An Examination of Cities' Resilience to Violent Crime: A Contextual Analysis of Victim-Offender Convergence

Vanessa Hatch Woodward
University of Southern Mississippi

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The University of Southern Mississippi

AN EXAMINATION OF CITIES’ RESILIENCE TO VIOLENT CRIME: A CONTEXTUAL ANALYSIS OF VICTIM-OFFENDER CONVERGENCE

by

Vanessa Hatch Woodward

Abstract of a Dissertation
Submitted to the Graduate School
of The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy

August 2013
ABSTRACT

AN EXAMINATION OF CITIES’ RESILIENCE TO VIOLENT CRIME: A CONTEXTUAL ANALYSIS OF VICTIM-OFFENDER CONVERGENCE

by Vanessa Hatch Woodward

August 2013

In his 2012 Presidential Address to the American Society of Criminology, Robert Sampson purported that causality can only be reached when social science researchers accept that individual actions are dependent on social context. He referred to this as contextual causality and argued that future research needed to focus on how to measure and/or reoperationalize community measures of crime.

There were three primary goals of this study. First was to provide a better understanding of victim-offender convergence in time and space (Cohen & Felson, 1979) within incidents of violent crime. In order to meet this goal, 90 city agencies’ incident and individual-level data from 2005-2009 were collected through the National Incident Based Reporting System (NIBRS). The second goal of this study was to provide a parsimonious measure of the social effects on crime and victim-offender convergence. Thus, the concept of resilience was used and operationalized as a measure of social characteristics within the areas in which the incidents of violent crime occurred. Lastly, the third goal of this study was to provide a measure of contextual causality (Sampson, 2013) by incorporating both individual and social-level variables to explain victim-offender convergence (Cohen & Felson, 1979). Therefore, additional data were collected from the American Community Survey, the Election Atlas, and the Online Almanac.
Using two ordinary least squares regression models, the results demonstrated that social resilience explained more variance in crime rates within the 90 city agencies than exposure, physical and social disorder, or economic resilience; however, economic resilience explained more variance in the average rate of change in crime within the 90 city agencies. Moreover, the multilevel analysis revealed that individual-level variables generally have significant effects on both the place of crime and the victim-offender relationship. Furthermore, the results revealed that resilience generally demonstrated significant effects on place of crime and the victim-offender relationship. The implications and policy recommendations are then discussed.
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August 2013
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CHAPTER I
INTRODUCTION

The extant literature on crime, criminality, and victimization is indicative of the complexity of criminology. Historically, there have been theoretical movements within the field, shifting from individual to environmental emphases, as well as from conservative to liberal foci. Understanding the development of criminological theory requires an understanding of the social and historical context. Similarly, in order to understand the complexities of crime, one must also examine the context of the crime.

The foundation of criminology focused predominantly on criminality (Beccaria, 1764; Bentham, 1780; Lombroso, 1876), particularly on violent crime and criminals, with little regard to victims of crime. The 1970s generated new theoretical developments that focused principally on victimization. This was fundamentally due to the development and dissemination of victimization survey instruments (Meier & Miethe, 1993), particularly the National Crime Victimization Survey (NCVS and NCS) in 1973 (Lauritsen, Laub, & Sampson, 1992; Meier & Miethe, 1993; Tseloni, 2000). Victimization theories were appealing primarily because they shifted control from the offender to the victim, and thus provided policies that were formally and informally executable. For example, lifestyle theories shed light on the relationship between an individual’s lifestyle and likelihood of becoming a victim of crime. Attention was given to the similarities between victims’ and offenders’ lifestyles under the principle of homogamy (Henson, Wilcox, Reynolds, & Cullen, 2010), particularly illustrated by the similarities in both parties’ lifestyle, and previously committed delinquent acts by both parties (Fagan, Piper, & Cheng, 1987; Gottfredson & Britain, 1984; Gottfredson & Hirschi, 1990; Jennings, Higgins,

One can also examine the victim-offender relationship through the convergence approach within lifestyle theories. In particular, routine activities theory (Cohen & Felson, 1979) assessed how suitable targets of crime that lack a capable guardian converge with motivated offenders through time and space. Thus, research has demonstrated that examining the victim-offender relationship prior to the incident is essential to routine activities theory (Bouffard, 2007; Cohen, Felson, & Land, 1980; Cohen, Kluegal, & Land, 1981; Felson & Cohen, 1980; Miethe & Meier, 1990).

In order to test the convergence of victims and offenders in both time and space, the context of each incident of crime would need to be accounted for within one model. Thus, it is necessary to examine the environmental, situational, and individual effects of crime, in an effort to achieve contextual causality, which requires the integration of micro- and macro-level explanations of crime (Sampson, 1993, 2013). Past literature has demonstrated strong support for such integration (Agnew, 1999; Bjarnason, Sigurdardottir, & Thorlindsson, 1999; Clear, Rose, Waring, & Scully, 2003; Frye, 2007; Gatti & Tremblay, 2007; Gibson, Zhao, Lovrich, & Gaffney, 2002; Lee, 2000; Messner & Blau, 1987; Moriarty & Williams, 1996; Rountree & Land, 1996b, 2000; Sampson & Lauritsen, 1990; Sampson & Wooldredge, 1987; Sherman, Gartin, & Buerger, 1989; Smith, Frazee, & Davison, 2000; Tewksbury, Mustaine, & Stengel, 2008; Warr, 1988).

Assessing the convergence of offenders and victims through time and space is arguably interchangeable with situational opportunity (Ekblom & Tilley, 2000). Thus, a different approach to this theoretical notion may reveal a more distinct measure of
victim-offender convergence. While routine activities theory was developed with the intention of providing both micro and macro approaches as explanations of crime, researchers initially responded to it as a micro and/or situational model of crime. Felson (1993, 2000) has since advocated for macro approaches of routine activities by assessing not only the target’s routine activities, but also the aggregate community characteristics and routines. Henceforth, researchers have begun to incorporate routine activities with other environmental theories of crime in an effort to create more contextual models of crime (Andresen, 2006; Bursik, 1988; Hipp, 2007a; Lee, 2000; Rice & Smith, 2002). While these models have generally demonstrated support, there is no recognition of how such a model may violate theoretical and statistical assumptions of an informal integrated model, such as multicollinearity between common constructs or theoretical justification for such integration.

Assessing the convergence of victims and offenders in time and space requires records of victim, offender, and incident locations. These sorts of data are rare; thus, research typically has assessed how victims’ locations were related to incident locations or how offenders’ mobility patterns related to their type of crime and recidivism. Consequently, assessing how victims and offenders are related by both social and spatial measures has generally been discounted within the literature. These sorts of analyses fail to provide any true measure of victim-offender convergence.

Statement of the Problem

The primary purpose behind criminological literature is to determine what causes both property and violent crime. While some theories have centered around criminality and attempted to generalize a model to explain all crime, by and large research has shown

In order to understand the effects of violent crime, a theory must account for all factors that may contribute to the occurrence of a criminal act: individual (victim and offender characteristics), situational (type of crime, location of crime, date, day, time of day, temperature), and environmental (social and structural aggregate measures of the community in which the crime takes place) (Browning, 2002; Eck et al., 2010; Hipp, 2007a, 2007b; Kennedy & Forde, 1990; Miethe & McDowall, 1993; Rountree, Land, & Miethe, 1994). Crime must be examined through its interactions, and the convergence of victims and offenders must be approached as a dynamic process (Kennedy & Forde, 1999). Samuels (1994) emphasizes this macro-micro approach in his article on environmental design and crime.

It is the interaction of the physical and the social, the situational and the motivational, the individual and the communal, and the micro and macro environments, which underlies the notion of environmental design and management as a holistic crime prevention strategy. (p. 1)

Thus, an effective understanding of crime is contingent upon answering the why (motivation) and how (convergence of victim and offender). While qualitative research aims to provide a deeper understanding, the use of contextual quantitative models aim to produce a deeper understanding in conjunction with generalizability. This is further
emphasized by Gruenewald, Fresithler, Remer, LaScala, and Treno (2006), who pointed to the utility of examining people within spaces and/or places. Within their study, they incorporated both social disorganization and routine activities theories in an effort to explain violent crime. Lauritsen and White (2001) assessed the differences in violent crime for stranger versus nonstranger victimization, and their findings led them to postulate that crime prevention must focus on individuals, place, and environment to determine the most effective course of defensive action.

Due to the findings of past research, it is seemingly appropriate to incorporate characteristics of all aspects of a crime: the victim, the offender, the situation, the place, and the environment/community in which the victim and offender converge. While there is a need to contextualize a model to explain this convergence, it is also imperative to meet the assumptions of a sound, parsimonious theoretical model. Accomplishing both of these goals has become problematic within developed contextual models that select certain items to measure multiple theoretical constructs, yet disregard possible commonalities that may exist between those constructs. Thus, in order to develop both a contextual and a more parsimonious model to explain violent crime, in particular, violent crime relationships, it is necessary to use guided techniques of theory integration to create a new model that recognizes the common foundations within schools of thought, as well as distinctions between criminological theories (Akers, 1999).

Purpose of the Study

The general goal of this study is to provide a comprehensive model to explain victim and offender convergence in time and space. In order to do so, there are a multitude of considerations that one must account for: one, a comprehensive approach
requires theory integration; two, theory integration can create *theoretical mush* (Hirschi, 1989); three, the method of integration must be theoretically driven; and four, methods of analysis of such a model must be statistically sound. The present study aims to take a crime-specific approach (Clarke, 1980, 1997; Clarke & Felson, 1993); meaning that the study will operate under the assumption that victim-offender convergence is distinct for each type of violent crime. Therefore, this study will focus on crimes of sexual assault, simple assault, aggravated assault, and homicide.

The objectives of this study are multifaceted. The primary purpose of this study is to provide a model that better explains victim-offender relationships and convergence in space and time. To accomplish such an objective two independent variables were used for the study: victim-offender relationship and place/location of the crime. The victim-offender relationship expands the traditional dichotomous measure of stranger or nonstranger into four groups, including stranger, family member, romantic relationship, or acquaintance (Broidy, Daday, Carandall, Sklar, & Jost, 2006; Parker, 1989). Within the present study, the researcher constructed the place of crime by collapsing a previously constructed variable provided in the National Incident Based Reporting System Data. The original categories were collapsed into three groups: outdoors, public area, or residence (see Chapter IV).

The second objective was to assess all levels of independent effects on the dependent variables. More specifically, the researcher aimed to assess the individual (victim and offender), situational (time, drug use, date, climate, place/victim-offender
relationship\(^1\), and environmental (aggregate social and structural characteristics of the corresponding community) effects on victim-offender relationships and place of crime within homicide, sexual assault, assault, and robbery in a national sample of crime incidents within selected United States’ cities. Moreover, while each incident of crime is typically not deemed a process, the overall crime within a community is *processual* (meaning many events of crime take place over time) and thusly should be approached in such a manner. To account for this, the model will examine crime within a city over a five-year period and control for changes in environmental factors over time.

In order to create a model that encompasses all levels of effects on victim-offender relationship and convergence, the assumption of parsimony can become easily disregarded. Therefore, the first step in creating such a model was to use a *conceptual absorption* approach to integration (Akers, 1999). Akers (1999) argued that there were many commonalities within theories that often went unrecognized. Thus, he proposed using what he coined *conceptual absorption*, which allowed for partial integration of multiple theories. This technique creates a more parsimonious model, as it simplifies the integration and avoids issues of multicollinearity (meaning measuring the same phenomenon repeatedly within the same model only to ensure all aspects of each theory are included within the model). The foundations of theories often differ vastly; thus, any partial integration should attempt to maintain the original meanings of the theories (Lanier & Henry, 2004). To some degree, conceptual absorption is already present within the literature; research has oftentimes incorporated aspects from both micro and macro approaches. Even so, these tests have rarely provided any theoretical explanation for such

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\(^1\) Place of crime was dichotomized (public area or residence) to determine its effects within the victim-offender relationship models. Victim-offender relationship was dichotomized (stranger or known) to determine its effects within place models.
integration. Thus, in order to create a parsimonious, yet sufficiently comprehensive model, the researcher embarked on a new approach: applying a more novel ecological theory to violent crime: resilience to crime. The concept of resilience, a measure of risk management through times of change, has been applied in multiple disciplines, including ecology, social work, sociology, geography, political science, and psychology. From a social perspective, research on communities has operationalized resilience as the environmental stability of the community (structural and social), as well as the social preparation and reaction to various hazards (Foster, 2010). While the theory most often is applied to extreme hazardous events (particularly natural disasters), the literature has also put emphasis on the processual nature of resilience within communities. While there are various measures and approaches to resilience research, a social resilience measure encompasses the aforementioned theories of crime, including routine activities, social disorganization and collective efficacy. Furthermore, because scales of resiliency have been constructed and tested, this allows the analyst to further explore how resilience is applicable to crime. Moreover, because of the interdisciplinary nature of resilience, most measures are limited to only the main tenants of resilience and thus can be expanded.

Research Design

The study was designed in an effort to meet the previously mentioned objectives. Thus, in order to assess the three levels of fixed effects (environmental, situational, and individual) data were collected from multiple sources (see below). These data were then merged to create a comprehensive dataset that provided both disaggregated data for each incident, as well as aggregated data for all selected communities in which the incidents of
violent crime (i.e., sexual assault, aggravated assault, simple assault, robbery, and homicide) took place.

**Model Design**

*Theoretical model.* Due to the objectives of the study, it was imperative to create a model that encompassed the underpinnings of the aforementioned theories, yet also provided a more comprehensive approach than prior literature. Therefore, it was essential to more closely examine the effects on violent crime relationships within three levels: environmental, situational, and individual (See Figure 1). Furthermore, it was imperative that the relationships between the independent effects were related and likely interacted with one another (Samuels, 1994). Past research has emphasized importance of the contextual model and its interactions within incidents of crime, which is referred to as the criminal event perspective (Anderson & Meier, 2004; Mieczkowski & Beauregard, 2010; Miethe & Meier, 1994).

*Statistical model.* While the theoretical model is designed to examine effects at three levels (environmental, situational, and individual) the statistical model will use a traditional multilevel model with only two levels. Due to the data being nested by cities/communities, nesting the data by situational context would then restructure the nested data by situational similarities instead of community similarities. Therefore, both situational variables and individual variables were included within the first level to examine the individual-level effects of each incident on victim-offender relationships. Multilevel multinomial models were constructed for both dependent variables (victim-offender relationship and place of crime), and will also be partitioned by each violent crime, thus resulting in eight generalized linear mixed models. Due to the categorical
nature of both dependent variables, multilevel multinomial models were used to assess the individual and environmental main and interactional effects on victim-offender relationships and place of crime. (More on the model design can be found in Chapter IV).

Data

Data for this study were collected from multiple sources, including the Uniform Crime Report (UCR), the National Incident Based Reporting System (NIBRS, which provides information about each incident of violent crime for participating police agencies within the United States), as well as the Census (including the traditional Census of 2000 and 2010, the American Community Survey one year estimates in 2005 and 2009, the Election Atlas (Leip, 2009) and the Almanac (available online). The research constructed such a dataset for purposes of providing an all-encompassing explanation of each incident of violent crime.

Figure 1. Theoretical Model for Explaining Victim-Offender Relationship at three levels.
Participants

There are two main units of analysis for this study: cities and incidents of violent crime within each city. Thus, a multistage cluster sampling technique with a reliance on available subjects was deemed appropriate for this study. To explain further, to meet the objectives of this study (to examine violent crime relationships at a national level over a period of crime) required a national dataset of violent crime incidents that provided information about the community in which the crime took place from 2005-2009. While NIBRS provides that information, it was also imperative that other data could be incorporated within the dataset. Thus, city police agencies that participated in NIBRS consistently from 2005-2009 and had a population of 65,000-499,999 (for purposes of collecting census information) were included within the analysis.

Research Questions

R1: Does Social Resiliency explain differences in victim-offender crime relationships?

R2: What effect do individual demographics have on victim-offender relationships?

R3: Does the modified Social Resiliency Index provide a more parsimonious measure of community effects of crime than other macro theories of crime?

R4: What is the effect of situational characteristics (drug use, incident time, incident day, temperature, and place) on victim-offender relationships?

R5: Do the effects of target suitability (victim demographics) on victim-offender relationship vary across communities?

R6: Do the effects of space (place of crime) and time (incident hour) on victim-offender relationships vary across communities?

R7: What effect do individual demographics have on place of crime?
R8: What is the effect of situational characteristics (drug use, incident time, incident day, temperature, and victim-offender relationship) on place of crime?

R9: Do the effects of time (incident hour) on place of crime vary across communities?

R10: Do the effects of target suitability (victim demographics) on place of crime vary across communities?

Definition of Terms

The present study focuses on how theories can be incorporated in a contextual model. To meet the objectives of the study, criminological theories are reviewed and examined for two purposes: to directly test its elements (fully or partially) within the multilevel models, or to provide foundation for theory integration. Therefore, the theories and their entities are reviewed within the definition of terms.

List of Terms

Victim-offender overlap: Victim and offenders oftentimes are living similar lifestyles, in regards to deviance, economic standing, and/or peer association.

Victim-offender convergence: The primary focus of routine activities theory (Cohen & Felson, 1979), victim-offender convergence focuses on how victims and offenders meet at the time of the incident. Through past literature and for purposes of this study, this is assessed by their prior relationship, the time, date, and day of the incident, the present temperature in the area during the day of the incident, and the place of the incident.

Routine activities: Routine activities theory, developed by Cohen and Felson (1979) provides both a micro and macro approach to crime. The theory is incorporated in this study in two ways: one, as a partial measure in the final theoretical model, and two,
as the theoretical justification for creating a contextual model, as Felson (1993, 2000) emphasized the theory’s macro-micro processual approach. The current study incorporates the theory’s main tenant (convergence of suitable targets and motivated offenders) as its theoretical foundation of the two dependent variables: victim-offender relationship and place of crime.

Social disorganization: For purposes of this study, social disorganization was used as a partial measure of environmental effects on crime. First developed by Shaw and McKay (1932, 1942), social disorganization primarily looks at the effect of aggregate population characteristics on crime, particularly mobility/residential turnover, population heterogeneity, and socio-economic status. Later expansions of the model also examined family disruption (Sampson & Groves, 1989).

Collective efficacy: Collective efficacy was developed by Sampson, Raudenbush, and Earls (1997) in response to traditional models of social disorganization. The theory focused primarily on the inverse relationship between social cohesion and social capital within communities in an effort to better understand informal social control and efforts to increase control within communities. Furthermore, the model typically assessed disorder within the communities, as both physical and social disorder (Yang, 2010). For purposes of this study, collective efficacy effects are partially measured within the model within the traditional resilience measure (community connectivity) and the modified resilience model, to include measures of both physical and social disorder.

Rational choice: Cornish and Clarke (1986) applied choice theories to crime within an economic framework. The theorists postulated that potential offenders choose whether to commit crime based on a comparison of the opportunity to the risk. For
purposes of this study, rational choice is employed as a linkage theory between routine activities and situational crime prevention. Moreover, it is used as an explanation for possible explanations of differences in crime. The actual elements of the theory were not tested within this study.

*Situational crime prevention:* Developed by Clarke (1980, 1983, 1997), the foundation of the theory vastly differed from others in that it was created within a policy-driven framework, and thus, is oftentimes regarded more as a criminal justice theory than a criminological theory. Clarke’s main postulations included that by using a crime-specific approach, crime prevention was feasible within environments and places within those environments. Generally, he focused on how the design of an area, both structurally and socially, could prevent crime by decreasing opportunity and increasing risk. The current study only partially tested this theory in the final model. Its inclusion in the study is based upon its policy-driven approach, as well as its demonstrable linkage of integrating social disorganization, collective efficacy, and routine activities theory.

*Resiliency:* A theory of ecology, resilience has no one founding theorist. The concept of resiliency has become interdisciplinary (Tidball & Krasney, 2007), and thus can be applied to a number of fields with various units of analysis. Resiliency is primarily applied as a risk-management theory, particularly within communities. The goal is to examine the process of organisms or communities and how change affects them, and how they change as a community or organism over time (Tanner, Mitchell, Polack, & Gunther, 2009; Tidball & Krasney, 2007). In order to measure community resilience, there must be measures of change to assess preparation and reaction to hazards (violent crime), to determine adaptive capacity and stability. For purposes of this study, a
resilience model is constructed using previously developed measures of resilience, which are then expanded to encompass all entities of resiliency, as well as the principle tenants of social disorganization, collective efficacy, and routine activities theory.

