Roman, Chalfin & Jannetta, 2007). The program was developed in California in the early 2000s, and is designed to combat theft through techniques that include farmer education, the promotion of equipment marking, and the creation of a theft database that can be shared by multiple agencies. An outcome evaluation of its performance suggests that the program is successful in reducing theft victimization, recovering stolen farm equipment, and convincing farmers to adopt prevention measures (Mears et al., 2007). Counties and/or groups of counties seeking to reduce incidence of farm equipment theft may benefit by drawing from the ACTION model. In addition to opportunity reduction, it is also beneficial to place focus on programs that improve informal social control, as these too may offer the ability to reduce incidence of farm equipment theft (as well as other forms of offending). The following section discusses potential options.

Improving Informal Social Control. Steps designed to increase levels of informal social control in rural areas may provide additional means by which to reduce incidence of farm equipment theft. As previously discussed, social disorganization theory suggests that the occurrence of crime is higher in communities lacking in informal social control (Bursik & Grasmick, 1993; Kasarda & Janowitz, 1974; Sampson, Raudenbush & Earls, 1997). Control is dependent upon cohesion between community members, as well as, a shared willingness to intervene when problems become apparent (Kubrin & Weitzer, 2003; Sampson, Raudenbush & Earls, 1997). Because the current study finds that characteristics indicative of a lack of organization—and thus a lack of informal control—serve to influence farm equipment theft, policies and programs designed to improve cohesion in rural communities may be beneficial.

Addressing the structural characteristics associated with disorganization is a complex proposal due to the fact that it requires cooperation between governmental entities, community organizations and individual residents. Designing interventions and programs that emphasize poverty reduction, stability and communication between groups is also likely to be an expensive endeavor. If successful, however, they feature the potential to offer benefits to rural communities. What follows is a brief discussion of potential measures designed to target deleterious structural characteristics in these areas.

Rural residents are more likely to live in poverty compared to their urban counterparts (DeNavas-Walt & Proctor, 2014). This is especially true in recent years, as traditional forms of employment continue to decline (Kusmin, 2012). For example, the rural economy has traditionally depended upon farming operations, the manufacturing industry, and natural resource procurement for stability (Johnson, 2001). These industries provided stable forms of employment and salaries that allowed rural residents to maintain a respectable quality of life. Each of these industries has suffered in recent years, leading to a loss of available jobs (Black, McKinnish & Sanders, 2005; Levine, 2012; McElroy, Strickland, Ryan, McGath, Green, Erickson & McBride, 2001; McGranahan & Beale, 2002). This in turn creates higher levels of unemployment and poverty, an impediment to the development of connections between community members.

Policies to enhance the economic sustainability of rural areas may assist in improving connections to the community, and in turn, improve levels of informal social control. Two possibilities seem especially viable in achieving this goal: Improvements to educational systems and economic development initiatives. Rural areas have been

shown to suffer from poor performance on standardized tests, low graduation rates, and low college enrollment rates (Provasnik, KewalRamani, Coleman, Gilbertson, Herring & Xie, 2007). Low educational attainment leads to a limited number of career possibilities, and to a degree restricts the potential for a high quality of life. Moreover, it limits the attractiveness of rural communities for corporations seeking new markets (Connolly, 2010). Because unskilled employment opportunities in rural areas are more limited than ever, this creates an environment in which high levels of poverty are commonplace. Improved educational systems that promote student success and foster the desire for higher education may create a more diversified employment pool; in turn making rural areas more viable for industries that offer higher salaries (Connolly, 2010).

In line with this logic, rural areas may be well advised to promote economic development initiatives designed to lure corporations. This can be achieved by offering tax breaks to these corporations, or by creating partnerships with local technical colleges that produce graduates with the specific skills desired by them (Green, 2012; Hagedorn & Purnamasari, 2012; Reynolds & Rohlin, 2014). Because rural areas are now in competition with international markets (e.g., Mexico) for manufacturing facilities, steps such as these are necessary to ensure that they are not "left behind" by changing economic structures (Leigh & Blakely, 2013).