Limitations

Due to a deficiency of national data on incidents of violent crime, there are a number of limitations which must be noted. First, while data from all the aforementioned sources were checked for validity and reliability, there are bound to be inaccuracies, particularly within data that were imputed by various individuals. Furthermore, the data used for environmental measures of crime were pulled from a number of sources that may slightly vary on their overall unit of analysis (city versus city-county, zip code areas, etc.). This was noted within the analysis, and taken into consideration during data interpretation and references to generalizability. Furthermore, city selection was restricted by population (65,000-499,999), as well as their participation in the National Incident Based Reporting System (NIBRS) from 2005-2009. Both restrictions were imperative for data collection; as there are a number of reports unavailable for small cities. Thus, this too was accounted for and noted within data interpretation, particularly using caution regarding any national generalization of the findings.

Assumptions

Assumptions of this study pertain to both the theoretical foundation and to the study’s approach of examining violent crime relationships. While using a resilience measure still requires measures of multiple items, it reduces the dimension to one overall construct: resiliency. There are three assumptions of using such a theoretical approach. One, using this dimension will create a more parsimonious model for explaining violent
crime and violent crime relationships. Two, the concept of resiliency operates under the assumption of change, which allows the analyst to create a model that examines environmental changes in crime and demographics over time. Three, due to the interdisciplinary nature of resilience, it is theoretically robust, thus it can be modified for purposes of applicability to a given subject.

Due to the limitations of the data, there are two assumptions made when assessing incidents of crime. First, that the data were entered validly by the corresponding agencies (although reliability checks of the data were conducted); and three, that the information given by the victim about him or herself, the offender, and/or the incident is factual.

Summary

The purpose of the present study was to develop a more comprehensive, yet parsimonious model to explain victim-offender convergence in violent crimes, by examining both victim-offender relationships and place of crime in a contextual model. Furthermore, the aim of the study was to develop an integrated parsimonious model by applying the ecological theory of resiliency to violent crime. In order to meet these objectives, several data sources were used and compiled to provide detailed data for situational and individual characteristics of each incident of crime, as well as aggregated characteristics about the community. The findings of the study are discussed in Chapters V and VI.
CHAPTER II
THEORETICAL FRAMEWORK

Introduction

The primary objective of criminological theories originally was to explain crime through criminality, the offenders’ processes, thoughts, and behaviors (Meier & Miethe, 1993). It has only been within the last thirty to forty years that victimization theories of crime have become prevalent within the field of criminology, primarily focusing on lifestyle patterns (Garofalo, 1987; Hindelang, Gottfredson, & Garofalo, 1978; Sampson & Wooldredge, 1987), as well as the relationship between lifestyle and one’s environment (Cohen & Felson, 1979; Cohen, Kluegel, & Land, 1981; Garofalo, 1987).

Wolfgang (1959), who coined the term *victim precipitation*, conducted one of the first studies on the role of victimization within crime. According to Meier and Miethe (1993), Wolfgang used the term to explain how homicide victims had a role in instigating the initial violence that led to their murder. Victim precipitation was then applied to other criminal acts, including aggravated assault (Curtis, 1973; Miethe, 1995) and rape (Amir, 1967); however, its meaning was expanded to include cases in which the victim had made him or herself more vulnerable to victimization. While this research is undoubtedly influential in more current victimization literature, its downfall lied within its latent message that the victim was partially at fault for the criminal act (Meier & Miethe, 1993).

It was not until the 1970’s that victimization theories truly began to emerge. This was largely attributable the creation of comprehensive surveys on victimization (Meier & Miethe, 1993). This allowed subsequent research and theoretical arguments to be data-driven at a national level, particularly after the development of the National Crime
Victimization Survey (known as both the NCVS and NCS) in 1973 (Lauritsen, Laub, & Sampson, 1992; Meier & Miethe, 1993; Tseloni, 2000). Moreover, it was the development of lifestyle and routine activities theory (Cohen & Felson, 1979; Hindelang et al., 1978), coupled with the data that led to the prevalence of victimization theories. As Felson (2001) noted, the value of routine activities lied within its distinct shift of concentration upon the offender to the victim and guardian (Dugan & Apel, 2005; Garland, 1999).

The emphasis on victimization theories was somewhat instigated by the need to examine relationships and dynamics between victims and offenders (Block, 1981; Reiss, 1971). Subsequent literature within lifestyle and routine activities theories on victimization suggest that there are similarities between victims and offenders. This operates under the principle of homogamy, which can apply to both the association of offenders and victims, as well as the overall lifestyles of victims and offenders (Henson et al., 2010). The victim-offender overlap has been recognized within a number of criminological theories, including subcultural (Anderson, Grandison, & Dyson, 1996), strain (Merton, 1938), and aggression and relations theories (Tesdeschi & Felson, 1994); yet is most vastly demonstrable within lifestyle and routine activity theories (Jennings, Piquero, & Reingle, 2011; Schreck, Stewart, & Osgood, 2008). However, incorporating a general assumption of homogamy within criminological theories would conflict with the consensus that victims and offenders are distinct, easily divisive groups. This is exemplified within the policy implications of lifestyle and situational theories, through target hardening and defensible space (Clarke & Felson, 1993; Newman, 1973; Singer, 1981; Taylor, Gottfredson, & Brower, 1984). While these theories, particularly within
their original formation, disregarded motivation, their strengths lie within the ability to explain the situation of crime and the interaction likelihood of victims and offenders. Research findings indicate that there are a number of similarities between victims and offenders, and that these are particularly observant within situational and lifestyle measures. To elaborate, an individual’s degree of association with delinquents directly influences his or her likelihood of victimization. Moreover, the more an individual mirrors characteristics and behavior of delinquents (demographics, structural community characteristics, and illegal/delinquent activity), the greater the likelihood of being victimized (Henson et al., 2010; Schreck, Fisher, & Miller, 2004). The victim-offender overlap is particularly prevalent within violent crime (Fagan et al., 1987; Gottfredson & Britain, 1984). Klevens et al. (2002) found that there is a one-third overlap between victims and offenders within violent crime. More specifically, victims of crimes had previously been offenders and offenders had previously been victims 33% of the time. The reasoning for this relationship is often explained by how one’s own deviance is indicative of a more risk-seeking lifestyle and low levels of self-control, which has been used to explain the relationship between delinquency and victimization (Gottfredson & Hirschi, 1990; Jennings et al., 2010; Lauritsen & Quinet, 1995; Wittebrood & Niewbeerta, 2000).

Present day researchers have greatly emphasized the importance of understanding victimology. Studies have shown that certain demographic characteristics, specifically, age, area of residence, gender, marital status, and parental involvement (Bjarnason, Sigurdardottir, & Thorlindsson, 1999; Gottfredson & Britain, 1984; Henson et al., 2010; Hindelang et al., 1978; Kennedy & Forde, 1990; Miethe, Stafford, and Long, 1987).
While research has generally shown the highly attributable effects of individual demographics, findings have shown that this relationship is spurious without controlling for the mediation of two effects: individuals’ lifestyles and the effects of individuals’ communities on those lifestyles (Henson et al., 2010). While initially, lifestyle theories were predominantly developed and interpreted as micro-level theories, (Hindelang et al., 1978; Sampson & Wooldredge, 1987) routine activities’ foremost argument is that it is the convergence of its elements in time and space that create a criminal event. Additionally, lifestyle and routine activities theories are better understood when identifying them simply as a component of a general theoretical model of opportunity (Sampson & Wooldredge, 1987).

A community’s collective lifestyle choices coupled with its environmental structure may affect the likelihood of motivated offenders and potential victims’ convergence. Thus, assessing the individual-level relationship between the offender and the victim in context of the community is truly imperative to understand the motivation, reasoning, and consequences of criminal activity for both the offender and victim (Bouffard, 2007; Cohen, Felson, & Land, 1980; Cohen, Kluegal, & Land, 1981; Felson & Cohen, 1980; Miethe & Meier, 1990). The environmental and situational effects of victimization are what Miethe and Meier (1990) refer to as a “structural choice theory of victimization” (p. 245). This approach embraces the general opportunity model as it assesses the choices and likelihood of victimization by examining both lifestyle and spatial components, while also analyzing the effects of a target’s attractiveness and availability on the choice/selection criteria of the offender.
Evaluating crime by employing a micro-macro integration of community-level theories with individual-level theories is still considered rather novel. However, studies have demonstrated that this integration provides vastly greater explanatory power of criminality (Agnew, 1999; Bjarnason et al., 1999; Clear et al., 2003; Frye, 2007; Gatti & Tremblay, 2007; Gibson et al., 2002; Lee, 2000; Messner & Blau, 1987; Moriarty & Williams, 1996; Rountree & Land, 1996a, 1996b, 2000; Sampson & Lauritsen, 1990; Sampson & Wooldredge, 1987; Sherman et al., 1989; Smith, Frazee, & Davison, 2000; Tewksbury, Mustaine, & Stengel, 2008; Warr, 1988). Therefore, the present objective is to review the primary arguments and extant literature of the following theories: Routine activities (Cohen & Felson, 1979), Rational choice (Cornish & Clarke, 1986), Social disorganization (Shaw & McKay, 1932, 1942), and collective efficacy (Sampson et al., 1997). Moreover, the secondary objective is to examine how these theories’ main tenets have been integrated using Akers’ (1999) ideas of conceptual absorption to explain the micro, macro, and processual elements of a criminal act in a socio-spatial context. Lastly, the aforementioned theories and a model of resilience were used as a framework to integrate the aforementioned theoretical foundations.

Routine Activities Theory

In 1979, Cohen and Felson published *Social Change and Crime Rate Trends: A Routine Activity Approach*. Within the manuscript the two authors presented their theory of routine activities, which focused on community and individual crime prevention by examining how a motivated offender, a suitable target, and a lack of a capable guardian converged in time and space to create a criminal event (Cohen & Felson, 1979; Cohen et al., 1981; Cullen & Agnew, 2006; Felson, 1987, 2000). Like other lifestyle theories,
routine activities theory was victim centered, applying previous criminogenic variables as victimogenic (Jensen & Brownfield, 1986). The theorists developed their conjectures under the assumption that full crime prevention was unachievable; there would always be offenders who were motivated to commit crime. Decreasing the likelihood of a criminal incident, however, was feasible by undertaking two methods of prevention: increasing guardianship of individuals and the community, and altering individuals’ daily activities that made one more susceptible to victimization.

Cohen and Felson (1979) heavily based their theory upon the principle of least effort (Zipf, 1949), which argued that people aspired to find that method which required the least amount of effort, time, and means. Although others have applied the principle to various types of crime, Cohen and Felson (1979) primarily concentrated on predatory crime. Therefore, they originally had not intended to explain exploitative, mutualistic, or competitive violations of criminal activity (Cohen & Felson, 1979; Felson, 1987). According to Felson (2000), the theory’s purpose was solely to explain those offenses that were predacious in nature, particularly since they theorized that the motivated offender conducted some method of decision-making to seek out a suitable target, regardless of whether it was a person or property. The likelihood of personal victimization was contingent upon the degree of guardianship for the target, which fluctuated within everyday activities, and dependent on one’s company, his or her typical association, and the activities’ purpose location. Thus, when a desirable person or property became unguarded, she, he, or it transformed into a motivated offender’s suitable target.
Cohen and Felson (1979) stated that routine activities are defined as “formalized work…provision of standard food, shelter, sexual outlet, leisure, social interaction, learning, and childrearing” (p. 593). Moreover, they “may occur (1) at home, (2) in jobs away from home, and (3) in other activities away from home” (p. 593). The theorists postulate that one could evaluate the theory’s validity through individual and aggregate crime rates, when accounting for the location in context of the activity, as well as the hypothesized guardianship within that location. As previously stated, Cohen and Felson (1979) deemphasized the importance of the offender in an effort to provide practical objectives of crime prevention to the community and potential targets of crime. While most theories focused on how crime originated from the evils, wrongs, and inequality within society, routine activities focused on how the commonplace was truly the instigator of crime. The two argued that ostensibly, theorizing that crime could be defined as the bad that arose from the bad was a *pestilence fallacy* (Felson, 1994). Thus, Cohen and Felson (1979) instead concentrated on how the mundane, everyday goings-on within law-abiding individuals have a symbiotic connection to the illegal and predatory events of offenders (Osgood, Wilson, O’Malley, Bachman, & Johnson, 1996).

*The Elements and Assumptions of Routine Activities*

**Suitable target.** According to Cohen and Felson (1979), a suitable target can refer to a person and/or property. The degree of attraction of the target to the motivated offender is contingent upon four elements (Felson, 2000): value, inertia, visibility, and access, which are commonly denoted by the acronym VIVA. Value is the offender’s level of desire for the target—how significant or worthy possessing or pursuing that target would be. Inertia represents the overall effort that it will take to move or take possession
of the potential target. This may refer to the weight of the object and/or its location. Visibility represents how close or observable the potential target it. Greater visibility typically increases accurate assessment of pursuing or taking possession of the target. Lastly, access to the potential target is the motivated offender’s proximity to the target, as well as his/her proximity to a safe place after taken hold of the target (Felson, 2000).

*Capable guardian.* A capable guardian can refer to a person or person/s; however, it can also refer to a location and/or the social construction of that location. The macro-level assumptions of routine activities theory are predominantly present within the element of guardianship (Cohen & Felson, 1979; Felson, 2000). On a micro-level, lacking a capable guardian may mean a potential victim walking alone at night or leaving a car unlocked with valuable electronics on the inside. Yet, Felson’s (1986, 1994, 2000) later work emphasized the capable guardian being interchangeable with informal social control, arguing the state and its policing were not the solution to crime prevention. He purported that the solution to crime was founded within the individual and collective methods of a community to prevent crime on an everyday basis. Yet it was not until 2006 that Felson began to focus on the ecological aspects of crime, by incorporating the early works of the Chicago school into the ideas of how guardianship was observable through the natural interplay of the community and its overall collective efficacy (Akers, 1999; Felson, 2006).

From the offender’s perspective, a capable guardian is known as a handler, the person who controls the offender, preventing them from committing criminal acts (Cohen & Felson, 1979). This idea was the impetus for the continuing emphasis of social control. Specifically, Felson and Gottfredson (1984) integrated the main proponents of Hirschi’s
(1969) social control theory to argue that society first must provide a handler to each individual, but that the individual may be handled not only by one intimate handler (typically the parent), but also the community. It is when the overall collective of a community breaks down that the community handler is weakened and fallible.

Eck (1994) later provided a third type of guardian, whom he referred to as managers or the protectors of places. This was met with ringing endorsement from Felson (1994), who used this typology to assess further the relationship between guardians, offenders, and victims. Moreover, Eck’s (1994) addition contributed to Felson’s continuing advancements on the assimilation of socio-structural effects on temporal and spatial convergence (Felson, 1987, 2001, 2006).

*The motivated offender.* Cohen and Felson (1979) did not originally test the last proponent, the motivated offender. In fact, they made little reference to the development or creation of a motivated offender; they simply contended that there is always a plethora of motivated offenders. This coincided with the foremost proponent, as well as the main appeal of the theory: crime prevention had little to do with either the state or the criminal; controlling crime was within the community’s and its members’ control (Akers, 1999; Cohen & Felson, 1979; Felson, 2001).

*Deviance and victimization.* As previously discussed, both lifestyle and routine activity theories operate under the assumption of homogamy, which essentially states that a positive and significant relationship exists between one’s association with offenders and one’s chances of victimization (Block, 1981; Campbell, 2005; Fagan et al., 1987; Gottfredson & Britain, 1984; Jennings et al., 2010; Sampson & Lauritsen, 1990). While the rationale behind this association may contribute to varying degrees of victimization
odds, the association itself remains significant. To explain further, whether someone intentionally socializes with offenders, or unintentionally encounters them, it is the individual’s lifestyle that affects the chance of victimization. While one may regard this lifestyle as a choice (Fagan et al., 1987; Henson et al., 2010; Jennings et al., 2010; Meier & Miethe, 1993), social inequality also substantially affects victimization risk, meaning that one’s proximity to offenders, even when actively attempting to avoid them, will still increase the likelihood of victimization (Cohen, Kluegal, & Land, 1981). Sampson and Lauritsen (1990) state that nonviolent or violent offenders are susceptible targets of crime because of the activities they seek out. Moreover, when assessing the choice aspect of the opportunity model, offenders deem deviant individuals suitable targets because there is a decreased probability of punishment. Meaning, the victim is typically more reluctant to involve law enforcement, and has less credibility than a seemingly innocent target (Siegel, 2010). Studies have consistently found that one’s own deviance is one of the strongest indicators of future victimization (Broidy, Daday, Crandall, Sklar, & Jost, 2006; Finkelhor & Asdigian, 1996; Osgood, Wilson, O’Malley, Bachman, & Johnston, 1996; Schreck, Fisher, & Miller, 2004; Schreck, Stewart, & Osgood, 2008; Schreck, Wright, and Miller, 2002).

The Validity of Routine Activities

Crime prevention. Although routine activities’ underlying message regarded controlling crime and preventing criminal acts by decreasing opportunity, it simultaneously emphasized that full crime prevention was unobtainable; crime, just like other events, was routine (Cohen & Felson, 1979). In later developments, the theorists, particularly Felson (Clarke & Felson, 1993; Felson, 2001) recognized that subsequent
studies have contradicted this supposition. Incorporating the seemingly contradicting works of Clarke’s situational crime prevention (1980, 1997) and social control has allowed Felson to expand the theory’s explanation of other crimes, including mutualistic and competitive violations, as well as drugs and drug markets (Eck, 1994; Eck & Wartell, 1998), suicide (Clarke & Lester, 1989) and escalations of violence (Kennedy & Forde, 1999; Tedeschi & Felson, 1994). This original supposition of crime prevention has led to the concern of crime displacement; thus, instead of demotivating the offender, it simply motivated him or her to seek another target within another area (Brunet, 2002; Clarke, 1997). While some research has invalidated this finding (Sherman et al., 1989), it is still recommended that this be controlled within the model (Messner & Anselin, 2004; Stucky & Ottensman, 2009).

Testability. Research has generally demonstrated that routine activities affect victimization. When assessing victimization in a multilevel model, however, individual-level approaches have shown mixed results. For instance, when assessing the effects of individual characteristics on routine activities, Messner and Tardiff (1985) found that one’s demographic characteristics affected routine activities, which in turn affected the likelihood of victimization. Similarly, Mustaine and Tewksbury (1998), as well as Miethe et al. (1987), found individual-level activities were a strong indicator of victimization. Conversely, Lauritsen et al. (1992) found little effect of individual-level characteristics and routine activities on likelihood of victimization. Kuo, Cuvelier, Sheu, and Zhao (2012) found that individual-level characteristics had inconsistent effects across types of crime. Lauritsen (2001) found that the effects of personal characteristics were sensitive to how violence was measured, while Spano and Freilich’s (2009) results demonstrated that
operationalization and the effects of routine activity’s elements were contingent upon the population in which the theory was tested. These findings were consistent with Spano and Nagy’s (2005) previous study, which found that when assessing rural populations, it was imperative to include a measure of social isolation to understand the relationship between routine activities and violent criminality. Moreover, as previously stated, other individual-level studies have found that one’s own deviance remains the strongest or one of the strongest predictors of crime (Broidy et al., 2006; Osgood et al., 1996; Schreck, Fisher, & Miller, 2004; Schreck, Stewart, & Osgood, 2008; Schreck et al., 2002). This characteristic may be more contributable to social context rather than individual activities (Lauritsen, Laub, & Sampson, 1992). Thus, as previously mentioned, assessing structural and individual-level variables simultaneously has become prevalent (Agnew, 1999; Bjarnason et al., 1999; Clear et al., 2003; Frye, 2007; Gatti & Tremblay, 2007; Gibson et al., 2002; Lee, 2000; Messner & Blau, 1987; Moriarty & Williams, 1996; Rountree & Land, 1996a, 1996b, 2000; Sampson & Lauritsen, 1990; Sampson & Wooldredge, 1987; Sherman, Gartin, & Buerger, 1989; Smith, Frazee, & Davison, 2000; Tewksbury et al., 2008; Tseloni, 2000; Warr, 1988).