An improvement in economic conditions may have the added effect of limiting population turnover in rural areas, as outward migration is commonly tied to a lack of available jobs (Brown & Wardell, 2013; Winkler, Cheng & Golding, 2012). Moreover, it may motivate young persons to remain in these areas following graduation, as they perceive abundant opportunities to be available to them. This economic improvement,

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combined with other measures (such as the development of downtown entertainment districts), may reduce problems associated with residential mobility—in turn further promoting higher levels of informal social control.[12]

As previously discussed, rural areas are increasingly more heterogeneous in terms of ethnic composition. This development can be directly tied to high levels of Hispanic immigration (Dalla et al., 2004; Lichter & Johnson, 2006; Kandel & Cromartie, 2004; Marrow, 2011; Taylor et al., 1997).[13] Recent research suggests that Hispanic immigrants may have difficulty in assimilating to areas in which they settle. Moreover, long-time residents of these rural areas—the majority of which are non-Hispanic Whites—have also been found to feature prejudiced views toward immigrants (Lichter, Parisi, Taquino & Grice, 2010; Lichter, Parisi, Grice & Taquino, 2007). This may be due to the fact that these immigrants are viewed as threats to low-level employment opportunities. Regardless of the rationale, discrimination serves to isolate Hispanic populations, while creating fear and distrust in the dominant group(s) (Mora, Grzywacz, Anderson, Chen, Arcury, Marin & Quandt, 2014; Potochnick, Perreira & Fuligni, 2012).

Combined with the lingering tension between Blacks and Whites in rural America (Chakraborti & Garland, 2013), this reality serves to render informal social control less easily achieved. Strategies to reduce distrust between groups may do well to focus upon educational interventions. Whereas older individuals may feature unwavering prejudices, young persons are more easily influenced by positive interactions with individuals from other racial and ethnic groups (Nava, 2013). Diversity education at a young age may

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[12] Current trends appear to favor the revitalization of downtown economic districts across the United States, rural areas included. Revitalization provides more entertainment options, in turn making the town and surrounding area a more attractive place to live (Faulk, 2006; Lofgren, 2008).

[13] The research literature suggests that Hispanic immigrants find rural areas appealing due to their similarity to their home countries and the availability of agricultural employment (Saenz & Torres, 2003).

allow for future generations of rural residents to have more favorable opinions of other groups (Broadhurst &Wright, 2004; Nava, 2013). The limited amount of research conducted on the effectiveness of diversity education suggests that it is beneficial to intergroup relations (Zirkel, 2008). As such, adoption of multicultural education programming in rural schools may offer an added tool to improve intergroup dynamics, and ultimately, foster greater informal social control.

Summary of Implications

The results of the current study have implications for both theory and practice. Both routine activity theory and social disorganization theory are advanced in meaningful ways. In relation to routine activity theory, the current study offers further support for its macro-level conceptualization. Moreover, it suggests that opportunity plays a role in a rather unique form of criminal offending and that offense-specific measures are a beneficial means of gauging opportunities. Finally, it calls into question the relationship between farm characteristics and farm equipment theft commonly cited in micro-level studies. In relation to social disorganization theory, results suggest that the theory is generalizable to rural crime problems and that poverty may in fact serve to increase incidence of crime in these areas. Of interest to both perspectives, and supportive of the call for theoretical integration, results also suggest that interactions may exist between elements of the two theories.

Policy implications arising from the current study center around the need for opportunity-reduction measures and strategies designed to improve levels of informal social control in rural communities. Opportunity reduction relies upon the ability of law enforcement agencies, agricultural extension agents and farmers to work together to

improve guardianship of farm property. Improved informal social control is most easily

attainable through economic stimulation initiatives and multicultural diversity training for

young people. Taken together, these steps should provide valuable gains in reducing

incidence of farm equipment theft at the county level. Having discussed the theoretical

and policy implications of the study, attention is directed at an assessment of limitations

associated with its methodology and theoretical underpinnings.

<div align="center">**Limitations of the Study**</div>

Though the current study makes several contributions to our knowledge of farm

equipment theft at the macro level, it is not without limitations. These limitations can be

separated into two categories: Limitations relating to the methodology employed, and

limitations relating to the application of routine activity theory and social disorganization

theory to the problem at hand. Each category, and the specific limitations associated with

it, is worthy of brief discussion.