Operationalization. Even when studies have demonstrated strong support for routine activities, the validity of these results may be questionable, since one of the three elements has been poorly operationalized (motivated offenders), rarely tested, and even when included in a testable model has lacked any direct measure of motivation (Akers, 1999; Bernburg & Thorlindsson, 2001; Paulsen & Robinson, 2004; Schwartz, DeKeseredy, Tait, & Alvi, 2001). This is particularly problematic, considering subsequent literature has labeled it an opportunity theory (Cohen, Kluegel, & Land,
Given that opportunity theories are contextualized through a general choice model, failing to examine this imperative aspect greatly diminishes the strength of the theory. This disregard for explaining the origination of motivation within the offender has arguably been the theory’s greatest source of ridicule. While this argument was consistent with their de-emphasis of the offender, it left the theory open to vast criticism, as the temporal ordering of motivation was never clarified—was motivation already in existence, or did the observation of a suitable target create the motivation? The question remains unanswered (Lanza-Kaduce, Dunham, Akers, & Cromwell, 1998). In response to this criticism, the theory has focused more on victim-offender convergence within an environmental foundation rather than an opportunity model.

**Expansion and Reformation**

As previously stated, routine activities is generally classified as a micro-level, lifestyle theory; however, Felson’s subsequent work has emphasized its macro-level components (Felson, 1986, 1987, 1993, 1994, 2000), by expanding his mentor’s work (Clarke, 1980) of situational crime prevention (Garland, 1999). Following the naturalist approach of Clarke, Felson (1980, 1987, 1994, 2006; Felson & Cohen, 1980) has simultaneously expounded upon the original theory, while maintaining the theory’s policy-driven, parsimonious approach. To illustrate, Felson (1996, 2003) has conducted various studies that have incorporated theoretical rationales to crime from a number of disciplines, including sociology, criminology, economics, geography, and ecology. He has then used these rationales to assess how individual relationships between victims and offenders occur, how motivated offenders are originated, and lastly how the community can affect the degree of guardianship. Felson managed, however, to expand without
complicating, to expound upon the proponents of the theory without hindrance from the vague subsets of past theoretical suppositions that adhere to armchair theory and disregard policy and practical utility. He did so by employing previously developed theories from other disciplines, and integrating those using theory-driven techniques. Within its present form, routine activities theory attempts to integrate community- and individual-level factors to examine the convergence of offenders and victims through time and space (Felson, 2001; Garland, 1999).

While the theory has arguably maintained its overall prevalence within criminology, its utility within female victimization research has been somewhat remiss. This was slightly purposeful as the theories applicability to female victimization created a divide within the criminological field, particularly due to its prodigious concentration on victims’ lifestyles (Franklin, Franklin, Nobles, & Kercher, 2012). Furthermore, the portrayal of the suitable target as measures of property coupled with the insinuation of the victim being at fault created some resistance to its overall applicability within crimes against women, particularly sexual assault. Campbell (2005) reiterated this point within her critical analysis of crime prevention of sexual assault. She purported that efforts to lower risk focus on control and diminishment of women’s freedom and lifestyle choices.

The developments and additions to routine activities theory have led Felson to encourage further testing of the effects of routine activities through multiple levels of analysis, not only through contextual models, but also through analyzing the mediating effects of routine activities on the relationship between that of time, space, and/or weather and criminal events (Felson, 2001). Even with its criticisms, it remains one of the most influential theories in criminology (Cullen & Agnew, 2006).
Rational Choice: The Economical Choice of Crime

Similar to routine activities theory, rational choice theory falls under classical deterrent theories of crime (Akers, 1999; Bernard, Vold, Snipes, & Gerould, 2010; Cullen & Agnew, 2006). Clarke and Cornish (1985) developed the theory of crime using economic principles and methods. Specifically, the theorists applied the principle of expected utility, which assessed the processes of decision-making based on maximizing profits and minimizing losses. Its fundamental argument was that offenders make a decisions in an observable succession focusing on whether to participate in a criminal lifestyle, whether to participate in a particular criminal event, which and what type of potential victims to target, and the methods to effectively complete the crime without detection (Wright & Decker, 1997). Similar to deterrence, the theory is grounded in utilitarian theory, by determining the value of the event by its outcome (Akers, 1999; Gibbs, 1975; Paternoster & Piquero, 1995). While the theory was established on the tenets of the classical school, it extensively builds upon the original theories. Rational choice encompasses the ideas of deterrence (Beccaria, 1764), opportunity theory (Cloward & Ohlin, 1960), and routine activities theory (Cohen & Felson, 1979). Its parsimony and economic application is both its appeal and downfall, the theory is clean and deductive (Hirschi, 1986); however, its directionality and attempts at causality are fallible (Akers, 1999; Bernard et al., 2010; Hirschi, 1986; Pogarsky & Piquero, 2003).

Theories of rational choice are not novel; however, prior to the theoretical developments of Clarke and Cornish, no one within criminology had applied the theory to criminal decision-making (Akers, 1999; Bernard et al., 2010; Cullen & Agnew, 2006). Generally, the theory expands on deterrence (Beccaria, 1764) and the Hedonistic
Calculus (Bentham, 1780) by developing a more sophisticated model to explain how an individual determines whether they will become involved in criminal activity, participate in a certain criminal event, and then continue or desist from criminal activity throughout the life course (Clarke & Cornish, 1985; Cornish & Clarke, 1986, 1987). Cornish and Clarke (1985, 1986, 1987) argue that these decisions are based predominantly on the outcome of the decision, specifically the costs and benefits. The theorists postulate that this is based on rational calculations that are based on individuals’ knowledge and experience (Cornish & Clarke, 1986, 1987; Clarke & Cornish, 1985). Like routine activities theory (Cohen & Felson, 1979), rational choice theory is established within the model of human choice (Bernard et al., 2010); however, the context of the situation is imperative in determining the eventual decision of the individual. Moreover, the situation is one of the most significant tenets of the model, offenders may target certain situations based upon the opportunity. This is referred to as situational selection (Birbeck & Lafree, 1993). Thus, in order to assess the context of the event, there is a need for more complex multilevel analyses that examine the macro and micro level characteristics of the event and its opportunity (Cook, 1986; Hechter & Kanazawa, 1997). These observations have led to further developments of rational choice theory to focus more on crime prevention through situational, not individual means (Bernard et al., 2010; Clarke, 1980, 1997, 1999, 2002).

The general objective of rational choice theory is not to explain criminality, but to explain certain criminal events, as well as an offender’s decision to desist or continue criminal activity. The decision-making process is crime-specific and individual-specific, meaning that there are a number of variables that must be accounted for prior to

The Elements and Assumptions of Rational Choice Theory

Rationality. Arguably, the foremost principle of rational choice theory lies within its assumption of rationality. Unlike most other criminological theories, rational choice theory asserts that (with the possible exception of criminal events involving mentally ill offenders) a criminal act is never meaningless or illogical—the offender’s purpose to the act that is typically based on the benefits received by that offender (Akers, 1999; Bernard et al., 2010; De Haan & Vos, 2003). Moreover, determining the decision-making process and calculations of costs and benefits vastly differs for each crime. Just like each situation contributes to the calculated risks and benefits, so too does the type of crime being committed. Cornish and Clarke (1997) argue that the economic model must incorporate a number of personal and situational variables to determine the costs and benefits of a potential criminal act. De Haan and Vos (2003) state that this postulation contends that there is an underlying assumption with rational choice theory of a priori decisions, meaning that this complex, mathematical model must take place prior to any involvement or participation in a criminal event.

Motivation. Clarke and Cornish’s (1985) theory of rational choice is focused on the process of involvement in crime; however, it does not focus or attempt to explain the origin of motivation. As previously stated, the theory is similar to other classical school theories in that it assumes that there is always a plethora of individuals who are motivated to commit crime if given the opportunity (Bernard et al., 2010; Clarke & Cornish, 1985;
Cornish & Clarke, 1986, 1987). Typically, researchers have argued that motivation usually is explained by potential monetary gains; what truly effects the motivation is the reason behind the monetary motive (De Haan & Vos, 2003). Clarke and Cornish (1985) argue that individuals’ motivations behind crimes differ, and changes within motivation are contingent upon the type of crime, the situation, and the potential target. Cornish and Clarke (1997) refer to these distinctions as choice-structuring properties, meaning that certain types of crime and areas may attract some more than others, depending on the advantages and risks of the offense. Therefore, the goal is not to explain motivation specificities for each criminal, but instead to develop a crime-specific focus within a general model of criminal decision-making (Cornish & Clarke, 1986, 1987).

Stages of decision-making. In addition to assessing decision-making in isolated criminal events, the theory also aims to assess decision-making over the life-course. Cornish and Clarke (1986, 1987) purport that there are three steps that take place throughout the life-course: initial involvement in criminal activity, criminal involvement in a particular event, and lastly, continued desistance or continued involvement in criminal activities.

Risks, benefits, and opportunity. Cornish and Clarke (1986, 1987) primarily focus on the second model, the criminal event model. Clarke and Cornish (2001) assert that crime is a choice, it is not unexplainable, nor accidental, criminality and “…crime are purposive and deliberate acts, committed with the intention of benefiting the offender” (p. 25). Additionally, the theorists contend that decisions to partake in a criminal activity are rationally, calculated decisions. First, they become appealing to a potential offender by the perceived benefits of committing the offense, and then based on the opportunity to
commit the crime, and the level of risk, the potential offender will make a rational choice to commit the crime. While Clarke and Cornish (1985) state that decision-making is based upon the context of the situation, subsequent literature has demonstrated that there are a number of other factors, including an individual’s emotional, demographic, and social background that determine how one will perceive risks and benefits (Cullen & Agnew, 2006; Grasmick & Bursik, 1990; Nagin & Paternoster, 1991; Paternoster, 1989). Moreover, while risks were originally considered for the most part to be a function of formal sanctions, there are a number of informal sanctions that have demonstrated equal if not greater perceived costs of crime (Bernard et al., 2010; Grasmick & Bursik, 1990; Nagin & Paternoster, 1991).

**Deviance and victimization.** The emphasis on the situation fundamentally dries the foundation of rational choice theory. Like routine activities theory (Cohen & Felson, 1979), the policy implications for rational choice focus more on crime prevention through the situation and the potential victim (Fattah, 1993). Research on rational choice has demonstrated that self-protection measures can be effective (Cook, 1986; Cornish & Clarke, 1997; Nagin & Paternoster, 1991). Moreover, according to Farrell, Phillips, and Pease (1995) the theory can explain repeat victimization. Offending against the same places or people are arguably rational choices made because of the benefits and lower risks of the area and/or the vulnerability of the individual victim. The likelihood of an individual changing his or her behavior when s/he feels threatened is dependent on his/her past experiences with crime (Khan, Byrne, & Livesay, 2005). While self-protection measures used by the victim are largely a function of rational thought, they can
also be attributable to unfounded beliefs and emotions. Motivations behind changes in behavior are often challenging to distinguish (Khan et al., 2005).

The Validity of Rational Choice.

Rational choice theory has received vast criticism, which is predominantly attributable to its heavy reliance on economic principles that fail to account for human thought processes, emotion, and irrationality (Grasmick & Bursik, 1990; Hirschi, 1986). Cornish and Clarke (1987) argue that decision-making is not simply precipitous, but instead based on individual characteristics and experiences. Moreover, they purport that by assessing the individual’s past criminal involvement, as well as his/her emotions and lifestyle, will provide better understanding of offender decision-making (Bernard et al., 2010; Clarke & Cornish, 1985, 2001; Cornish & Clarke, 1986, 1987; De Haan and Vos, 2003; Grasmick & Bursik, 1990; Paternoster, 1989; Nagin & Paternoster, 1991; Tibbetts & Herz, 1996).

One of the appeals of rational choice was its pointed divergence from pre-deterministic theories (Hirschi, 1986); however, its relentless emphasis on rationality disregarded the effect that the past has on the present. Emotionality and individual characteristics can affect one’s rationality, even to a point of being irrational (Akers, 1999; Cromwell, Olson, and Avary, 1991; Opp, 1997; Tunnell, 1990, 1992). Furthermore, as newer criminological theories were introduced, particularly A General Theory of Crime (Gottfredson & Hirschi, 1990), Cornish and Clarke’s (1985, 1986, 1987, 2001) contention that offenders thought-out and calculated cost-benefit analyses were seemingly speculative. Gottfredson & Hirschi (1990) agreed that opportunity affected criminality, but it was more a case of impulsivity than rationality. Research also
demonstrated that the validity of the rational choice decision-making model increased when applied to or integrated with social control (Hirschi, 1986), shame (Grasmick & Bursick), and social leaning (Akers, 1999; Matsueda, Kreager, & Huzinga, 2006; Matthews & Agnew, 2008).

*Crime prevention.* While rational choice theory initially seemed to center on the offender and his/her processes of decision-making, the theory is largely driven by the situational context surrounding the decision-making. Thus, policy that is driven by rational choice theory should center on changing situations, which will in turn change offenders’ calculations. By increasing the risk and decreasing the benefits, this will decrease the likelihood of a motivated offender committing that particular offense (Bernard et al., 2010; Clarke & Cornish, 1985, 2001; Cornish & Clarke, 1986, 1987; Nagin & Paternoster, 1991). As previously stated, although initially the theory focused on how formal sanctions impacted changes in risk/benefit calculations, research has demonstrated that informal sanctions have a significant influence on offender decision-making (Bernard et al., 2010; Clarke & Cornish, 1985, 2001; Cornish & Clarke, 1986, 1987; Grasmick & Bursik, 1990; Nagin & Paternoster, 1991; Paternoster, 1989).

*Testability.* Rational choice theory has been praised for its parsimony; it is clean and deductive (Hirschi, 1986). The theory has continually expanded, focusing on better explanations for the complexities of criminality (Pratt, 2008). However, Cornish and Clarke’s (1980, 1997, 2009) continual contention that each crime, situation, target, and criminal is unique and thus must be met with distinct approaches, obfuscates the decision-making model, thus decreasing its testability. While research has demonstrated their argument is correct (Paternoster, 1989; Tibbetts & Herz, 1996), this still weakens
the results of studies that support the theory. For instance, sexual offenders have
oftentimes been deemed impulsive and irrational; however, Bachman et al., (1992)
argued against this notion, asserting that sexual assault is a willful act, and with
willfulness comes some sense of rationality, which in turn signifies some sort of rational
decision-making model.

Conversely, Bouffard (2002) found partial support that sexual arousal increased
the focus on perceived benefits of sexual assault, while decreasing the focus on perceived
risks. Calhoun and Weaver (1996) conducted a study on the prevalence of rational
decision-making with male prostitutes. Their findings indicated that there were
indications of weighing benefits versus liabilities; nonetheless, understanding the
decision-making process was complex and hard to follow. Pilavian, Garner, Thornton,
and Matsueda (1986) found that previous studies had failed to focus on the effects of
rational choice on violent crimes due to a lack of data. Their findings indicated there
might be a positive relationship between deterrent effects and crime seriousness.
Additionally, Clark and Cornish’s (1985) focus on situational factors, while valuable for
policy changes, decrease the testability of rational choice. Determining effects of
situational changes on target crimes are challenging, particularly at a macro-level, since
changes in overall crime statistics may obscure crime displacement (Bernard et al., 2010;

Operationalization. Similar to determining a definition for normality, determining
whether thinking is rational is seemingly unachievable. While offenders do seem to
develop some sort of decision-making model, its basis is not always rational (Akers,
1999; Opp, 1997). Tunnell (1990, 1992) found that offenders oftentimes did not believe
they would be caught, and if they did, believed they would not serve much prison time. Pogarsky and Piquero (2003), who applied the gambler fallacy to rational choice and deterrence, further supported these findings. They found that increased experience with formal sanctions actually decreased the deterrent effect. Moreover, some research has shown that formal and informal sanctions have a significant effect on the decision to participate in a criminal event (Pilavian, 1989; Sung & Richter, 2007; Tibbetts & Herz, 1996); some research has demonstrated that perceived informal sanctions had little to no deterrent effect (Nagin & Paternoster, 1991; Pogarsky, 2002; Williams & Hawkins, 1986). This demonstrated that individual characteristics affected whether someone was deterrable (Pogarsky, 2002). Additionally, research has revealed that individual characteristics and experience affect perceptions of the likelihood of formal and informal sanctions. Paternoster and Simpson (1996) determined that morality and one’s moral restraints had a significant effect on the deterrent influence of formal and informal sanctions for white-collar criminals. Grasmick and Bursik (1990) found that when accounting for shame the effects of informal and formal sanctions were much greater for women than men. The researchers suggest that the process of socialization can explain this gap in gender. This supports Matsueda et al.’s (2006) and Akers’ (1999) argument that the process of calculating the ratio of benefits versus costs is established through social learning.

In addition to measuring rationality, challenges ensue when attempting to assess how benefits are calculated. Since benefits strongly influence motivation, research has shown that individuals’ rationales for participation are dependent on gender, individual experiences, age, self-control, morality, and experiences (Bouffard, 2007; Exum, 2002;
Expansion and Reformation

Rational choice has found its niche within deterrence as a micro-level explanation of criminal decision-making. However, perhaps the theory’s most significant contributions are in their influences of the development and expansion of other theoretical developments. For instance, when the theory is coupled with routine activities theory (Cohen & Felson, 1979), the theory’s explanatory value vastly increases (Clarke & Cornish, 2001; Clarke & Felson, 1993). When examining target suitability, which was encapsulated with the VIVA acronym (visibility, inertia, value, and accessibility), Clarke (1999) expanded on this, focusing more on the offender’s decision-making. He developed the CRAVED model, using the same acronym method to assess how offenders selected targets for theft. CRAVED (concealable, removable, available, valuable, enjoyable, and disposable) better explained target assessment and provided a better explanation for Clarke and Cornish’s (1985, 1986, 1987) crime-specific approach, as each element differed dependent upon the type of theft, the offender, and the situation (Clarke, 1999; Clarke & Cornish, 2001).

Rational choice theory has also demonstrated significant utility in the basis for situational crime prevention, developed by Clarke (1997) to provide policy-driven methods of preventing crime that are focused on transforming situations that are vulnerable to crime and/or promote criminal opportunity (Farrell, 2010). Generally, the focus is on increasing risks and decreasing both benefits and opportunity. While there has been some argument that these methods simply displace crime, there is some evidence
that this is not the case (Hesseling, 1994). Situational crime prevention provides a parsimonious macro-application of rational choice theory, as well as routine activities theory within cultural criminology (Farrell, 2010). Moreover, the theory provides methods of environmental constraints that can be placed on the opportunity of crime (Pratt, Cullen, Blevins, Daigle, & Madensen, 2006; Pratt, 2008). To expand, the theory provides prevention techniques for all types of crime, aims to improve the quality of life throughout communities, and assesses how deviations in cultures affect a community’s routine activities, which thus affects the rate of crime (Farrell, 2010).

This modern approach to rational choice has demonstrated its multifarious applications. While its foundation lies within its model of decision-making, it has demonstrated great utility within geographic profiling of individual serial offenders (Brantingham & Brantingham, 1982, 1995, 1997; Rossmo, 1995). Moreover, Rossmo’s (1995) findings demonstrated that the theory’s greatest utility lies within its ability to explain target selections within areas and places, and how geographic features affected the location of crime. Thus, future research should focus on the theory’s explanatory contribution within community models of crime and crime prevention.

**Environmental Criminology**

*Human Ecology*

First developed by Robert Park (1921), and later expanded upon by him and Ernest Burgess, human ecology assessed how traditional measures of ecology were applicable to the social aspects of human life. The theorists assessed how communities relied upon one another and interacted with one another, and how this related to the location in which they chose to live (Bernard et al., 2010). Moreover, Park and Burgess
Park and Burgess (1921; Park, Burgess, & McKenzie, 1925) examined how these relationships existed within urban areas, and how changes within areas can affect the communities’ natural balances. Park and Burgess (1921) developed the concentric zone model, which provided explanation of land use within urban areas. The theorists illustrated this through five zones, the center being the central business district that when developed, would push its residence to zone II, the transitional zone. The theorists characterized this zone by high levels of immigration and population heterogeneity, and low socioeconomic status. Parks and Burgess (1925) described the third zone as moderate—the middle zone that included residents with modest income and housing. Zone IV and zone V were both residential areas, zone V being outside of the city and known as the commuter zone (Bernard et al., 2010).

The theory became the impetus for subsequent sociological works within the Chicago School. The theory provided greater illustration of how crime and urban land use are related, as well as how macroscopic analyses of criminality are imperative to the study of criminology.

**Social Disorganization**

Shaw and McKay (Shaw, 1929; Shaw & McKay, 1932, 1942) first introduced a formal presentation of social disorganization theory in 1942. The theory was developed after the researchers examined the relationships between juvenile delinquents and the areas in which they lived (Akers, 1999). Starting in the 1920’s, the theorists began to observe how transitions within Chicago were affecting the overall quality of life and structure of the city. Chicago had experienced a significant influx in population, attributable to both immigration, as well as migration from the southern states (Bursik &
Webb, 1982; Martinez Jr., Rosenfeld, & Mares, 2008; Siegel, 2010). Shaw and McKay
(Shaw, 1929; Shaw & McKay, 1932, 1942) tested the effects of the community on
juvenile delinquency by examining residencies of juvenile delinquents from 1900 –1933.
In 1969, McKay presented findings that continued the study until 1965, providing a 65-
year analysis (Bursik & Webb, 1982). The results of their work demonstrated that a
macro sociological approach to crime provided a better explanation of criminality,
particularly for juveniles (Bursik & Webb, 1982). When communities were low in social
capital (Sampson, 1992), then the communities were less cohesive and thus, less able to
avoid setting “the context for gang violence” (Kawachi, Kennedy, & Wilkinson, 1999, p.
721). Specifically, the theory centered on structural characteristics of communities; its
theorists postulated that indications of socially disorganized communities were
recognizable through certain characteristics, including community disruption, population
mobility, and a heterogeneous population. These aforementioned characteristics create an
environment where unified goals are unfeasible due to differing cultural objectives and a
lack of stability. This leads to an inability for the community to regulate behaviors, which
in turn diminishes the overall quality of the community (Bursik, 1988; Chamlin, 1989;
Kornhauser, 1978; Paternoster & Bachman, 2001; Rountree et al., 1994; Shaw, 1929;
Shaw & McKay, 1932, 1942). More specifically, this leads to a diminishment of social
institutions that deteriorates friendships and community networks, thus makes the area
more conducive to crime. Moreover, research has demonstrated that a loss of social
control increases and aggravates the loss of familial control (Taylor & Covington, 1993).
The result is an increase in criminal activity that can become infectious within the
community and create a slow-spreading, yet prominent epidemic (Fagan & Davies, 2004).

At the time of its development, social disorganization was seemingly unique, due to its macro approach (Bursik & Webb, 1982). Instead of attempting to explain why individuals committed crime, it focused on how community characteristics created a criminal-inducing environment (Shihadeh & Steffensmeir, 1994). Moreover, the theory shed light on the observable communalities between high crime communities. These were observable contextual variables that were occurring regardless of whom was residing within the communities (Kawachi et al., 1999). To illustrate, Shaw and McKay (1942) found that while racial heterogeneity was attributable to crime rates, an individual’s actual race was irrelevant. Immigration and heterogeneity were significant because they demonstrated instability and differences, not because minorities were simply committing more crime (Paternoster & Bachman, 2001). Tests of the theory have continued to focus on commonalities within communities instead of individuals. Research has demonstrated that social characteristics, as well as structural characteristics, explain changes within crime rates. These include high population density, excessive residential transience, low socioeconomic status, racial heterogeneity, and physical degeneration (Paulsen & Robinson, 2004; Porter & Pursuer, 2010). Specifically, these include rates of unemployment, single-parent households, unrelated people residing together, a plethora of unskilled jobs, changes in land use and population density, and significant population shifts both culturally and racially (Siegel, 2010). These effects are oftentimes indirect. For instance, maternal employment and single-parent households result in fewer guardians, as well as diminished contact with neighbors and a decreased likelihood of
developing friendships within the community (Coleman, 1990, 1994; Shihadeh & Steffensmeir, 1994) Thus, the effects of poverty, heterogeneity, and residential instability may be multifarious (Grattet, 2009; Warner & Pierce, 1993).

Central to the original formulation and subsequent testing of social disorganization theory is social relationships and control. When social control within a neighborhood is high, it increases residents’ perceptions of safety. Change coupled with heterogeneity within the population can be a destructive force on social control. Constant change consequently leads to disorganization due to a community’s members being unaware of who belongs to the community and who does not (Bernard et al., 2010). Successive research has focused on how residential turnover influences social disorganization. Bursik and Webb (1982) found that community transience is positively related to disorganization, regardless of who was transitioning because it inevitably resulted in the diffusion of social institutions and disintegration of social institutions (Bernard et al., 2010; Grattet, 2009; Suttles, 1968). Furthermore, those residents who remain within the community become hostile to those who are new to the area in a struggle to maintain common values. Subsequently, a battle between cultures ensues (Bernard et al., 2010; Grattet, 2009; Shaw, 1929; Shaw & McKay, 1932, 1942; Siegel, 2010; Suttles, 1968). Urban growth affects not only population size but has an effect on the distribution of land use (Hawley, 1950). Shaw and McKay (Shaw, 1929; Shaw & McKay, 1932, 1942) also assessed whether Park and Burgess’ (1921) concentric zones were applicable to their theory of juvenile delinquency. They found not only areal patterns of juvenile delinquency, but also found that urban growth and concentric zones provided explanation of these patterns (Bursik & Webb, 1982; Siegel, 2010). Research
has demonstrated that community deterioration and dilapidation, coupled with poverty and mixed land use are highly associated with crime rates (Siegel, 2010; Stark, 1987).

Shaw and McKay’s (Shaw, 1929; Shaw & Mckay, 1932, 1942) theory originally placed a great deal of significance on the subculture; however, they later minimized its importance. After assessment of Shaw and McKay’s (1932, 1942) theory of social disorganization, Kornhauser (1978) arrived at the conclusion that the theory had two separate structural and subcultural arguments. She contended that the focus should be on social disorganization within communal social control, and that subcultures were an illogical focus (Bernard et al., 2010; Osgood & Chambers, 2000). She argued that criminogenic subcultures were nonexistent. Kubrin and Weitzer (2003) affirmed this theory, arguing that high crime communities remain generally anti-crime; however, they have come to accept it, regarding it as normal and inevitably inescapable. Kornhauser (1978) proposed a model of community control in relation to Shaw and McKay’s (1932, 1942) theory. The model illustrated that micro-level effects were interchangeable with macro-level effects; those who live in poverty will live within diverse communities, and will oftentimes move frequently and effect individuals’ development of normal relationships (Bernard et al., 2010; Osgood & Chambers, 2000). Since Kornhauser’s (1978) model, the central focus within social disorganization has been on social networks in communities and what effect this has on the overall control of the area (Osgood & Chambers, 2000). In addition to analyzing the effects of the community through quantitative and spatial analyses, Shaw (1931, 1938) conducted ethnographic analyses, including life histories. These individual qualitative analyses allowed for understanding of the processual effects of the community throughout the life-course.
Social Networks and Social Disorganization

In 1989, Sampson and Groves established their own model that expounded upon the original theory of social disorganization. While maintaining the original structural variables, Sampson and Groves (1989) added measures of social control including the supervision of teenage gangs, friendships, and involvement in formal community organization. This theory provided a more detailed account of community disorganization, as it examined the original macro-level variables, but provided more insight into the processes of communities and social control. Sampson’s and Sampson and Groves’ (1989) research indicated that the relationship between social disorganization (as originally formulated by Shaw and McKay, 1932, 1942) and criminality was mediated by measures of social control. Sampson (1991) emphasized the importance of these variables, arguing that previous research had ignored how the structure of a community effects social control, which in turn effects individual behavior (Sampson, 1991). This has resulted in more of a focus on the effects of friendship networks, which have shown to have some effect on social disorganization (Sun, Triplett, & Gainey, 2004; Warner & Rountree, 1997). Although this reformulation is considered significant to the social disorganization literature, it has rarely been tested (Akers, 1999; Kubrin & Weitzer, 2003; Sun, Triplett, & Gainey, 2004).

Building upon Sampson’s (1985, 1986, 1987, 1988, 1991) and Sampson and Groves’ (1989) work, Bursik & Grasmick (1993) argued that there were three networks of social control that influenced social disorganization, including private, parochial, and public. Furthermore, they stated that community transience and heterogeneity influenced all three levels of social control. They argue that examining the various levels of social
control provide a more valid explanatory model of juvenile, as well as adult criminality (Taylor, 1997). Their work, as well as Sampson’s (1985, 1986, 1987, 1988, 1991) and Sampson and Groves’ (1989) work establish integration of ecological and psychological assessments within a community by concentrating on how social processes affect economic processes, which can have a circular effect on the community. Recent studies have revealed that there is a confounding relationship between formal and informal control. Rose and Clear (1998) argue that this relationship is reciprocal and at times inverse. Their findings indicated that arrests and incarceration have negative effects on social networks as it creates familial disruption, which thus depletes social control within families and communities. Conversely, Kubrin and Weitzer’s (2003) findings indicated that a lack of formal control might decrease informal control. If community members lack faith in the police to maintain order, they will likely believe they will have a minimal effect on social control and crime within the community.

In his earlier work, Sampson (1985, 2011) had found indirect relationships between community variables and crime. For instance, poverty was not directly related to crime, but was indirectly related through residential mobility. Moreover, he found that community rates of family disruption were strongly related to violence, and family disruption was related to the population percentage of minorities as well as poverty. Moreover, family disruption was prevalent within areas that had high population density and vast apartment buildings (Sampson, 1985, 1986; Warner & Pierce, 1993). Sampson concluded that community characteristics that are indicative of social disorganization were also indicative of anonymity. Individuals who felt isolated created a community that
lacks social cohesion by avoiding participating within community activities and a lack of
social ties with other community members.

Expanding upon his original work, Sampson (1985), with his colleagues, Raudenbush and Earls, developed the model of collective efficacy. Sampson et al. (1997) constructed the model to provide a better explanation of procedural and social measures of social control. Collective efficacy focuses on processes of social integration and cohesion to determine how a community can accomplish a collective, envisioned goal (Duncan, Duncan, Okut, Stycker, & Hix-Small, 2003). Collective efficacy is the community’s ability to uphold order within public shared places. While social disorganization focuses on negative aspects of communities, and the inability to preserve a consensus of shared values and goals, collective efficacy focuses on the processes of maintaining and developing shared values and norms (Kornhauser, 1978; Rose & Clear, 1998). In order for a community to achieve collective efficacy there must be trust among the community members, general and consistent supervision of children, and a common expectation for action (Grattet, 2009; Sampson et al., 1997). When a community’s residents are able to prevent and control disorder, particularly physical disorder, this has a significant effect on community crime (Jain, Buka, Subramanian, & Moinar, 2010; Sampson, Raudenbush, & Earls, 1997).

Sampson et al. (1997) postulated that collective efficacy had a significant relationship with crime. Moreover, they stated that collective efficacy was the mediating variable missing in the social disorganization model, demonstrating a significant effect of concentrated disadvantage, immigration concentration, and residential stability on violent crime. Additionally, they contended that collective efficacy was contingent upon social
capital, not social cohesion. Redefining social capital, Sampson et al. (1997) argued that with common goals and organizations, social capital focuses on establishing and maintaining common values without the need for close social relationships within communities (Morenoff, Sampson, & Raudenbush, 2001).

Gibson et al. (2002) applied the ideas of social capital to their model of social integration. Social integration is present when there is an abundance of participation within formal community organizations, such as neighborhood watches or community meetings. Research has demonstrated that it has a significant effect on perceptions of community collective efficacy (Gibson et al., 2002; Zevitz, 2004).

Interest has been generated in the relationship between collective efficacy, social cohesion, and perceptions of safety, also known as the fear of crime. Research on the fear of crime has passed through various stages of development; however, Wesley Skogan (1986) was the first criminologist to study the relationship between the fear of crime and neighborhood statistics. He reached the conclusion that structural community variables such as neighborhood disinvestment, demolition and construction, deindustrialization, and demagoguery explained changes in crime rates, as well as fear of crime. In fact, the effects of fear of crime are multiplicative and at times reciprocal. Changes within the community can have a substantial increase on fear of crime, which can result in increased social isolation and mistrust of neighbors (Ross & Jang, 2000; Skogan, 1986; Zevitz, 2004). Conversely, increased social ties can also increase fear of crime, due to improved communication of criminal events (Ross & Jang, 2000). Moreover, fear of crime can instigate mobilization, which can then affect the population composition of an area. Fear, along with cultural and racial differences in a community, can result in small
homogenous association (Duncan, Duncan, Oku, Stycker, & Hix-Small, 2003; Suttles, 1968). This further demonstrates the relationship between community disorder and the fear of crime (Kelling & Coles, 1996; Ross & Jang, 2000; Sampson & Raudenbush, 2004; Skogan, 1986). Fear of crime does not only signify individual risk, but overall community concern and perception of risk (Taylor et al., 1984).

Research tangential to Skogan’s (1986) original application of fear of crime on neighborhood factors has provided further insight into the development of the fear of crime construct. One of the primary findings has been that the fear of crime is contingent upon communities’ incivilities as much as it is on actual crime (Lagrange, Ferraro, & Supancic, 1992). Additionally, one’s past victimization oftentimes affects his or her fear of crime (Markowitz, Bellair, Liska, & Liu, 2001; Skogan, 1986; Taylor, 1995).

Original research on the relationship between fear of crime and communities focused on individual angst, and failed to assess how the fear of crime was an assessment of actual, not perceived risk (Wyant, 2008). A substantial portion of studies support this argument, stating that fear of crime is oftentimes comprised of two very distinct elements: emotional fear and perceptual risk of victimization (Kanan & Pruitt, 2002; Lagrange, Ferraro, & Supancic, 1992; Rountree & Land, 1996b). Therefore, it is imperative to assess risk of victimization and overall emotional fear as separate measures.

Elements and Assumptions of Social Disorganization and Collective Efficacy

Establishing general assumptions and implications of social disorganization is unfeasible, the expansions upon the theory, both theoretically and statistically, have resulted in a school of thought that, according to Bursik and Webb (1982), recognizes the “complex nature of the delinquency process” (p. 24). Moreover, research in social
disorganization and environmental criminology has passed through various stages of development. Thus, the present objective is to examine the broad concepts that comprise both the original work of Shaw and McKay (1942), as well as expansions upon the theory and the eventual development of collective efficacy (Sampson et al., 1997).

**Physical status.** Earlier studies on the community shed light on the importance of a community’s physical nature (Kelling & Coles, 1996; LaGrange, Ferraro, & Supancic, 1992; Ross & Jang, 2000; Sampson & Raudenbush, 2004; Wilson & Kelling, 1982). Physical status can refer to both the physical structures and the social disorder that one can deduce from simple observation. When community members witness unruly behavior, such as prostitution, intoxication, and disruptive youth, their perceived quality of life is threatened, and thus it affects their overall perceptions of their community (Raghavan, Mennerich, Sexton, & James, 2006; Ross & Jang, 2000; Sampson & Raudenbush, 2004). In addition to community members observing this disorder, outsiders also become aware of the lack of social control. Thus, potential criminals are enticed by the disorder and lack of informal social control. They view this lack of social control as a lack of guardianship, thus decreasing their risk of punishment for committing a crime (Taylor & Covington, 1993).

**Economic status.** Examining the association between socioeconomic status, unemployment, and crime is omnipresent within most theories of deviance (Kornhauser, 1978; Sampson & Groves, 1989). Communities that represent those who are extremely disadvantaged typically have little social cohesion (Rountree & Land, 1996). In addition to Shaw and McKay’s (1932, 1942) original hypothesis that there was a relationship between socioeconomic status and criminality, research has demonstrated that economic
status has a direct effect on multiple aspects of the community cohesion and control. As previously discussed, Kornhauser (1978) elaborated on the relationship between poverty and crime on a micro-level, stating that those who are highly disadvantaged will reside in poor neighborhoods that are racially and culturally diverse. Communities that are extremely disadvantaged isolate its residents through a lack of resources. Moreover, individuals are alienated and fearful, and generally mistrust their fellow community members (Byrne & Sampson, 1986; Siegel, 2010). Moreover, family disruption, which is oftentimes high within poverty-ridden areas, has a positive effect on violence (Sampson, 1985, 2011). Furthermore, data has demonstrated that there are increased effects of crime when a community is in closer proximity or more cognizant of surrounding areas with higher socioeconomic status. This creates feelings of inequality, which deteriorates social and formal community institutions (Blau & Blau, 1982; Shihadeh & Steffensmeir, 1994). Additionally, there exists a relationship between emotions and inequality, as inequality can lead to frustration and resentment, which can thus lead to violent crime (Blau & Blau, 1982; Hipp, Tita, & Bogess, 2009; Kawachi et al., 1999).

Population composition. The ideas expressed by Shaw and McKay (1932, 1942) lead to a broader conceptualization of structural effects on a community’s members. In addition to assessing how the influx and outflow in reference to culture and race affects crime rates, researchers have also concentrated on how a community’s structural characteristics affect multiple levels of social control. For instance, Wilcox, Doherty, Fisher, Galston, Glenn, and Gottman (2005) found there was a strong and negative relationship between one’s health of marriage and violent crime. As stated previously, household composition appears to have a direct effect on social order, particularly a large
presence of single-parent households, maternal employment, and nonrelative cohabitation (Coleman, 1990, 1994; Shihadeh & Steffensmeir, 1994; Siegel, 2010). Sampson (1987) attributes this relationship between marriage and social control to its ability to provide stability to social relationships across the community, as well as promote conventional norms. However, Mustaine, Tewskbury, and Stengel (2005) found the effect of single-parent households to be null, and believe this change is perhaps due to its increasing normality (Mustaine et al., 2005).

Spatial analysis and land use. Although Shaw and McKay’s (1942) application of Parks and Burgess (1921; Parks et al., 1925) concentric zones was not the first to examine the spatial distribution of crime, their work has had pervasive influence on the methods employed to examine patterns and relationships within areal data. Shaw and McKay (1942) examined spatial patterns by plotting residents of juvenile delinquents by hand and then examining patterns within one-square-mile areas (Anselin, Cohen, Cook, Gorr, & Tita, 2000). Using these same general methods has resulted in multiple units of analysis for communities, including census blocks, neighborhoods, cities, and location quotients of crime (Brantingham & Brantingham, 1995, 1997; Zhang & Peterson, 2007); however, none are without their limitations. As earlier referenced, Stark (1987) found that structural variables, including land use and physical dilapidation were pertinent to explaining crime rates of communities. The basis of Shaw and McKay’s (1932, 1942) work has resulted in multiple detailed analyses of the relationship between land use and crime (Lockwood, 2007; Sampson & Raudenbush, 2004; Stucky & Ottensmann, 2009). Of particular interest is the relationship between rural and urban land use; Stucky and Ottensmann (2009) found that violent crime was significantly higher within commercial
areas, as well as areas with high population density, than more undeveloped areas.

Examining the effect of land use and patterns of crime density has also been an area of interest (Harries, 1976).

Moreover, the presence of alcohol outlets, including liquor stores, appears to have had a positive effect on crime. For instance, Sampson and Raudenbush (2004) found support for inclusion of various landmarks and structural use to explain crime rates, specifically street design, bars, and housing. Pridemore and Grubesic’s (2011) results were consistent with Sampson and Raudenbush’s (2004) study; they found that a greater presence of bars, liquor stores, and carryout restaurants, when moderated by general land use, had a significant effect on assault.

Land use has also been assessed in context of social control and dominant group regulation. Valentine (1989) discussed the relationship between public space and group control, stating, “The group which is actually dominant in a public space is time specific, the controlling group fluctuating with time of day” (p. 387). This further illustrates the complex process of social control and disorder within communities. Lastly, areal data has been used to develop more effective methods of policing, by determining where crime is particularly high within a small area, or a hot spot of crime (Sherman et al., 1989; Weisburd & Green, 1995).