Methodological Limitations

The first limitation associated with the methodology of the current study is the

potential for missing data to be of concern. As discussed, full reporting is not assured

even when agencies are NIBRS certified (Thompson, Saltzman & Bibel, 1999).

Agencies may not accurately classify all incidents of farm equipment theft under the

appropriate category, instead choosing to simplify reporting procedures by listing them as

"other." This creates the potential for theft counts associated with each county to differ

from the actual theft prevalence experienced by them. Underreporting cannot be fully

addressed through the research methodology employed in the current study.

Nevertheless, the steps taken to eliminate states (and counties within them) featuring

conspicuously low theft counts should lessen the potential for it to have influence upon the results.   In addition, the fact that all counties included within the analysis claim at least one theft incident reported by their county-level law enforcement agency (the agency most likely to respond to farm equipment theft incidents) suggests that NIBRS reporting procedures are promoted by the leadership of these agencies. This decreases the potential for underreporting to be systematic in nature.

A second limitation relating to the methodology employed is centered upon the utilization of the 2007 Census of Agriculture to create macro-level routine activity measures. This version of the Census is used due to the fact that it surveys farm characteristics prior to the years in which counts of the dependent measure are taken, allowing for temporal ordering (Abbott, 1983; Simon, 1979). However, the potential exists for meaningful change to occur in county-level farm characteristics in the four-year time period between survey administration and collection of the dependent measure. As such, the use of the 2007 Census of Agriculture may not accurately represent the characteristics of farming operations in the years 2011-2012. With that said, the Food and Agriculture Organization of the United Nations promotes a time period of every ten years as being suitable for the collection of agricultural census data, as structural characteristics of farming tend to change somewhat slowly over time (FAO, 2010). Thus, the fact that the gap in question is only four years in duration provides some confidence in the use of the 2007 version.

Third, it is possible that other factors, not included within the current analysis, may have some impact upon incidence of farm equipment theft. For example, the density of law enforcement officers present in each county may impact both reporting of theft

and serve as a deterrent to potential offenders. However, inclusion of this as an additional variable in the analysis is hindered by the fact that multiple agencies operate within each county, some of which (e.g., municipal departments) may rarely respond to incidents of farm equipment theft. Furthermore, state police officers oftentimes operate in multiple counties (Weisheit, Falcone & Wells, 2005), offering little potential for a true measure of enforcement density in each individual county.

In line with the potential for other factors to play a role in farm equipment theft incidence, it should be noted that the current study is somewhat exploratory in nature. It constitutes the first attempt to discern whether criminological theory can be utilized to explain incidence of farm equipment theft at the macro level. As such, the possibility exists that other theoretical frameworks may be equally applicable to our understanding of theft incidence. For example, elements of strain theory may be useful in understanding whether equipment theft is more common in counties that feature wide disparities in land ownership and farm output. Such disparities are found to influence crime in other nations (see Villarreal, 2004 for an example). The current study does not allow for an understanding of whether this is the case due to limitations in the data.[14] However, it provides an initial indication that farm equipment theft incidence is not random in nature. Moreover, it provides a framework by which to explore the potential for other theories to explain theft incidence in future studies.

The fourth methodological limitation deals with the potential for spatial auto-correlation to be a factor in incidence of farm equipment theft. That is, the level of theft in one county may have a sort of spill-over effect, contributing to the levels of theft

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[14] The Census of Agriculture does not provide a viable means for gauging disparities in land ownership and agricultural sales among farms within each county.

witnessed in those counties contiguous to it. Kaylen and Pridemore (2012) suggest that

dismissing this potential in studies utilizing counties as the level of analysis creates

concerns relating to the validity of their findings. However, controlling for auto-

correlation in the current study is difficult due to the fact that many of the counties under

analysis border counties located in other states. Because spatial auto-correlation

techniques utilize values for the dependent variable in their calculations, data for farm

equipment theft counts would be required for all counties contiguous to each county

under analysis. Thus, the lack of data for contiguous counties not under analysis would

render any control measure utilized somewhat invalid. As such, spatial-autocorrelation is

not controlled for in the current study.