Another area of interest within spatial analysis and populations revolves around communities’ use of space in methods of defense. Hawley (1950) discussed the processes of communities to defend itself when threatened (Heitgard & Bursik, 1987). Newman (1973) discussed defensible space, which refers to real and emblematic barricades that hinder the opportunities for victimization. For instance, streets with higher accessibility
provide easier entrance and exit from an area, creating greater opportunity for crime. Conversely, a greater frequency of culs-de-sac within an area not only decreased fear of crime, but they increase defensibility (Cozens, 2008). Additionally, Taylor et al., (1984) discussed communities using social and physical barriers to demonstrate territorial functioning and its relationship on crime.

Within criminology, spatial analysis has become an important element of criminological theory models. Its application to crime, however, is still somewhat novel. Cartographers Guerry (1833) and Quetelet (1828), both began to assess the geography of crime. Quetelet examined the location, climate, and seasons of criminal events, while Guerry examined aggregate levels of socio-economic factors and their effects on crime. These sorts of analyses remain prevalent in present day research. The resurgence of social disorganization coupled with multilevel models and spatial software has resulted in the new Chicago school (Anselin et al., 2000).

There have been a number of approaches to examining the relationship between crime and space. Some examples of these include: hot spot analysis (Sherman et al., 1989; Weisburd & Green, 1995), land use (Clarke, 1980, 1983, 1997; Cozens, 2008; Lockwood, 2007; Newman, 1976; Samuels, 1994; Stucky & Ottensmann, 2009; Taylor, Gottfredson, & Brower, 1984; Taylor, 1995; Valentine, 1989), near-repeat victimization (Youstin, Nobles, Ward, & Cook, 2007), climate and crime (Anderson, 1987; Baumer & Wright, 1996; Cohen, 1941, Cohn, 1990; Cohn & Rotton, 2000; Dexter, 1904; Quetelet, 1842), and serial-offenders’ patterns of crime (Brantingham & Brantingham, 1982, 1995; Canter, 1996; Canter & Larkin, 1993; Kocsis & Irwin, 1997; Lundrigan & Czarnomski, 2006; Rossmo, 1995).
Individual crime patterns. As previously discussed, one of the commonalities within routine and rational choice theories is motivation and opportunity. Past literature has demonstrated that most often, offenders exemplify the principle of least effort (Zipf, 1949). Three theories have been developed that apply this principle, including Braithwaite and Brantingham’s (1982, 1995) crime pattern theory, Canter and Larkin’s (1993) circle theory, and Rossmo’s (1995) mathematical algorithm of crime.

Braithwaite and Brantingham (1982, 1995) purported that individuals’ crimes are directly related to their activities. More specifically, neither crime nor opportunities to commit crime are random. Opportunities develop within time and space by the routine activities of both potential victims and offenders. Thus, areas with high crime (which they refer to as location quotients, the frequency of crime in comparison to areas within close proximity) have a high level of criminal opportunity, motivated offenders, and suitable targets. Lundrigan and Czarnomski (2006) assessed crime patterns of serial sexual offenders in New Zealand. While their results showed overall support for the principle of least effort (Zipf, 1949), they did find that more offenders traveled to commit their first offense (only 49% committed their first offense closest to home).

Canter and Larkin (1993) postulated that the majority of criminals would commit crime within close proximity to their home. They found this to be the case for 91% of serial offenders. They suggested there were two types of serial offenders, marauders, who committed crime within their home base, and commuters, who would travel outside of their home base/circle to commit crime. While their model has provided great foundation for understanding patterns of serial offenders, their methodology is questionable (Turvey, 2011). Kocsis and Irwin (1997) assessed the applicability of serial spatial patterns to
sexual assault, and found only 79% could be classified as marauders. They emphasized that future research needs to examine the structural and geographic characteristics of areas of residence and travel, as well as individual mobility. Furthermore, the researchers stress the importance of individual-level factors that affect travel distance, including demographics and time of crime. They also said that the type of crime and the motivation behind that crime might affect offender traveling.

Rossmo (1995) applied a mathematical algorithm to determine the locations of serial offenders, using geographic software and triangulation. Similar to Brantingham and Brantingham (1981, 1995), Rossmo argued that crime is not random, even when it seems to lack any pattern. He asserted that criminals typically commit crime close to home; however, it is imperative to assess the characteristics of the criminal and the type of crime. For instance, older criminals tend to travel further distances, and bank robbers tend to have more mobility than burglars do.

*Climate and crime.* Researchers have approached the relationship between weather and crime in a myriad of ways. One of the original findings on temperature and crime was by Quetelet in 1842, who found that violent crime increased during the summer, while property crime increased in the winter. He referred to this as the Thermic Law, which the majority of subsequent literature on weather and crime has examined. Another explanation of the relationship between weather and crime is the temperature-aggression theory in which Anderson (1987) postulated that temperature had a significant effect on crime, particularly violent crime. This coincided with Lombroso and Forel’s (1899) hypothesis that heat increased emotion, which he related to biological periodicity. References to weather and crime were synthesized within other theories, including
Bonger’s (1916) economic theory of crime, in which he makes mention of the increased physical interaction of people during the summer months (Falk, 1952).

Subsequent research on climate and crime has been neither scarce nor frequent. Farrell and Pease (1994) asserted that little research had examined the effects of seasonality on crime, which Baumer and Wright (1996) quickly refuted. Available research on the subject has demonstrated mixed support for the relationship between climate and crime. While some research has corroborated Quetelet’s (1842) thermic law (Baumer & Wright, 1996), other research has demonstrated mixed results. For instance, Falk (1952) found there was an increased seasonality effect rather than a specific temperature effect on crime, while Baron and Ransberger (1978) found a curvilinear relationship between crime and civil disorder. More specifically, they found that civil disorder increased with temperature until a certain point when the temperature became exceedingly hot. Cohn (1990) found that extreme low temperatures increased aggression. He also assessed the effects of precipitation on crime and found it increased the occurrence rate of robbery, yet had no significant effect on other forms of violent crime.

While seasonality and crime had been a predominant focus of criminological literature, there was a shift from meteorological explanations to community explanations (Cohen, 1941). However, Cohn and Rotton (2000) emphasize how seasonality is embedded within the routine activities framework, both by victim and offender convergence, and weather effects on routine activities of suitable targets (for instance, vacationing during summer months may increase likelihood of burglary). Contrarily to Quetelet’s (1842) thermic law, they found that property crime was more frequent during summer months. Within their study, Cohn and Rotton found that temperature had a significant effect on burglary and
robbery even after controlling for the effects of time (month of year). Cohn and Rotton’s (2000) dismissed psychological explanations of weather and crime, and contend that routine activities provides a much better framework for assessing the effects of seasonality on crimes within communities.

**Mobility.** One of the most prominent variables within environmental criminology and spatial analysis is mobility. Mobility can refer to a number of processes, including influx and outflow of community members, as well as immigration and community stability (Bogess & Hipp, 2010; Bursik & Webb, 1982; Sampson, 1985, 2011; Shaw & McKay, 1942; Stark, 1987). The principle hypothesis within the mobility/crime community model is that personal relationships and conventional, common goals are strained (Sampson, 1986; Sampson et al., 1997). While movement is a naturally occurring social state, frequent movement results in instability and decreased social control. Burgess contended that mobility “tends to inevitably to confuse and demoralize the person” (p. 76); Clark (2009) referred to community turnover as “part of a stigmatizing discourse about deprived places, something we all know about” (p. 76).

While some research has focused on the direct effects of mobility on crime (Bursik & Webb, 1982; Crutchfield, Geerken, & Gove, 1982; Stark, 1987), others have focused on the indirect effects of residential instability. For instance, Sampson’s (1985, 2011) data indicated that poverty was only significantly related to crime when mediated by residential mobility. Increases in crime also increased mobility. Cullen and Levitt (1999) assessed the effect that rising crime had on urban flight and found that for every 10% increase in crime, there was a 1% decrease in overall population within cities. Contrarily, Ellen and O’Regan (2009) found that city growth was attributable to the city’s economic
development and that, generally, changes in crime did not affect overall population. From these previous perspectives, it is clear that the relationship between mobility and crime is confounding, particularly when controlling for perceptions of risk, fear of crime, and poverty. For instance, Bogess and Hipp (2010) found that crime and residential instability are reciprocally associated, as both affect one another. While mobility affects crime, increased crime affects mobility, thus creating a never-ending cycle. The effects of immigration in context of population composition and mobility have been an area of interest, particularly within ethnic and cultural changes. Although Shaw and McKay (1942) found that mobility and immigration were significant regardless of the population ethnicity or race, research has remained focused on the effects of various immigrants within certain areas. Martinez et al., (2004) found there to be significantly less drug-related homicides when communities had prepared for transitions through established organizations and social institutions. Moreover, a high population percentage of immigrants can actually increase social control (Morenoff & Astor, 2006; Vélez, 2009).

In reality, research has consistently demonstrated that immigrants are typically no more or no less likely to commit crime than American citizens, with the possible exception of sexual assault (Butcher & Piehl, 2008; Huff-Corzine & Corzine, 1986; Lee, 2003; Martinez Jr., 2002; Martinez Jr. et al., 2004; Morenoff & Astor, 2006; Olson et al., 2009).

**Collective efficacy and social control.** Collective efficacy is an imperative concept to explain the relationship between community disorder and crime (Raghavan, Mennerich, Sexton, & James, 2006; Valentine, 1989). The degree of social cohesion and collective efficacy are affected by macro social structural conditions, including population composition, socioeconomic status, de- and urbanization (Markowitz et al.,
Social control in itself signifies the degree of community members’ self-regulation and ability to control the behavior of other community residents and nonresidents (Bursik & Grasmick, 1993). Social control can be in reference to the community as a whole, or various social and/or familial networks (Sabol, Coulton, & Korbin, 2004). While researchers have postulated that social ties are directly related to social control at all levels within the community (Burchfield 2009; Bursik & Grasmick, 1993). However, as previously stated, the influence of collective efficacy lied within Sampson et al.’s (1997) denial of strong social ties being a necessity to maintain social control. Instead, the focus was on establishing and maintaining common goals (Mazerolle, Wickes, & McBroom, 2010; Sabol, Coulton, & Korbin, 2004). In fact, research has demonstrated that the importance of social ties lies only within its influence on participation in achieving common goals; however, this relationship is weak, and therefore effectual control and low crime are achievable within communities who possess high collective efficacy and low social ties (Kubrin & Weitzer, 2003; Sampson, 2003; Sampson et al., 1997). Thus, establishing more formal social networks can increase social control within a community without the need for strong friendship networks (Browning, Feinberg, & Deitz, 2004; Wilson, 1996). However, Frye (2007) found no significant impact of social cohesion or neighborhood involvement on rates of intimate partner violence.

The Validity of Environmental Criminology

Crime prevention. One of the widespread weaknesses of most theories on delinquency is its fallibility in providing sound policy implications. Moreover, even when there is some intimation of policy, oftentimes there is no execution of such suggestions. Clifford Shaw’s implementation of his research was exceptionally distinctive; not only
did he, along with Henry McKay, provide operative methods of implementing the policy implications of social disorganization, he himself implemented them (Paternoster & Bachman, 2001). According to Bernard et al. (2010), Shaw launched the Chicago Area Project, which focused on increasing community awareness and quality of life. Although he ran this program for 23 years, there was never any data recorded to assess the direct effects of the program.

Within both social disorganization and collective efficacy theories, the goal is to prevent crime through community intervention and reformulation of places, not people (Sampson, 2003). While research has demonstrated that demographic effects on crime generally remain constant, regardless of governmental intervention, there should be more focus on addressing economic disadvantage (Scarborough, Like-Haislip, Novak, Lucas, & Alarid, 2010). Moreover, in order to better social environments, policies should focus on physical and social disorder, by cleaning up visible signs of disorder (Kelling & Coles, 1996; Ross & Jang, 2000). Fox, Nobles, and Piquero (2009) purported that educating the community about crime and its effects may ease the negative effects of a community’s fear of crime. Lastly, family control and structure, and well as employment unions, affect fear of crime and community order (Porter, Rader, & Cossman, 2012). However, policy intervention can only improve with valid assessment of their effects (Raghavan et al., 2006).

Another focus within policy, particularly in terms of policing, is examining areal data of crime. Geographic analysis of crime patterns within police departments has become another prevalent policy implication. Sherman et al. (1989) provided a detailed analysis of hot spot mapping of crime within neighborhoods. This study, in addition to
subsequent literature, has provided demonstrable methods of effective policing through small, block-level areas.

*Testability.* Inferences of Shaw and McKay’s (1942) findings are truly its focus on the relationship between crime and change, particularly how growth in urban areas and the consequential processes of this growth are implemented. There has never been a comprehensive longitudinal test of the effects of urban expansion on the evolution of communities (Bursik, 1988; Kubrin & Weitzer, 2003). The processes and effects that occur within communities are conceptually challenging, as they exist within a temporal, compounded model. Thus, it is imperative to assess the unit of analysis, the method of analysis, and interpret results with caution to the inevitable limitations of the data.

While some researchers have commended Shaw and McKay (1942) for their recognition of the complex relationships and effects that occur within communities (Cook, 1986; Hechter & Kanazawa, 1997), others have identified this lack of parsimony as the theory’s biggest weakness. Bellair and Browning (2010) attribute Shaw and McKay’s multiple components during various times as the cause of the eventual downfall of the school of thought.

Considerable criticism arose from demonstrable evidence of a nonsignificant relationship between Shaw and McKay’s (1942) proposed community-level structural variables and crime. However, the theorists never asserted that the relationship was direct; instead, they argued that a community’s characteristics affected its overall level of control and order (Akers, 1999; Bursik, 1988; Bursik & Grasmick, 1993; Paternoster & Bachman, 2001; Sampson, 1995, 2001). While this revelation led to significant reformulations of the original theory (Bursik & Grasmick, 1993; Sampson & Groves,
1989; Sampson et al., 1997), these expansions are ostensibly responsible for the further complexities of the community model of crime. Sampson (1988, 1991), citing Kasarda and Janowitz’s (1974) work on community attachment, applied the systemic model of community to illustrate the complex and continual processes of communities. Meaning that how a community affects crime (by its population’s demographics and overall cohesion and organization) changes over time. Furthermore, crime changes a community over time, and thus one should study crime within a community longitudinally, not cross-sectionally. Sampson (1991) stated that the model “conceptualizes the local community as a complex system of friendship and kinship networks and formal and informal associational ties rooted in family life and ongoing socialization processes” (p. 44).

Recent literature has demonstrated the complexity of studying community effects of crime through identifying multidirectional relationships within community crime models. Bogess and Hipp (2010) make note of the reciprocal effect between residential instability and crime. Similarly, Bellair (2006) found informal social control and rates of crime were reciprocally related. While informal surveillance decreased crime initially, it then lowered the overall rate of informal surveillance. Furthermore, fear of crime can have a significant negative impact on social control and a community’s physical conditions (Woldoff, 2006), as well as affect overall social cohesion (Markowitz et al., 2006). Sampson, Morenoff, and Earls (1999) found child-centered social control was higher within poorer areas. They credit this unique finding to a reciprocal exchange within disadvantaged communities. These multidirectional relationships have resulted in confounding implications. For instance, Tita, Engberg, and Cohen (1999) found a significant relationship between low levels of social control and higher levels of gang
formation; however, when they included race as a control variable, the relationship became nonsignificant. Rose and Clear (1998) referenced their study’s findings as evidence of a reciprocal relationship between formal and informal social control. Formal social control can increase victimization (Rose & Clear, 1998) through weakened social institutions; however, formal social control can also decrease victimization if formal organizations have strong relationships with the community (Vélez, 2009).

The inclusion of collective efficacy within community crime models has revealed vast increases in the overall validity of the models. Moreover, it has substantiated previous findings of mediating effects and reciprocal relationships between structural variables, social variables, and crime. Sampson et al. (1997) found that collective efficacy had a negative effect on crime, yet also found that it mediated the relationship between crime and community disadvantage and residential stability Morenoff et al. (2001) examined the effects of friendship and kin ties when collective efficacy was included. Their findings indicated that the effects of friendship and kin networks on changes in crime were null when including the effects of collective efficacy.

One of the foremost issues that arose from Shaw and McKay’s (1942) research was the data used for the study. Bursik and Webb (1982) state that while Shaw and McKay (1942) recognized their limitations, they attempted to make conclusions that would require individual-level and not aggregate-level data. Furthermore, using aggregate data substantially increased the observed degree of association between community characteristics and rates of crime. Thus, successive research has demonstrated that there is more transition within communities than originally conceived by Shaw and McKay (1942), and these effects need to be measured accordingly (Bursik, 1988;
Sampson & Groves, 1989; Siegel, 2010). Another noted limitation of the data was that it was comprised solely of official crime statistics. Specifically, Shaw and McKay’s (1942) employed police records to compute crime rates within areas is subject to police concentration and police bias (Hagan, Gillis, & Chan, 1978; Sampson & Groves, 1989; Warner & Pierce, 1993). Presently, studies on community effects of crime still incorporate official data due to scarce data availability; there has been a growing body of research that incorporates other forms of data, including victimization interviews and surveys, 911 calls, and area surveillance (Sampson, 1988; Sampson & Raudenbush, 2004; Sherman et al., 1989).

Determining the unit of analysis at both the individual and community level has been thoroughly examined within the literature. One of the original criticisms of social disorganization was its focus on interrelationships and effects of small areas. This intense focus on internal dynamics and networks inadvertently insinuated that communities within an urban area were socially remote (Finestone, 1976; Heitgerd & Bursik, 1987). This has remained an issue within studies of community and crime, particularly when examining neighborhood effects, as they are methodologically regarded as distinct areas, and there is typically little to no recognition of the spillover effect (Hipp, Tita, & Boggess, 2009; Sampson, 2003). This can result in spatial autocorrelation, thus invalidating the statistical model (Anselin et al., 2000; Kubrin & Weitzer, 2003). Typically, however, social disorganization is treated as a characteristic of small communities, in particular neighborhoods. However, it has been applied to various types of communities, including metropolitan statistical areas (Crutchfield et al., 1982), cities (Chamlin, 1989; Cullen & Levitt, 1999; Decker, Schichor, & O’Brien, 1982; Franklin,
Typically, studies on communities and crime have focused on urban areas; however, Osgood and Chambers (2000) found it applicable to rural areas as well.

While there have been multiple criticisms of social disorganization, a consistent finding and recommendation is that criminality is affected by both macro and micro-level variables. Burgess (1928, 2008) referred to the process of community disorder and order as a recurrent circular process. In addition to its ongoing processes, there is a need to examine the individual factors of crime through contextualization of community effects (Repucci, Woolard, & Fried, 1999). While Shaw (1931, 1938) did provide some understanding of community effects on individuals through case studies, present studies on crime and communities should employ qualitative methods to increase understanding on individual and community relationships and effects (Repucci et al., 1999; Sabol et al., 2004). While qualitative research has been encouraged, the most widespread conclusion within analyses of communities and crime has been to test the effects within a multilevel model (Franklin et al., 2008; Kanan & Pruitt, 2002; Kubrin & Weitzer, 2003; Morenoff et al., 2001; Porter et al., 2012; Rountree et al., 1994; Rountree & Land, 1996; Woldoff, 2006). The use of multilevel models within research has immensely expanded, because it controls for individual effects within communities and provides actual micro-level variance distinct from macro-level variance (Schafer et al., 2006).