Finally, the current study utilizes data for counties located in four Southeastern

states. Though the sample size is sufficient for purposes of statistical analysis, the

possibility remains that measures associated with routine activity theory and social

disorganization theory may have differential impacts upon theft incidence in other areas

of the country. Due to data limitations, this potential is not assessed in this study. Future

versions of the NIBRS dataset may better allow for the inclusion of multiple regions in a

similar analysis.[15]

Theoretical Limitations

Routine Activity Theory. The routine activity measures utilized in the current

study are primarily derived from past attempts to test the applicability of the theory to

farm equipment theft at the micro level. Essentially, they are aggregated micro-level

characteristics. Unfortunately, not all measures employed in these studies are able to be

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[15] Less than one-third of all law enforcement agencies are currently NIBRS certified. This limits the number of counties eligible for inclusion in the analysis. Because the current trend appears to favor certification, this may not be an issue in future studies.

tested at the macro level. Though target-hardening measures are found to lessen the likelihood of theft for individual farming operations (Mears, Scott & Bhati, 2007), no data is available to test the relationship between theft incidence and target-hardening at the macro level. Such data would require surveying individual farmers, and then aggregating responses to the county level. Similarly, proximity to roadways is found to increase likelihood of theft victimization at the micro level (Mears, Scott & Bhati, 2007; George Street Research, 1999). Creating a comparable measure at the macro level would require data on the miles of roadway located within each county. This data is not currently available.

     Social Disorganization Theory. Though past studies have sought to explore social disorganization and its impact upon crime in rural areas, they are not without limitations. Because the current study borrows extensively from their methodology, these limitations are equally applicable to its findings. As discussed, utilizing structural factors as an indication of a lack of community-level processes conducive to informal social control does not provide a true assessment of our modern interpretation of social disorganization theory. A true test would require data on social ties, social cohesion, and the potential for collective action on the part of residents (Kaylen & Pridemore, 2012). Such data is difficult to gather in rural areas. The current study (as is the case with those cited in the literature review of social disorganization outside of urban locales) serves as only a limited test of social disorganization theory's application to farm equipment theft. However, because this study is exploratory in nature—as it is the first attempt to understand farm equipment theft from a macro-level perspective—the findings still allow

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for a better understanding of the problem and the potential for structure to play some role in theft incidence.

Directions for Future Research

The current study constitutes an initial attempt to better understand farm equipment theft incidence at the macro level. It does so by assessing the potential for routine activity theory and social disorganization theory to explain disparities in incidence across counties. Results suggest that the two theories have applicability to the problem. Future studies should seek to further explore this applicability by addressing the limitations associated with the current work. For example, the current study is unable to discern whether proximity to roadways and target hardening measures may serve to explain theft prevalence. Data at the county level that would allow for the creation of such measures is simply not available at the current time. The potential is likely to exist for data on roadway density to be gathered in the future, as mapping technologies continue to evolve. Gaining an understanding of target hardening measures at the macro level requires surveying individual farmers and aggregating responses to the county level. Because a sufficient number of farmers would need to be surveyed in each county analyzed, such a tactic may be problematic. Restricting a study of this nature to a more limited number of counties may help to alleviate the issues associated with collecting survey data.

Future studies should also seek to conduct a multi-level analysis of farm equipment theft. Multi-level analyses allow for an understanding of the relationship between both macro-level and micro-level characteristics in conditioning incidence of crime (DiPrete & Forristal, 1994; Raudenbush, 2004; Sampson & Woolredge, 1987). A

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multi-level analysis of farm equipment theft would present the potential to discern whether the impact of characteristics associated with individual farms upon farm equipment theft are conditioned by broader structural characteristics. For example, it may be that farms employing large amounts of equipment are at greater risk of victimization due to the additional opportunities that they provide to offenders. However, in counties where most farms claim similarly large amounts of equipment, this characteristic may not be as influential in conditioning victimization risk. Factors related to guardianship may be more important in these counties, as attractive targets are equitably distributed among farms. Multi-level analysis should allow for a determination of whether this is the case.