Operationalization. There have been various methods of measuring social disorganization and collective efficacy. While Akers (1999) contends that objective measures must be employed for purposes of validity; perceptual research, particularly on
the effects of fear of crime, has been used as a measure of community disorder (Rountree & Land, 1996; Woldoff, 2006). Shaw and McKay (1942) stated that social disorganization was not directly measured by population, physical, and mobility characteristics, but instead they were indicative of the manifestation of disorder (Paternoster & Bachman, 2001). Disorder has been defined and portrayed within multiple ways, first through the focus of the fear of crime (Taylor, 2002), as well as the effects of physical disorder on informal social control (Wilson & Kelling, 1982), and lastly as a mediating effect of neighborhood conditions on crime (Skogan, 1986). Furthermore, the elements of social order have been redefined and reformulated with some recognition of original definitions. This has resulted in confusion and possible multicollinearity (Taylor, 2002). For instance, as earlier noted, Sampson et al. (1995) redefined social capital, which originally referred to the effects of social ties on the expedition of action (Bourdieu, 1980; Gatti & Tremblay, 2007). While Sampson et al.’s (2001) definition of social capital maintained its reference to social action, it disregarded the need for close social ties and networks. Thus, overcoming possible issues within construct operationalization requires a priori tests of the unidimensionality and distinction of various constructs, including social capital, friendships, collective efficacy, social control, and social homogeneity. Furthermore, collecting multiple measures of constructs will increase overall validity and operationalization (Taylor, 2002).

Expansion and Reformation of Environmental Criminology

Originally proposed as a method of assessing community effects on juvenile delinquency, both social disorganization and collective efficacy have had a considerable effect on criminological theory and research. After critical reception, research in
ecological approaches to crime became somewhat dormant; however, there has been resurgence in environmental criminology since the late 1980’s. Its initial revival was largely due to Burgess and Akers’ (1966) social learning theory, as well as Hirschi’s (1969) theory of social control, as these demonstrated the macro social effects on individual psychological thoughts and processes (Bursik, 1988). Moreover, Sampson’s (1985, 1986, 1991), Sampson and Groves’ (1989), and Bursik and Grasmick’s (1993) reformulations of environmental criminology provided a renewed interest in the ecological aspects of crime (Bursik, 1988; Heitgerd & Bursik, 1987; Markowitz et al., 2001). However, its preservation is largely attributable to analytic advances in both statistical analysis and geographic software. Furthermore, research has begun to incorporate multiple community and individual factors derived from various criminological theories in an effort to better contextualize and understand crime (Cozens, 2008).

Summary and Conclusion

Criminological theory has examined crime and criminality from a number of approaches, including micro and macro, contextual, processual, and cross-sectional. The theories discussed within this Chapter have shown prominent support within following research; however, all are lacking strong explanatory power. Thus, there has been a movement focused on examining the effects of crime using a contextual model. To expand, using advanced statistical analyses (structural equation modeling and hierarchical linear modeling) has allowed researchers to examine both the independent and interactional effects of environmental, situational, and individual effects on crime (Raudenbush, 1993).
CHAPTER III
LITERATURE REVIEW

Contextual Analysis of Crime

*Contextual Model*

The purpose of an analysis is to provide a better understanding to some issue, phenomenon, and/or event. A contextual analysis expands upon traditional quantitative analyses by providing a deeper understanding of multilevel effects and their interactions. The purpose of contextual models is to recognize the intricacy of understanding certain phenomenon. For instance, Feaster, Brincks, Robbins, and Szapocznick (2011) define contextual effects as the “(1) divergence of the simple within-and between-group regression coefficients, (2) the presence of a cross-level interaction of the within-and between-group predictor variable, or (3) the effect of discrepancies within the group” (p. 167).

Contextual analysis typically refers to multilevel models, or environmental effects on individuals or events (Duncan et al., 2003; Feaster et al., 2011; Hechter & Kanazawa, 1997; Mitchell, Devine, & Jagger, 1989; Rountree & Land, 1996a). Kreft, De Leeuw, and Kim (1990) describe contextual models as “the various multilevel models decompose the variation in the data into a within and a between part, but each in their own way” (p. 22). Contextual effects are defined as environmental or macro level effects; however, a contextual model examines those contextual effects on individual effects, thus requiring a two level model (micro and macro, or environmental and individual; Hoffmann, 2003). The purpose is to increase explanatory power by examining both the direct and indirect effects of crime, specifically environmental (physical or social), situational, and
individual. Within criminological theory, the purpose of contextual models oftentimes is to provide more meaning to a criminal event, specifically social and spatial context (Duncan et al., 2003).

Subsequent research on routine activities, social disorganization, and collective efficacy has provided evidence of the commonalities between these theories. In order to create an integrated model to explain violent crime, it is imperative to first examine various processes of theory integration, as well as its strengths and weaknesses. Thus, the literature on theory integration is reviewed, followed by an introduction to an ecological theory of resilience. Resilience is an interdisciplinary method of risk management, and its commonalities between the aforementioned theories are later presented. Lastly, in order to assess what sort of variables should be included within a model to explain victim-offender convergence, past studies on homicide, sexual assault, assault, and robbery were examined.

Theory Integration

While previous research on delinquency has employed various theoretical foundations, methodologies, data, and analytical techniques, there is a prevailing consensus: crime is a complex process that is affected by numerous variables. Furthermore, as analytical techniques continue to advance, there appears to be further integration of criminological theories. Integrating theories has been a relatively prevalent phenomenon within criminology; however, methods of theory integration are often met with critical reception (Akers, 1999; Hirschi, 1989). Hirschi (1989) referred to theory integration as *theoretical mush* that diminishes original conceptualizations and increasing bias. Conversely, Hawkins and Weis (1985) contended that multiple theoretical
perspectives should be included within a model to assess criminality. Moreover, although parsimony is the ultimate goal, extreme parsimony only results in an insignificant model. Braithwaite (1993) asserted that advances in criminological research are reliant on theoretical integration, and when constructed in a methodologically sound manner, can provide better insight into the reasons and processes within delinquent behavior.

Some integrated theories focus on various processes, such as Elliot, Ageton, and Canter’s (1979) integrated theory that assessed two paths of weak integration into conventional society, followed by degree of involvement in delinquent peer groups. Others focus on the effects of social structures on social processes throughout the life-course, such as Thornberry’s (1987) interactional theory of delinquency. Similarly, Tittle’s (1995) control balance theory focused on how situational variables interact with control to determine individual behavior. Krohn (1985) developed a model of network analysis that focused on two structural variables: multiplexity and density. Krohn’s (1985) foundation of social networks vastly influenced advances in social disorganization (Bursik & Grasmick, 1993; Sampson & Groves, 1989) and also provided support for the inclusion of multilevel variables within one model.

Theorists have created integrated models of crime and criminality in a number of ways. For instance, Liska, Krohn, and Messner (1989) provided three types of integration, including proposition integration (how theories explanations are similar), integrating micro and macro-level theories, and lastly, cross-level integration of structural and processual explanations of crime. Akers (1989) asserted that theory integration could provide better explanations of crime if one recognized the existing commonalities within each theory’s elements. He coined the term conceptual absorption to explain this method
of integration, arguing that many theories have a substantial degree of commonality, and thus, certain constructs of the theory should be included within one model in an effort to explain crime. He illustrated this through a proposed integration of social control and social learning theories, claiming that the operational definition of attachment was virtually interchangeable with social learning definitions of peer intensity (Akers, 1999). While this theory has received support, researchers have also criticized it for its methodological approach (Thornberry, 1989; Tittle, 1977, 1995). However, Cusson (1986) argues that remaining differences within theories of crime may be more attributable to historical context than actual differences, and that theoretical integration is both foreseeable and necessary for the expansion of criminology.

**Integrating Micro and Macro Explanations of Crime**

Understanding the occurrence of violent crime and victimization requires researchers to assess a number of effects. Moreover, one cannot assess victimization of violent crime from a solely individual-level approach. While victimization is partially based upon individual lifestyles, social and structural effects also influence the odds of victimization (Miethe & McDowall, 1993; Rountree et al., 1994; Tewksbury & Mustaine, 2006). This realization has led to a vast increase of support of macro/micro theory synthesis to assess a criminal event (Ekblom & Tilley, 2000). Miethe and Meier (1990) supported integration of victimization theories and advocated for a structural choice theory for understanding the effects of victimization. The problem with the most prevalent theories of victimization, including lifestyle, opportunity, and choice theories, is that they oftentimes disregarded structural and environmental effects. For instance, Miethe and McDowall (1993) said that while a motivated offender must find a suitable
target, the likelihood of committing a crime was also dependent upon the frequency of suitable targets within an area.

The *intellectual roots* of routine activities are founded within its individual-level understanding of activities and daily routines (Clarke & Felson, 1993; Eck & Wartell, 1998). Cohen and Felson (1979) found that even within well-founded and organized communities that individuals’ routine activities still affected crime. Proceeding tests of the theory confirmed these findings (Cohen et al., 1981; Cohen et al., 1980). Therefore, previous works on routine activities oftentimes focused on either individual or aggregate levels of crime, with little regard to the interaction of the two (Miethe & McDowall, 1993). However, the unit of analysis is imperative to understanding crime, as the routine activities of places and its individuals versus the routine activities of individuals themselves results in very different findings (Sherman et al., 1989). The importance of place has been recognized throughout the routine activities literature and has led to various expansions of the model. Felson (1986) introduced the term *handlers* as a representation of guardianship of potential offenders. Furthermore, he assessed the types of individuals who controlled crime, including personal (owners of a place), assigned (hired to regulate behavior), diffusers (those who have frequent contact with the place) and those who are general (customers or visitors). Following this same regard, Eck (1994) assessed managers of places and handlers of offenders, which led to further assessments of the economic properties and management of places (Eck & Wartell, 1998), as well as the effects of guardians, managers, and handlers on places on a micro-level (Eck, 2002; Eck & Weisburd, 1995; Eck et al., 2010).
Although rational choice theories and routine activity theory were originally presented as two very distinct theoretical foundations, their commonalities were undeniable. So much so, in fact, that Clarke and Felson (1993) made recognition of their commonalities only eight years after Clarke and Cornish (1985) founded their rational choice theory of crime. Routine activities and rational choice theories have distinct characteristics; however, the two have a symbiotic relationship. Their ability to be integrated became more feasible after Felson (1993) began to include multiple types of crime and focused more on the victim, who previously had been regarded in the same manner as property. However, routine activities elements of guardianship and suitable target were found to be a substantial aspect of choice making; that offenders assess whom they should offend, and how and when they should commit the offense based on risk (Wright & Decker, 1997). While routine activities is more a theory of crime, and rational choice is a theory of crime and criminality, their common ground lies within both theories’ focus on situations and the opportunities of certain situations (Clarke & Felson, 1993).

Theory Integration: Situational Crime Prevention

There are two primary purposes of creating an integrated theoretical model: to increase explanatory power and to provide a more policy-driven approach. In 1971, C. Ray Jeffery introduced the phrase *crime prevention through environmental design* (CPTED). Within his book, he purported that criminological literature had put too much focus on the social effects of crime, and instead needed to focus on environmental effects on crime and environmental methods of crime prevention (Clarke, 1980). CPTED generally focuses on how to reduce crime opportunities by changing the design of a place
or environment. Jeffery (1971) was heavily influenced by psychological learning theories, and thus examined the reward/punishment effect of the environment on individual behavior (Jeffery & Zahm, 1993).

CPTED was discounted after multiple failed attempts at implementing its methods of crime prevention within certain areas (Clarke, 1980, 1983). However, Jeffery’s work undoubtedly influenced Clarke’s (1980, 1983) expansions on situational crime prevention, which allowed for the foundation to present an integration of routine activities and rational choice within a situation. Within this theory, he ascertained that in order to reduce crime, communities and law enforcement would need to vastly diminish opportunities to commit crime. Similar to Cohen and Felson’s (1979) routine activities theory, the offender was not the most significant variable to explaining and reducing crime.

One of the appeals of Clarke’s (1980, 1997) theory was that it was policy-driven and provided clear implementations for both formal and social control. Its focus was on the repression of motivated offenders (Buerger & Mazerolle, 1998) through individual and community interventions. Moreover, it provided methods of crime prevention for law enforcement through problem-oriented policing (Goldstein et al., 1990). Problem-oriented policing is a crime-specific approach to diminish a certain offense through community and law enforcement efforts (Eck, 2002; Eck & Spelman, 1987).

This policy-driven, community-based theory was appealing, as it provided control to the people—prevent crime by assessing the situations that provide opportunity for crime and reduce that opportunity. Although the theoretical model is seemingly parsimonious, it is crime-specific and is slow moving within its progression of crime
prevention (Clarke, 1983; Goldstein et al., 1990). Accordingly, its efficacy is observant only when it approaches crime prevention within one particular type of crime (Weisburd & Green, 1995). Situational crime prevention provided the groundwork for multilevel models of victimization. Clarke (1983) was one of the first to recognize the importance of environmental factors in explaining crime and criminality. Moreover, he provided the link between routine activities and rational choice: opportunity.

Clarke (1983, 1997) also placed an emphasis on the geography of places to understand how to prevent crime within situations. He discussed how communities and the physical organization of areas can affect the opportunity of crime, citing Newman’s (1973) defensible space, which represents how an area can defend itself by being physically cognizant of danger. He conceived that interest in crime situations would naturally lead to interest in geographic features and patterns that affect opportunity of situations. Furthermore, he purported that (in relation to routine activities) the frequency of examining social characteristics of the environment, like housing, retail, and routine activities, would provide a better understanding of crime prevention. Clarke’s contributions helped to lay the groundwork for linking environmental criminology with routine activities and/or rational choice.

The Role of Opportunity in Victimization Theory Integration

Opportunity within victimization theories was founded as a micro-level process of explaining crime; however, it provides a convincing argument for how social structure affects the manifestation of offenders’ motivation (Miethe, Hughes, & McDowall, 1991). While routine activities had most often failed to measure motivation, asserting that there were always motivated offenders, rational choice placed much more of an emphasis on
motivation. Yet, assessing the effects of motivation became an imperative part within the expansion of both theories, with a consensus that an opportunity to commit a crime must present itself in order for a crime to take place (Miethe & Meier, 1990). To elaborate, there is an interactional association between criminality and opportunity that is affected by three levels of informal and formal control, including family, community, and police (Rice & Smith, 2002). Thus, to decrease opportunity, one can either reduce suitable targets or increase guardianship. As stated previously, routine activities originally focused primarily on individual-level processes; however, within this model, guardianship and the frequency of suitable targets are regarded as aggregate community characteristics.

Sherman et al. (1989) argued that opportunity is the connection between individual and structural routine activity effects on crime. There is a symbiotic relationship between lifestyle and opportunity theories—their significance is arguably null without one another. Clarke (1993) developed the crime opportunity structure and asserted that lifestyle theories provided the needed legitimization for opportunity by focusing on the sum and relationships between targets, victims, and crime facilitation (Clarke, 1997). The convergence of offenders and victims within time and space is indistinguishable from the conjunction of opportunity (Ekblom & Tilley, 2000), as it assesses the overall situational likelihood of opportunity and risk. This recognition of opportunity’s connection with routine activities and rational choice furthers the validation of integration of social disorganization theories with lifestyle theories.

Social disorganization and routine activities are two of the leading theories for explaining variations in crime rates at aggregate and individual levels (Hipp, 2007a).
While social disorganization assumes that there is a stable level of opportunity to commit crime, routine activities assumes that space, time, and individual lifestyles influence the fluctuation of opportunity. Furthermore, while social disorganization has no assumption of motivation, routine activities assumes there is a constant supply of motivated offenders. Thus, while there are definite commonalities between these two theories, they each provide distinct explanatory value to crime (Andresen, 2006; Rice & Smith, 2002).

Additionally, opportunity and social disorganization are both theories that focus on the systematic formation of communities and the effects of change. Change can produce weakness, and in turn, can diminish risk and assuage avoidance of social control. This is further understood when assessing commonalities within social disorganization theories and routine activities. Specifically, Lee (2000) argued that guardianship was not merely a micro aspect of crime, it was indicative of social control. Similarly, Bursik (1988) discussed that using a measure of supervision or protection was similar to explaining both the social control aspect of social disorganization and the guardianship aspect of routine activities theory.

When Sampson et al. (1997) expanded social disorganization theory to include measures of social and family networks, this only furthered the rationale for inclusion of routine activities within the social disorganization model. Browning (2002) discussed how collective efficacy affects criminal opportunity through direct interference (exemplifying guardianship), as well as indirect through management of prospective criminals, which relates directly to routine activities’ elements of guardianship, managers, and handlers. Accordingly, Hipp (2007b) examined challenges within neighborhoods, arguing that there is a positive impact of social cohesion on ability to
provide protection and supervision, once again relating routine activities and social disorganization.

*Environmental Context of Crime*

Space has remained one of the underpinnings of routine activities theory, originally focused on individuals (offenders and victims) converging in time and space; however, its new founded emphasis has allowed for integrated theories of victimization to come to fruition. Moreover, the examination of opportunity within the context of space will allow for a contextual model of crime and victimization, or the *spatial diffusion process* (Smith et al., 2000).

One of the primary applications of routine activities theory has been on place at a micro-level (Eck, 1994, 2002; Eck & Weisburd, 1995; Eck et al., 2010). Eck et al. (2009) examined the effects of managers, guardians, and targets on crime within single places. Furthermore, Eck and Weisburd (1995) assessed how patterns of criminality (Brantingham & Brantingham, 1981) were applicable to individual places. When accessibility (an element of a suitable target) was easy, there was higher crime. Accessibility was also contingent upon discovering a place, which occurred when a potential offender was performing their daily routine activities, which were typically noncriminal. Their findings also indicated elements of situational crime prevention and rational choice: the choice to commit a criminal act was conditional upon social cues.

The importance of place is imperative to understanding victimization. Groof (2008) discussed how social control and behavior changes within time and space. In reference to public spaces, those who are seemingly in command of a public park will vary throughout the day. Furthermore, authority within public spaces will be dependent
on the larger area in which that public space exists. Lastly, the amount of public space will oftentimes affect the behavior and authority within one public space area.

Clarke’s (1983, 1997) situational crime prevention provides a greater understanding of how social disorganization, routine activities, and rational choice overlap, while still providing distinct explanations of crime. Situational crime prevention can examine specific crime patterns within certain places (Ekblom & Tilley, 2000). By assessing expansive environments that have a higher rate of crime, we can then assess the individual factors. Ekblom and Tilley (2000) specifically make reference to this, stating the need to assess targets of crime by both susceptibility and attractiveness; the ability, presence, and inclination of individual and community measures of crime prevention, as well as those who may endorse criminal activity; and a potential offender who is “predisposed, motivated and adequately resourced for crime” (p. 380).

While a theoretical explanation of any phenomenon should strive for parsimony, its parsimonious nature is only valid in context of its explanatory value. Using various integration techniques, research has demonstrated the utility of theory integration for explaining victimization and crime (Andresen, 2006; Browning, 2002; Lee, 2000; Miethe & Meier, 1990; Moriarty & Williams, 1996). Moreover, past research has found general commonalities between the aforementioned theories, demonstrating an overall contextual model (See Figure 2). A criminal event is a process that is reliant upon choices made by individuals, within communities, and within places (Cornish, 1994; Weisburd, Bushway, Lum, & Yang, 2004). Thus, assessing crime as a process in a multilevel context should provide the strongest explanation of victimization and crime.
Figure 2. Contextual Model of Crime. This figure illustrates the linkages previously assessed between macro- and micro-level theories of criminality, crime, and victimization.

Resiliency Theory

In order to create a theory- and policy-driven integrated model to explain victim-offender convergence in violent crime, one must provide theoretical and methodological justification for incorporating certain measures. Thus, the theory of resiliency is examined for its grounded theory and application to many fields, as well as its policy-driven application to communities and regions to provide empowerment to communities in an effort to better communal relationships and overall quality of life.

The Great Fire of Chicago has been marked as one of the most destructive events during its time. However, according to some accounts, the effects of the fire were deemed advantageous to the expansion and rebirth of Chicago. Smith and Whaples (1995), argued that the positive reaction of the fire was not its cleansing of the soul of Chicago, but instead was due to the possibility of “bring[ing] under control the city’s sometimes short-
sighted speculative ambitions” (p. 46). Even though the city restoration resulted in more deaths than the fires themselves (Vale & Campanella, 2005); the individual and collective response to the fire was demonstrable of the positive outcome; the city was resilient. This resilience to disaster was signified by the city’s rampant growth, structurally and socially. Its growth led to greater rates of delinquency and its people and communities became the principle data for theorists within the Chicago School. While the city had demonstrated resilience within its recovery from the Great Fire, the same could not be said for its recovery from crime.

While the only constant is change, change continues to cause significant disruption to a system that can be either expected or unexpected (Adger, 2000; Miller, Osbahr, Boyd, & Thomalla, 2010). The preparation and response of organizations, (whether it be plant organisms or neighborhoods, or governments), is indicative of its strength and resiliency. While Chicago was buoyant in rebuilding, physically, socially, and economically, other events within communities have demonstrated less favorable results. For instance, in 2005, when Hurricane Katrina hit New Orleans, the lack of planning, coupled with the overall negative reaction of the community and government, exemplified the inability of a city to be resilient to such an event (Campanella, 2006; Schmidtlein, Deutsch, Piegorsch, & Cutter, 2008; Tidball & Krasny, 2007; Yarnal, 2007). What was particularly distinct about New Orleans was its vast inconsistency of vulnerability between all social levels: individuals, families, and communities. The social inequality in New Orleans was made evident by the storm (Yarnal, 2007).

First applied within ecological research (Cumming, 2011), resiliency represents an organisms adaptability regardless of hardship, which can refer to risk, danger, or
enduring exposure to negative events or processes (Luthar & Cicchetti, 2000; Miller et al., 2010). It is formulaically represented by the degree of disruption that an organism can endure to remain within the same overall condition (Cumming, 2011). Moreover, it is representative of the organism’s proficiency of self-organization and ability to increase its overall adaptability through preparation of future disturbances (Cumming, 2011).

Resiliency can be applied as a risk-management model (Waller, 2001), which can be approached through the study of individuals, and their response to risk and harm, or within communities. Community resilience can be assessed through the interdependent, dynamic nature of individuals within those communities (Germain & Bloom, 1999; Rutter, 1987; Waller, 2001). This sort of approach requires ecological thinking (Germain & Bloom, 1999), which is developing a model to understanding complex exchanges between individuals and communities over time, and how individuals fit within an environment.

Holling (1974, 2001) refers to resiliency as a panarchy, which he defines as the overall degree of innovation within a system that can experiment to determine the most effective methods of reacting to disturbances, while remaining stabilized. Within ecological theory, research applied resilience to measure the ability to maintain production of natural resources (Elmqvist et al., 2003). An additional component of resiliency was the organism’s responsive diversity within its ability to regroup and restructure itself during constant events of change (Bohle, Warner, & Zschabitz, 2007; Holling, 1974, 1996). Overall, it is understood as a multilevel, longitudinal application that assesses a system’s “capacity to cope with and adapt to change in the context of multiple-equilibrium systems and human-dominated environments” (p. 489).
Resiliency has been applied within multiple disciplines, and has become recognized for its interdisciplinarity, particularly since changing resiliency on any level (community, individual, or government) can only be approached as an interdisciplinary problem (Yarnal, 2007). Thus, for purposes of this study, the review of literature will focus on both social and environmental resiliency and its application to urban areas.

**Social Resiliency**

Within social-eco systems, resiliency can be assessed within the composition of small and large networks, which are comprised of nodes and links. The strength of the social networks are assessed by two elements: connectivity (density of links) and centrality, which is the degree and strength of connections (Janssen et al., 2006). Resiliency of an organism is affected by changes of nodes and links, by either “addition or removal of links” (p. 7).

Assessing responses to change can be understood through both a resilience and vulnerability context (Cutter, 2008; Holling, 2001). Vulnerability typically refers to measures of response to particular events, oftentimes referring to natural disasters, as well as the degree of preparation prior to the event (Bohle et al., 2008; Mustafa, 1998; Mustafa et al., 2011). The relationship between vulnerability and resiliency is best understood within social applications, as they are oftentimes measured similarly, yet signified by reverse scores. Bohle et al. (2008) purport that the presence of vulnerability represents the need of increased resilience, which once implemented, will in turn decrease vulnerability throughout time. Social resiliency has become popular within social science research. Cumming (2011) defines social resilience as the degree of “financial capital, diverse livelihood, trust, community cooperation, and enhancement of local response
capacity through appropriate institutions and organizations and economic incentives for abiding by laws” (p. 901). Adger (2000), states that there are multiple definitions of resilience; it is the ability to endure disturbance prior to needing to change the “variables and processes that control behavior” (p. 349). Similarly, Tobin (1999) stated that the following characteristics were representative of a resilient community: “low risk, low vulnerability, ongoing planning, high political and official support, government and private partnerships, interdependent and independence of social networks, and appropriate scale of planning” (p. 14).

Adger (2000) also applied resiliency to the degree of resource dependency which can be measured as the direct impact of the local economic and resource industry on the social order, livelihood, and stability or a community. Too great of a dependency can lead to vulnerability, which can be observed within changes to income, social networks, and frequency of migration. According to Adger (2000), vulnerability refers to “the exposure of groups of people or individuals to stress as a result of the impacts of environmental change” (p. 348). Within resilience research, resource dependency can also signify inequality, particularly economically (Donner & Rodriguez, 2008). This was evident within New Orleans following Hurricane Katrina; the high dependency on governmental resources left certain areas especially vulnerable (Schmidtlean et al., 2008).

From an individual standpoint, resilience is centered on individual concerns and proficiencies (Luthar & Cicchetti, 2000; Sapountzaski, 2007). Beck (1992) reinforces this idea, arguing that people become individual specialists in managing their own risk. Sapountzaski (2007) purports that collective resilience is achieved through similar means to individual resilience, by disaster and risk management. In order to remain resilient, an
individual or a community will assess their overall risk and potential loss within a situation, which represents self-vulnerability. Moreover, it is the strength and speed of recovery from disturbance that is indicative of social resilience. If risk seems too high, then an individual or a community will attempt to decrease their overall degree of vulnerability by changing how they manage their individual lifestyles or community lifestyles.

In order to understand social resilience, one must recognize the longitudinal cyclic process of resilience (Adger, 2000). Holling (2001) labels this an adaptive cycle that is comprised of three elements: the intrinsic ability to change, the controllability of a system and its cohesion, and the overall resilience to unforeseen events and processes. This is further exemplified by Luthar and Cicchetti (2000) who referred to adaptation as a measure of social capability that is comprised of both guarding and vulnerability factors. Foster (2010) discussed the inverse relationship between resilience and growth within cities; the slower the city grows, the greater its preparation. Moreover, it is the approach of resilience that makes it unique, as it focuses on the process of both good and bad to better understand events’ effects and outcomes.

Urban Resilience

A number of researchers have expanded upon the ideas of social resilience to assess urban resilience, which is oftentimes measures of community, structural, and environmental measures that signify outcomes and reactions within urban areas over time (Bohle et al., 2008; Coaffee & Rogers, 2008; Cutter, 2008; Donner & Rodriguez, 2008; Satterthwaite et al., 2007; Surjan et al., 2011; Tanner et al., 2009; Tidball & Krasney, 2007).
One of the first published studies on spatial resilience was conducted by Nyström and Folke (2001), who assessed defenses of coral reefs. Within their application of spatial resilience, they assess how ecosystems at a large scale are affected spatially by disturbances. They further analyze ecosystems at a network scale by determining the relationship between ecological memory and spatial resilience through framework, mobile links, and the support area for the mobile link. Cumming (2011) discusses spatial resilience within this context as land use which can be assessed both within and outside an area. Internal spatial resiliency refers to size, shape, boundaries within an area, and the properties of that network. External is based upon connectivity and the surrounding spatial environment. This measure of spatial resiliency as land use can be generally incorporated in measures of social resiliency (Satterthwaite et al., 2007; Surjan et al., 2011; Tidball & Krasney, 2007). Tidball and Krasney (2007), in their study of New Orleans and social resiliency, emphasized the importance of green spaces within communities, specifically because they increase cohesion among diverse populations, and signify resilience to observers. Furthermore, the degree of exposure or vulnerability is affected by land use, both structurally and environmentally (Yarnal, 2007). Surjan et al. (2011) stated that resilience within urban communities is attainable only with extensive structural and social planning.

Research on resilience pertaining to environments within urban and rural areas have focused predominantly on community locations and climate effects on disaster and/or social change. The relation between urbanization and climate change is reciprocal (Donner & Rodrigues, 2008), as the climate will attract and affect an area’s population composition and its structural design; however, growth and structural density also affects
the climate of the area (Satterthwaite et al., 2007). Research has demonstrated that climate change leaves poor urban areas the most vulnerable (Tanner et al., 2009), yet cities that have experienced rampant growth have especially weak adaptation capabilities (Satterthwaite et al., 2007).

*Resiliency Model for Crime*

In order for one to truly assess resiliency within a system requires measures of capital, economically, culturally, and socially (Donner & Rodriguez, 2008). However, these do not fully encompass a model of resiliency, as the process of resiliency must assess the population, as well as the *social organization* (Donner & Rodriguez, 2008) within its environmental context. Due to its interdisciplinary nature, resiliency research has become prevalent in social science research. While resiliency has been applied at the individual level for explaining delinquency (Daigle, Beaver, & Turner, 2010), and has also been applied as a measure of preparedness for terrorist attacks (Coaffee & Rogers, 2008), to the best of the researcher’s knowledge, it has failed to be applied as an integrated measure of social control, disorganization, and routine activities. Because of its many applications, designing a model within a resiliency framework can provide a more parsimonious measure of community effects on crime than would conceptual integration (Akers, 1999) of the aforementioned criminological theories. Even more, the similarities between measures of resilience/vulnerability and community explanations of crime are remarkable, and thus resilience measures encompass the principle measures of all three theories. Figure 3 provides an illustration of how measures of ecological models of crime and measures of social and spatial vulnerability and resiliency often incorporate the same, or interchangeable, measures. For instance, Donner and Rodriguez (2008) purported that
there is an observable relation between social vulnerability/resiliency and inequality. Furthermore, they cite economic income and resources (similar to socio-economic status within social disorganization theory) and community cooperation (similar to social control within collective efficacy), as well as basic social organization and population changes and exposure as measures that are indicative of adaptation, which thus measures resilience to hazards. Coaffee and Rogers (2008) discuss defensible space designs to provide resilience in a response to risk, specifically terrorism, and also stress the importance of community respect and development for protection against hazards.

Cutter, Boruff, and Shirley (2003) developed a complex measure of social vulnerability, entitled the Social Vulnerability Index. This scale was developed as a measure of environmental hazards, and its dimensions vastly mirrored those of social disorganization, specifically within measures of land use, mobility, economy, and physical disorder. In response to Cutter’s development of a social vulnerability index, Schmidtlein et al. (2008) argued that creating and applying a quantifiable measure of social vulnerability (in comparison to resilience) had greatest utility to evaluate city preparedness for hazards that was useful to researchers, as well as laypeople.

Chapter III provides a more detailed explanation of how a resiliency model was applied to explain crime in urban areas (Please see Table 1 for citations of concepts).

Violent Crime and Victimization: Studies on Violent Crime

In order to create a model with a resilience framework that integrates individual, situational, and environmental effects of crime, it is imperative to first examine what variables have been prevalent within violent crime explanatory models. Thus, the
following section provides information on environmental, individual, and situational effects of homicide, sexual assault, assault, and robbery.

Homicide

While homicide is generally regarded as the most serious offense, it is also the rarest. While there is ample research on homicide considering its rarity of occurrence, studies on the applicability of theoretical models on homicide are somewhat scant. This is attributable to limitations of homicide data (number of cases), but is largely due to a continued lack of knowledge behind motivational and situational effects of homicide (Voss & Hepburn, 1968). In 1959, Wolfgang conducted one of first extensive studies on homicide that would lay the ground for his later theory on the subculture of violence (Wolfgang & Ferracuti, 1982). In his 1959 study, Wolfgang encompassed both incidental and individual variables, specifically, victim and offender socio-demographic measures, victim-offender relationship, and situational factors (weapon used and alcohol use) within Philadelphia (Voss & Hepburn, 1968). Explaining homicide has stemmed from one of two rationales: socioeconomic or subculture (Parker, 1989).

Within context of this review, the socioeconomic model has broadened its focus to assess environmental and individual level factors that influence the likelihood of homicide offending and victimization. Furthermore, examining the effects of cultural, structural, and individual effects has illustrated a superior explanatory model of homicide.

*Individual Factors of Homicide*

Messner and Tardiff (1985) found that sex, age, and employment status had a significant effect on the location of the homicide event. While Duncan et al. (2003) found
a significant effect of age on homicide risk, race had demonstrated little significance
(Chamlin, 1989; Chappell, 1983). Aggregate data has demonstrated more of a
relationship between race and homicide; Vélez (2009) found that communities with a
majority of African American residents positively impacted homicide rates. Similarly,
Parker (1989) found that racial composition had a direct impact on nonintimate homicide;
however, the same did not hold true for felony homicides. Shihadeh & Steffensmeir
(1994) found that the effects of inequality were aggravated when race was held constant.
To elaborate, they found that within large U.S. cities, when there was income inequality
between black neighborhoods, there was a significant increase in homicide.

Situational Factors of Homicide

Changes in data availability and statistical analyses allowed for better analysis of
disaggregated homicide data. This provided a better platform for assessing the
environmental-, incident-, and individual-level effects on homicide characteristics.
Williams and Flewelling (1988) found this disaggregation provided a better
understanding of the significant effects of cultural variables on types of homicide.
However, research using aggregate data has been imperative to understanding the
environmental-, incidental-, and individual-effects on the typologies of victim-offender
relationships within homicide. Parker (1989) suggested that examining the differing
relationship is crucial to understanding the context of homicide and its
multidimensionality.
Figure 3. Commonalities between Resiliency and Ecological Explanations of Crime. This figure illustrates the similarities between concepts used to measure or represent constructs of resiliency theories and ecological criminology.

Messner and Tardiff (1985) found that demographic characteristics, specifically the victims’ age and race affected the type of victim-offender relationship for homicide. Broidy et al. (2006) and Wolfgang (1959) found evidence of the victim-offender overlap in terms of lifestyle; both homicide offenders and victims are more likely than not to have a prior record. Furthermore, Dobrin (2001) found that the likelihood of being a victim of
homicide increased with every new arrest. Tita and Griffiths (2005) assessed the convergence of victims and offenders in homicides by examining mobility patterns of both parties. Their results demonstrated measurable mobility from both the victim and the offender, illustrating the importance mobility has on measuring the relationship between environmental factors in the context of individual factors. Chamlin (1989) studied the differing effects of environmental controls on stranger versus intimate homicide and found a significantly greater impact of informal social control on homicides involving strangers than nonstrangers. Chamlin (1989) attributes these findings to the low frequency of reporting intimate crime (Chamlin, 1989; Crutchfield, Geerken, & Gove, 1982).

The effects of alcohol and drugs have been longstanding measures of risk within violent crime. Research can approach the effects of alcohol on homicide from both a micro and macro level. While some research has assessed the effects of individual drinking (both victim and offender), others have examined how the density of alcohol outlets increases the likelihood of crime. Goodman et al. (1986) used tests of blood alcohol level of homicide victims in Los Angeles to assess individual differences between those who were sober and nonsober. Almost half of the victims (46%) from the sample had alcohol in their system. They found that alcohol levels were negatively associated with age, and was more likely present in Latino males. They suggest that these findings show how a place can affect the relationship between alcohol and aggression. Pridemore and Eckhardt (2008) analyzed the differences in individual- and incident-level variables for sober and drinking victims and/or offenders. Odds ratios were significantly different only for incident-level variables, including time of the criminal event, season of the event
(winter), the relationship between the offender and victim, and the likelihood of the offender attempting to cover up the crime. Scribner, Cohen, Kaplan, and Allen (1999) conducted a study in New Orleans to determine the association between alcohol density and homicide. They found that the addition of the alcohol outlet variable to a traditional demographic model increased the explanatory value of the model by 4%. Rossow (2001) broadened the unit of analysis to countries, examining the difference in relations between alcohol sales and crime rates in fourteen countries, and then collapsed those countries within three regions of Europe. Rossow constructed an ARIMA (Auto Regressive Integrated Moving Average) model to examine the effects of specific types of alcohol on homicide, finding that each type of alcohol (liquor, wine, or beer) and its effect on homicide varied by country. However, when the data was collapsed into three regions, wine was the only significant variable on changes in homicide rates, and only for one region.

**Environmental Factors of Homicide**

Within environmental measures of homicide, there has been particular attention to the relation between the cultural and spatial effects of crime. Chamlin (1989), using aggregate data within a traditional social disorganization model, found that both mobility and economic inequality had a positive effect on homicide frequency. Similarly, Miethe et al. (1993), using uniform crime and census data assessed the effects of social disorganization and social control on homicide. Their model indicated significant positive effects for unemployment, residential mobility, ethnic heterogeneity, public transportation, and population density. There were also significant negative effects for female labor-force participation, household size, and institutional control measures.
Lastly, Miethe et al. (1993) found greater rates of homicide within Southern regions. This finding showed support for previous literature that had found vastly greater rates of homicide in the Southern region. Loftin and Hill (1974) found evidence for a relation between homicide and socioeconomic variables within the South, as did Huff-Corzine, Corzine, and Moore (1986) who purported that subcultural characteristics and individual socio-demographics explain the majority of observed regional differences of homicide rates.

Expanding off these preceding studies, Kawachi et al. (1999) assessed effects of social deprivation and social cohesion on crime. Their findings showed that income disparity increased homicide rates, as did degree of interpersonal mistrust, poverty, and unemployment; while higher socioeconomic status decreased homicide rates. Sampson and Raudenbush (2004) conducted a study using video observations of 298 face blocks to assess the effects on the prevalence of violent crime. More specifically, the researchers examined the effects of their model of collective efficacy versus physical and social disorder, and found that measures of collective efficacy provided a much greater explanation of homicide. Rosenfeld, Baumer, and Messner (2001) employed a measure of social capital to evaluate the effects of social capital on crime rates. Using data from a number of sources, they developed a structural equation model to assess the reciprocal relationship between homicide and social capital. Furthermore, their findings demonstrated that Southern region location was a mediating variable for the relationship between social capital and homicide. This finding, they argue, can likely contribute to the explanation of high rates of homicide in the south. Homicide research has also examined the effects of extreme disadvantage within a social disorganization context. Browning et
al. (2004) and Vélez (2009) found extreme disadvantage to have a significant impact on homicides.

Within this regard, Haynie and Armstrong (2006) examined how environmental effects differed between offender and victims’ sociodemographic characteristics. While past research had examined the relationship between environmental effects on victim-offender relationships and gender, Haynie and Armstrong (2006) purport that previous studies had failed to disaggregate data on victim and offender race, and thus have discounted the possible interactional of race and gender within violent crime. Using both census data and the supplemental homicide report, their results showed that disadvantage had a greater impact on the occurrence of black female homicide than white female homicide, on white male homicide more than white female homicide, and more on black female homicide than incidents of black male homicide.

Mirroring the hypothesis of social disorganization theory, Pridemore (2007) examined the effects of change on the homicide rate within Russia both prior to and after the fall of the Society Union. During this time, homicide rates increased exponentially, and Pridemore (2007) found that this rapid social change significantly affected rates of homicide. Moreover, he found significant changes in offender and incident characteristics, specifically increases in female offenders and first-time offenders, and increases in premeditated crimes, crimes for profit, and crimes of bodily force.

In regards to spatial effects of crime, research on homicide and social disorganization has found that mixed land use increases the risk for homicide within an area (Hipp, 2007a). Furthermore, examining the context of community and spatial effects on individual effects has become prevalent within the literature, assessing homicide
within a spatial context. For example, Morenoff et al. (2001) assessed collective efficacy (social control and social cohesion) and social disorganization on homicide within neighborhood clusters in Chicago. Using a hierarchical linear model, followed by a spatial dependent regression model, the researchers emphasized the importance of homicide being a spatially dependent process. Messner, Anselin, Baller, Hawkins, Deane, and Tolnay (1999) examined geographic patterns of homicide at the county level. While past research has found no diffusion effect of crime (Sherman et al., 1989), Messner and his colleagues (1999) found nonrandom patterns of diffusion across neighboring counties, indicating the presence of spatial autocorrelation. Within subsequent literature, Messner and Anselin (2004) again examined the presence of spatial autocorrelation, and emphasized the importance of contextual spatial analysis that controls for spatial lags (crime diffusion and nonrandom patterns of crime within areal data). The findings from these studies are indicative of the necessity of employing longitudinal, not cross-sectional data within studies of violent crime in areas.