Building upon this logic, future studies should also seek to assess whether interactions exist between routine activity measures in explaining incidence of farm equipment theft. The current study assesses the potential for interactions to exist between social disorganization measures themselves, and between routine activity measures and social disorganization measures. It does not seek to discern whether measures associated solely with the routine activity perspective have multiplicative impacts above and beyond their own unique influence. It is plausible that interactions may exist. If so, developing an understanding of these interactions may allow for a more thorough understanding of the relationship between opportunity structures and incidence of farm equipment theft.

In relation to social disorganization theory, future studies should seek to provide an improved test of the relationship between the theory and farm equipment theft. The current study relies solely upon structural characteristics as proxy measures for levels of informal social control. True tests of social disorganization utilize measures—such as

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social cohesion and a shared willingness to intervene—that more directly tap these levels of control (Morenoff, Sampson & Raudenbush, 2001; Sampson, 2002; Sampson, 1997; Sampson, Morenoff & Earls, 1999). Currently, no data exists that allows for the creation of these measures outside of metropolitan areas. This may change in future years, as technological advances better allow for data collection in remote populations. Should this come to fold, researchers would be well-advised to attempt to replicate the current work utilizing more appropriate measures of disorganization.

Finally, the potential exists for incidence of farm equipment theft to be explained by other theoretical frameworks. The current study is exploratory to the degree that it serves as the first attempt to better understand the distribution of farm equipment theft across counties. Though routine activity theory and social disorganization theory are shown to be influential in conditioning this distribution, other theoretical frameworks may be equally applicable. Future research may seek to assess whether measures associated with these frameworks share a relationship with incidence of farm equipment theft. One possibility would be to explore whether elements of strain theory may be applied to the problem (see Villareal, 2004 for an example of the theory being applied to other forms of offending in rural areas). The changing nature of agricultural economics has created a system in which wide disparities exist in relation to land ownership and production-related profits (Fearson, 2003; Lobao & Meyer, 2001). Furthermore, rural areas are now more economically heterogonous than in the past (Donnermeyer, Jobes & Barclay, 2006). Such phenomena certainly have the potential to contribute to higher levels of offending in general—and farm equipment theft specifically—as those on the lower end of the spectrum turn to crime out of frustration. Empirical tests of the theory's

applicability to the problem should allow for a better understanding of whether this is the case.

Conclusion

Though the current study is not without limitations, it has the potential to offer significant contributions to the literature on farm equipment theft. Several key finding emerge from its results, findings which serve to advance our understanding of both routine activity theory and social disorganization theory in meaningful ways. In relation to routine activity theory, the study offers support for the notion that farm equipment theft is influenced by opportunity structures. Micro-level studies find that characteristics associated with individual farming operations are influential in determining risk of theft victimization (Bunei, Roso & Chessa, 2013; Dunkelbergeret al., 1992; Farmer & Voth, 1998; Mears, Scott & Bhati, 2007). The current study finds that aggregate characteristics serve to condition incidence of theft at the county level. Thus, the hypothesis that interventions should revolve around the reduction of criminal opportunities is reinforced by its findings.

In addition, the theory itself is advanced in two key ways. First, relatively few attempts to assess the utility of routine activity theory at the macro level have been conducted. Whereas a good deal of research has sought to apply the theory to crime problems at the micro level, only a handful of studies have assessed whether aggregate patterns of production and movement influence incidence of crime (Bennett, 1991; Cohen & Felson, 1979; Copes ,1999; Messner & Blau, 1987). Those attempts that have been made tend to find support for the theory's core tenets. The current study does as well. As such, it adds to the literature that promotes the utility of the theory to understanding

macro-level problems. Second, crime-specific measures are utilized to test routine activity theory in the current study. Copes (1999) suggests that employing measures that are unique to the crime problem in question may allow for a better understanding of the role that opportunity plays in offending. Based upon the results of the current study, this appears to be the case.

The social disorganization perspective is also advanced by the current study. Recent years have witnessed increased attention to the possibility that disorganization may influence offending outside of metropolitan areas (Bouffard & Muftic, 2006; Kaylen & Pridemore, 2012; Osgood & Chambers, 2000). However, there still exist a relatively small number of studies empirically testing this possibility. This study adds to this limited literature, and offers further support for the application of the theory to these areas, as social disorganization measures are found to have influence upon incidence of farm equipment theft.

Moreover, the results suggest that social disorganization theory may be generalizable to rather specific crime types. Past applications of the theory—especially in nonmetropolitan areas—tend to focus upon the effect of disorganization on broad offense types. This is certainly beneficial, as the offense types in question are those commonly experienced by communities. Focusing upon unique crimes—such as farm equipment theft—serves to strengthen the argument that disorganization and a lack of informal social control is critical to understanding the distribution of crime across geographic areas.

Finally, the current study offers support for the potential for poverty to serve as an important determinant of disorganization in nonmetropolitan areas. Mixed findings are

present in the research literature, with some suggesting that rural areas experience poverty differently than their urban counterparts (Weisheit, Falcone & Wells, 2005). This may not be the case, as findings suggest that levels of poverty share a positive relationship with incidence of farm equipment theft. The changing nature of rural communities may be to blame for this finding (Donnermeyer, Jobes & Barclay, 2006). As these communities become more economically diverse, the shared experience of poverty is likely to become less commonplace (Dwyer & Childs, 2004; Lichter & Brown, 2011). This may serve to reduce social cohesion, in turn reducing levels of informal social control and culminating in increased rates of offending.

In addition to the advancement of criminological theory, the current study also adds to our understanding of farm equipment theft. To a degree, it offers support for the micro-level literature. These studies suggest that location near densely-populated areas serves to increase theft victimization risk (Bunei, Rono & Chessa, 2013; George Street Research, 1999). The current results indicate that this finding applies to the macro level as well, as more densely-populated counties appear to suffer from higher incidence of farm equipment theft. However, the current findings also suggest that characteristics commonly thought to increase theft victimization risk at the micro level may not hold true when controlling for social disorganization measures and aggregating farm characteristics to the macro level. Micro-level studies tend to find that large farms and farms employing workers are at high risk of victimization (Dunkelberger et al., 2013; Farmer & Voth, 1998; Mears, Scott & Bhati, 2007; McCall, 2003). The opposite is exhibited by the current results. Larger on-average farms and higher levels of worker density are found to decrease incidence of theft at the county level. Thus, it may be

beneficial to further explore the characteristics that are commonly thought to be conducive to theft victimization in order to gain a true understanding of their impact.

In conclusion, relatively few attempts have been made to understand farm equipment theft or the factors that contribute to it. Many of these attempts are somewhat dated, or rely upon data gained from other countries. As such, the current study provides researchers, policymakers, law enforcement agencies and farmers with a current understanding of farm equipment theft in the United States. Furthermore, and perhaps of greatest important, it suggests that rural crime problems can be explained through criminological theory. Future research should continue to explore the applicability of theory to these problems, as this will increase the likelihood that meaningful measures can be taken to reduce the impact of crime on rural America.

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CURRICULUM VITAE
Dustin L. Osborne

CONTACT INFORMATION

Home Address: 113 Orchard Hills Drive
                     Apt. #267
                     Jeffersonville, IN 47130

Email: dlosbo11@louisville.edu

Phone: (502) 991-7317

EDUCATION

2015   **Ph.D., Justice Administration**, University of Louisville
                     Louisville, KY

                     Dissertation: *Exploring Macro-Level Correlates of Farm
                     Equipment Theft: A Test of Routine Activity Theory and Social
                     Disorganization Theory*

                     Committee: Dr. Kristin Swartz (Chair), Dr. George Higgins, Dr.
                     Tad Hughes & Dr. Pamela Wilcox

2011   **M.A., Criminology and Criminal Justice**, East Tennessee State
                     University
                     Johnson City, TN

2009   **B.S., Administration of Justice**, University of Virginia's College
                     at Wise
                     Wise, VA

2007   **A.A.S., General Studies**, Virginia Highlands Community College
                     Abingdon, VA

ACADEMIC EXPERIENCE

2012-Present   **Graduate Teaching Assistant**, Department of Justice
                      Administration, University of Louisville

                      Courses Taught:

                      - JA 326: Quantitative Methods (3 Section)
                      - JA 202: Corrections (3 Sections)
                      - JA 496: Crime in Rural America (1 Section, conducted online)

2011-2012   **Instructor**, Department of Social Sciences, University of
                      Virginia's College at Wise

                      Courses Taught:

                      - AJU 3850: Organized and White-Collar Crime (3 Sections)
                      - AJU 3010: Ethics and Law (1 Section)
                      - AJU 3450: Corrections (1 Section)
                      - AJU 3950: Capital Punishment (1 Section)
                      - AJU 3950: Global Terrorism (1 Section)
                      - AJU 4950: Contemporary Issues in Criminal Justice (1
                        Section)
                      - AJU 4700: Criminal Law and Procedure (1 Section)

2009-2011   **Graduate Teaching Assistant**, Department of Criminology and
                      Criminal Justice, East Tennessee State University

                      Courses Assisted:

                      - CJCR 3310: Criminology (4 Sections)
                      - CJCR 4950: Crime in the Media (1 Section)

                      Other Duties:
                      - Academic Advising Assistant (2 Semesters)

ACADEMIC PUBLICATIONS

Works under Review

Swartz, K., Osborne, D., Dawson-Edwards, C., & Higgins, G. (Revise and Resubmit).
    School resource officers: Do they act as effective place managers? *Security
    Journal*.

Swartz, K., Osborne, D., & Stutzenberger, A. (Under Review). Examining the influence of the street life on violent offending versus violent victimization.

Invited Works

Osborne, D., & Higgins, G. (Forthcoming). Self-control theory and crime. In Wright, J. (Ed.), *International Encyclopedia of the Social and Behavioral Sciences*.

Osborne, D., & Higgins, G. (Forthcoming). Education and crime. In Jennings, W. (Ed.), *Encyclopedia of Crime and Punishment.*

CONFERENCE PRESENTATIONS

2014	Osborne, D., Swartz, K., & Stutzenberger, A. (Presentation). *Examining the Influence of Street Life on Violent Offending versus Violent Victimization*. Southern Criminal Justice Association, Clearwater, FL.
2014	Osborne, D., Swartz, K., Dawson-Edwards, C., & Higgins, G. (Presentation). *Violent Crime: A Comparison of Stratified Neighborhoods*. Academy of Criminal Justice Sciences, Philadelphia, PA.
2013	Osborne, D., McCord, E., & Higgins, G. (Presentation). *The Interactive Influence of Juvenile Population, Poverty, and Prosocial Places on Incidents of Assault with a Deadly Weapon*. Southern Criminal Justice Association, Virginia Beach, VA.
2013	Osborne, D., Swartz, K., Higgins, G., & Dawson-Edwards, C. (Presentation). *Using Opportunity Theory to Understand the Influence of School Resource Officers on School-Based Violence*. Academy of Criminal Justice Sciences, Dallas, TX.

RESEARCH INTERESTS

Agricultural Crime

Rural Crime and Deviance

The Role of Culture in Offending and Victimization

Opportunity and Crime

Community Structure and Crime

PROFESSIONAL AFFILIATIONS

2012-Present	Academy of Criminal Justice Sciences
2013-Present	American Society of Criminology
2012-Present	Southern Criminal Justice Association

SERVICE

To the Discipline

- Reviewer for the Journal of Criminal Justice Education

University of Louisville

- Graduate Student Union Representative for the Department of Justice Administration

- Participant in the Peer Mentorship Program for First-Year Ph.D. Students

- Participant in a Departmental-Initiated Program to Advise the Louisville Metro Police Department on the Creation of Victim-Services Programming

University of Virginia's College at Wise

- Departmental Representative for the College's Open House for Potential Incoming Students

- Independent Study Instructor (Course: Psychology of Terrorism)

HONORS

2011	Outstanding Graduate Student in Criminology and Criminal Justice East Tennessee State University
2009	Exceptional Graduate in Administration of Justice University of Virginia's College at Wise

REFERENCES

Dr. George Higgins
Department of Justice Administration
University of Louisville
Brigman Hall
Louisville KY 40292
gehigg01@louisville.edu
(502) 852-0331

Dr. Kristin Swartz
Department of Justice Administration
University of Louisville
Brigman Hall
Louisville KY 40292
kmswar01@louisville.edu
(502) 852-3240

Dr. Deborah Keeling
Department of Justice Administration
University of Louisville
Brigman Hall
Louisville KY 40292
deborah.wilson@louisville.edu
(502) 852-0370