There are innumerable relationships and motivations behind homicide, which make it difficult to measure at an aggregate level. Moreover, due to its rare occurrence, studies have oftentimes had to use Poisson models to interpret the main and interactional influences of homicide. Therefore, examining disaggregate data within larger units of analysis is seemingly the most appropriate method of analyzing a contextual model of homicide.

**Sexual Assault**

While there is an abundance of literature that examines the ability of criminological theories to explain violent crime, literature on sexual assault is particularly
copious. Speculations as to why there is such a focus on sexual assault within criminology vary; however, one of the foci of sexual assault research is founded within the *dark figure of crime*. Sexual assault exemplifies the overwhelming divergence between frequencies of crime versus actual reports (Bachman, 1998; Koss, Gidycz, & Wisniewski, 1987; Rumney, 2008), and how incident characteristics, as well as offender and victim characteristics, affect the likelihood of reporting and conviction. Another explanation for the vast literature on sexual assault is the overall multidimensionality of the crime. Furthermore, it exemplifies the overall need for a multidimensional model to assess violent crime, as literature has pointed to the importance of individual, situational, and environmental factors.

*Individual Effects of Sexual Assault*

A substantial body of research has centered on the relationship between gender and sexual assault. While gender of victims and offenders affects overall likelihood of reporting, (Rumney, 2008), gender is also a significant measure of risk management and fear of crime. For instance, Kavanaugh and Anderson (2009) assessed how males’ and females’ degree of risk management is contingent upon environments. Conducting qualitative interviews, the researchers found that when social support is high, females tend to react more openly to harassment. Generally, they found that while females tend to have higher degrees of risk-management overall, men’s risk management is affected more by environmental cues. Furthermore, sexual assault tends to provoke vast levels of fear and anxiety (Mieczkowski & Beauregard, 2010; Valentine, 1989, 1992), and the degree of anxiety is oftentimes explained by gender (Khan, Byrne, & Livesay, 2005; Lane, Gover, & Dahod, 2009). Using fear of crime and rational discrimination, Khan,
Byrne, and Livesay (2005) assessed how previous victimization affected female’s fear and risk-management within various situational context. Their findings demonstrated that overall, fear was positively associated to time of day situations; however, there appeared to be little distinction in rational discrimination for those who had previously been victimized versus those who had not been a victim of a crime. In their study of fear of crime at the University of Florida, Lane, Gover, and Dahod (2009) found that fear of rape was significantly related to fear of other sorts of crime for both men and women. Moreover, while both men and women’s fear was affected by observed risk, men had a greater tendency to incorporate perceived risk into their perceptual fear of crime. This is further exemplified by Valentine (1989) who examined how males and females differ in their assessment of immediate surrounding environments. Valentine (1989) argues that this is due to fear of crime, as well as past victimization.

Situational Effects of Sexual Assault

The literature on sexual assault is replete with references to psychological profiles of sexual offenders. While this research was originally founded within clinical psychology, its applicability and utility within investigation has become evident (Beauregard, 2010). One of the primary associations which has been discussed is the relationship between the offense/incident and the offender and victim. Canter (1996) employed a statistical technique known as smallest spatial analysis, which operates under the assumption that the variables have no relationship to one another. The multivariate technique examines the association of victim and offender characteristics in context of the event. Canter (1996) discusses how the approach to the criminal event can be a strong indicator of the events prior to the initiation of the offense, as well as the characteristics
of both the offender and the victim. Furthermore, the incident can often be a predictor of
the type of relationship between the victim and the offender. Along with Young in 2009,
Canter developed the $A \rightarrow C$ equation of profiling that provides a quantitative assessment
of the relationship between offense characteristics and offender characteristics (Canter &
Youngs, 2009). LeBeau (1987) conducted a study using investigation reports to
determine how the relationship between a victim and offender produced distinct patterns
within criminal event and offender characteristics. After examining 612 sexual assault
incidents with only one offender in San Diego, California, he developed a classification
of sexual offenders, which included three groups: open unknown, single (one offense), or
series (serial offender). His findings demonstrated that those offenders who are either a
serial offender and/or remain unknown to the police are those who are typically strangers
to the victim.

As previously stated, prior literature has demonstrated that situational effects of
sexual assault provide significant explanation of variations in sexual offense rates.
Related research has employed both a rational choice and a routine activities framework
to explain individual effects within situational context. Warr (1988) argues that it is
imperative to look at how opportunity is embedded within routine activities and its
effects on sexual assault. Taking into consideration the consensus of opportunity being
socially structured, Warr (1988) focused on the location of rape, and found a strong
correlation between burglary and rape. For instance, Bachman, Paternoster, and Ward
(1992) found that rational choice helped to explain offenders’ motivation in committing a
sexual assault. Using a vignette survey, they found that males reported they would be
more likely to commit a sexual assault if the female was partying or drinking than if she
was shopping, or if she had initiated some sort of sexual behavior. Moreover, they were less likely to see the act as morally wrong if the victim and offender were in a relationship. They found little support of a deterrent effect from informal sanctions.

Within this same regard, Armstrong, Hamilton, and Sweeney (2006) conducted 42 individual and 16 group interviews to measure the situational and interactional effects of sexual assault on college campuses. Their research showed that the place of the criminal event, as well as its social characteristics of its population, were associated with rape. However, the risk of rape within this context (particularly within parties) was strongly associated with personal perceptions of rape myths. Furthermore, alcohol and drugs only increase victimization risk. Generally, Armstrong et al. (2006) suggest that there are multiple levels of examining risk of sexual assault, including individual, interactional, and contextual. Therefore, policies targeted at prevention of only one of these aspects will likely have little impact on the rate of sexual assault.

Similarly, in an effort to determine how situational and individual level factors affect the outcome of sexual assault, Scott and Beaman (2004) examined 108 incident of sexual assault that were reported to a Canadian police agency. Specifically, they assessed what factors predicted victim injury, victim resistance through physical means, completion of the assault, and charges brought forth on the offender. Offender and victims’ ages were consistently significant for both injury and physical resistance, while age and drug or alcohol use of the victim were significant predictors of the completion of a sexual assault. Lastly, only drug and alcohol use of the offender significant increased the likelihood of whether charges were brought against the offender. The victim and offender relationship (either in a relationship or acquaintances) was consistently
significant across all four models. Surprisingly, location of the crime demonstrated no association with any of the four outcomes.

Muehlenhard and Linton (1987) surveyed college students to determine situational factors of dating that influenced risk of sexual assault. The researchers evaluated the influence of situational characteristics and personal characteristics on the likelihood of sexual assault and found that situationally, the use of alcohol or drugs and males initiating and paying for the date significantly increased the likelihood of sexual assault. Furthermore, the location of the date was a strong predictor of sexual assault risk. Individual-level variables that were significant included men’s perceptions of gender roles and rape.

While the previously mentioned studies establish support for situational factors, Mieczkowski and Beauregard (2010) conducted a conjunction analysis to assess how situational factors influenced the likelihood that a sexual assault would have a lethal outcome. The findings of their study showed that the victim’s immediate environment can serve as a protection mechanism. While their thesis emphasized the importance of situational factors (including time of day, offender drug use prior to crime, and the use of pornography prior to crime) their data showed only a weak relationship between the situation and likelihood of lethal outcomes within sexual assaults.

*Environmental Effects of Sexual Assault*

The larger unit of analysis within sexual assault research is the environment, which encompasses spatial and cultural characteristics of an area where the crime occurs and/or the resident locations of either victims or offenders. One of the first researchers examined city crime patterns in context of situational, environmental, and individual
factors was Boggs (1965) who found that forcible rape was unrelated to the frequency of offenders within an area. Boggs (1965) conducted a factor analysis to determine the commonalities between index crimes and found that forcible rape, larceny, and auto theft constructed one factor. However, she found no clustered pattern within areas for the aforementioned crimes. More than thirty years prior to the publication of Sampson et al.’s (1997) collective efficacy model, Boggs (1965), citing Greer (1956), attributes the high rates of urban crime to a lack of social interaction.

Because residents of highly urban neighborhoods have only limited acquaintance with one another, strangers and perhaps potential offenders can go unnoticed and unsuspected in such areas. The lack of knowledge about the lives of other residents and the absence of common interests among neighbors creates indifference, and in the extreme, prevent interference even when a crime is observed. (p. 905)

Accordingly, Gartner (1990) asserted that environmental effects, particularly the population composition and its routine collective movements, were essential to explaining homicide rates. Additionally, assessment of traditional social disorganization and routine activities factors including percentage of females in the workplace and family disruption provide important contributions to changes in homicide rates. Gartner examined the three levels of effects on homicide within the U.S. and how they were comparable to homicide effects in other countries. Gartner not only found preliminary evidence of a general cross-national model, she also found that these variables explained changes in crime rates across countries longitudinally.
Within his study on sexual assault, Bailey (1999) further examined the relationship between female sexual assault and socioeconomic disadvantage. Using secondary data, Bailey identified 20 cities in the United States that had the highest and lowest rates of sexual assault for both 1980 and 1990. He found significant associations between aggregate levels of income and rape; however, he found no significant impact of changes in income on frequency of rape. Kawachi et al. (1999) investigated the relationship between social deprivation and cohesion on crime. Using the General Social Survey, along with the Census and Uniform Crime Report, they found that inequality had no effect on frequency of rape; however, there was a positive association between the percentage of female-headed households and mistrust with sexual assault.

Stucky and Ottensman (2009) explored the environmental effects on violent crime in Indianapolis, Indiana. Using both UCR and Census data they assessed how mixed land use (high density areas, commercial land use, industrial land use, prominence of major roads, and residual land use) coupled with community demographics (population, race, and disadvantage) affected violent crime in 1,000 square foot blocks. Their findings indicated that race, industrial land use, and residual land use had no impact on sexual assault; however, population size, community disadvantage, density, commercial land use and major roads were all significantly associated with rates of sexual assault.

Examining mobility patterns of offenders generates a strong link between geographic/environmental and behavioral characteristics of crime. Within sexual assault literature, there is an abundance of research on how sexual offenses committed by the same individual are consistently nonrandom and thus are demonstrable of an observable pattern. Lundrigan and Czarnomski (2006), along with Kocsis and Irwin (1997), assessed
patterns of serial sexual offenders. Using the marauders/commuters classification (marauders being those who commit crime close to home and commuters being those who travel to commit crime; Meaney, 2004), both studies found that offenders generally commit offenses in close proximity to their home; however, there are those outlying commuters who tend to travel longer distances to commit crime. Both studies emphasize that this is based on the type of offense, motivation of the offender, and demographic variables. Meaney (2004), using police data in Australia found that the overall majority of sexual offenders were marauders (93%), while only 7% were commuters.

Beauregard, Proulx, Rossmo, Leclerc, and Allaire (2007) assessed the hunting process of 72 serial sex offenders within a crime script framework. Crime scripts analysis (Cornish, 1994) is a model that assesses choice within situations and events and how they are influenced by environmental cues and learning. Furthermore, while the traditional rational choice model tends to regard decision-making within an isolative event, crime scripts are representative of the choices and their effects in a sequential manner beginning with choices made before the crime, as well as the choices made after. (Beauregard et al., 2007). Using this foundation, Beauregard and colleagues (2007) identified five clusters of offenders: outdoor rape track A and B, (A begins and ends outdoors, while B begins indoors and ends outdoors), home-intrusion rape track, direct action rape track (the victim is first targeted within a visible area, and the sequential events all occur at the same location), and lastly, the sophistication rape track (various premeditative techniques that decrease risk and increase opportunity).
Robbery

Robbery is a unique measure of crime as it is a dual representation of both property and predatory crime. Robbery is classified as a crime against persons, as direct contact between victim and offender, as well as interaction of third parties increases the likelihood of physical harm (Piza, 2003). Its utility within criminological research is substantial, particularly because it generally occurs at higher rates than other forms of violent crime (with the exception of assault). Additionally, it provides unique data on victim-offender relationships, as most robberies take place between strangers. Lastly, within community-level analysis, research has shown that robbery typically clusters within small areas or hot spots (Sherman et al., 1989) more than any other form of violent crime.

Individual Effects of Robbery

Prevention and policy literatures point to techniques of guardianship and target hardening to prevent incidents of robbery (Clarke, 1997). Because of the twofold approach of robbery (being both a property and predatory criminal act), examination of victim characteristics without any sort of situational or structural context is rarely observed. Findings from studies have demonstrated that race has a significant effect on robbery, which is observable in aggregate and disaggregate data (Cancino Martinez, & Stowall, 2009; Parker, 1989). Furthermore, Kennedy and Forde (1990) found that individual routine activities coupled with socio-demographic factors were significantly related to robbery. Specifically, they found that young single men who frequented bars and clubs were most susceptible to robbery.
Situational Factors of Robbery

While routine-activities-focused models of violent crime often give little attention to the origin of motivation, rational choice is partially a theory of criminality (Clarke & Felson, 1993; Gottfredson & Hirschi, 1990) and thus the origin of motivation is an integral element of the theory. De Haan and Vos (2003) conducted qualitative interviews with street robbers in Amsterdam. They found that the underpinning of motivation behind robbery remained constant: monetary gain. However, the motivation behind the monetary incentive provided more insight into distinct rationales for committing street robbery. While some felt it was a necessary means to an end, others sought money to improve their lifestyle, while others were simply entertained by committing the offense and enjoyed the monetary outcome. Through their interviews, De Haan and Vos (2003) found that motivation was also diminished by certain components of robbery, including a high degree of uncertain outcome and overall low prestige, which could result in some semblance of shame.

The emphasis on situational factors and their interaction with individual factors is exemplified in Kennedy and Forde’s (1999) approach to understanding crime, in which they concentrate on situational factors of violent crime within context of routine activities and opportunity. Lee (2000) used a routine activities approach to examine differences in crime rates across cities in twelve different countries. Overall, he found that high levels of social control or informal guardianship are consistently significant explanatory variables of stranger and nonstranger robbery across countries and cities within those countries.
Groff (2008) also examined street robbery victimization within a routine activities model, particularly looking at the main theoretical supposition that victim distance from home increases likelihood of victimization. Within her proposed model, Groff also includes environmental characteristics (both social and spatial). Groff posited that using the simple measure of distance from home was appropriate since street robbery cannot take place at the residence. Using GIS software, she developed a spatial model to assess temporal and social effects and found that there were three distinct models that were impacted differently by both space and time neighborhoods.

*Environmental Factors of Robbery*

Cancino et al. (2009) assessed disaggregated data by race. Due to the lower count of events (because of disaggregation) the researchers employed a Poisson model to assess how immigration and racial composition affect intergroup and intragroup crime. Their findings showed the communities with more recent immigrants were most susceptible to robbery, and in particular that Latino immigrants had higher risk of victimization in traditionally black. Using aggregate data, Chamlin (1989), provided a comprehensive analysis of the effects of community characteristics on crime at the city level. He assessed the effects of characteristics of social disorganization on multiple crimes with 109 cities (all of which were above 50,000, with the exception of five cities) and found positive effects of residential mobility, poverty, and female-headed households on rates of robbery within cities. Additionally, his findings failed to support a relationship between community’s racial composition and frequency of robbery. Similar to Sherman et al. (1989), Warner and Pierce (1993) analyzed 911 call reports of violent crime from 60 neighborhoods and used the location of the caller to determine location of the crime,
even though those locations may be different. Using traditional measures of social disorganization, they concluded that there was a positive correlation between mobility, population heterogeneity, poverty, and robbery. They also found that when family disruption and density variables were included in the model, the social disorganization measures only had a slight effect on robbery.

There is a growing theme within the environmental crime literature of developing other measures of communities to assess crime. For instance, after Sampson’s (1987) inclusion of family disruption, as well as Sampson and Groves’ (1989) reformulated model and Sampson et al.’s (1997) addition of collective efficacy within the structural model of crime. Sampson and Groves’ model (1989) employed traditional social disorganization models, but also included meso-level variables including family disruption, friendship networks, low organizational participation, and unsupervised groups. Using the British Crime Survey, they found that robbery rates increased with greater population heterogeneity, family disruption, population urbanization, and unsupervised peer groups, and found significant inverse correlations for local friendship networks and organizational participation on robbery rates. Kawachi et al. (1999) assessed violent crime rates using traditional measures of social disorganization and collective efficacy within one model. Using the General Social Survey, Census data, the Uniform Crime Report, and compressed mortality files, they included measures of social deprivation and social cohesion on violent crime. Their findings provide support for collective efficacy and the expansion of social disorganization models, female-headed households, income disparity, and median income had a positive effect on rates of robbery and greater degrees of trust within one’s community was inversely related to
robbery rates. Within the same respect, Sun et al. (2004) replicated Sampson and Groves’ (1989) model of social disorganization to test the influence of community characteristics on crime. Traditional measures of social disorganization had significant influence on changes in robbery, as did family disruption and social networks. Yet, socioeconomic status was positively related to robbery, and organizational participation provided little contribution to the model.

Using a unique visual data of surveillance video within 23,816 face blocks, Sampson and Raudenbush (1999) found that collective efficacy and physical disorder were related. Since this can violate assumptions of independent effects, Sampson and Raudenbush (1999) assessed the residual effects of collective efficacy on disorder without including perceptual measures of disorder in the model. While social disorder was significant within the first model, in the second model, Sampson and Raudenbush (1999) also included measures of mixed land use which negated any original effects of social disorder originally observed within the first model. Stucky and Ottensman (2009) also examined the effects of mixed land use on violent crime, and found that presence of major roads, residual land use, and spatial lags were all significant predictors of robbery rates.

While at the individual and situational level, target hardening is commonly used as a method of crime prevention, within spatial and environmental models, defensible space is the predominant method of prevention (Newman, 1973; Taylor, 1997). Smith et al. (2000) presented an integrated model of routine activities and social disorganization to explain differences in robbery rates across city blocks within one city. Although geographical analysis has demonstrated nonrandom patterns of crime within areas of
close proximity, and the need to control for spatial lags or spatial autocorrelation, there has been a continual defense of the positive effects of creating defensible space within small areas. Taylor (1997) contended that there are physical barriers within blocks, and Sherman et al. (1989), in their hot spot analysis, even stated that there was no diffusion process of crime, that in fact there were carryover effects of the positive methods of crime prevention from a hot spot to its surrounding areas. Smith et al. (2000) contended that assessing routine activities and social disorganization effects in a spatial context provide a better understanding of victimization risk within certain areas. Smith et al. (2000) found that there were a number of spatial relationships that could be used to explain changes in robbery. For instance, increased distance from the city-center decreased likelihood of robbery victimization, while land use, particularly the presence of motels/hotels, vastly increased victimization risk. Furthermore, every unit increase in commercial buildings had a significant increase on risk of robbery victimization.

Baumer et al. (1998) used a multilevel model to assess how changes in crack cocaine within cities affected violent crime. Using a two level model, Baumer et al. (1998) found that when controlling for population characteristics and resource deprivation, robbery rates were significantly related to levels of crack cocaine within a community. Baumer et al. (1998) made note within their literature that property crime and its relationship to crack is more prevalent than violent crime in relation to crack cocaine. To elaborate, because addiction may increase motivation, when opportunities for monetary gain present themselves, there is a greater likelihood of offense. Since they found no significant relationship between homicide and crack cocaine, and since robbery is both a property and a violent crime, its property aspects likely explain this link. Within
this same perspective, Martinez, Rosenfeld, & Mares (2008) collected incident reports of robbery from the Miami Police Department to assess the effects of drug use on violent crime within a social disorganization model. The researchers found that traditional social disorganization measurements were directly related to rates of robbery and drug activity within an area had both a direct effect on violent crime, as well as a mediating effect on the negative association between population heterogeneity and robbery.

Assault

Researchers have often employed data on incidents of assault to assess the effects of multilevel effects on violent crime. Its utility lies within its frequent occurrence, providing ample variability within individual and situational factors. Furthermore, it requires both a victim and offender, yet requires little focus on the victimization antecedents, given that there is no distinct divide of male perpetrators and female victims. Moreover, within research that centers on community or situational factors, offender motivation can oftentimes be omitted from the model, as reasons behind assault are innumerable, oftentimes lack planning, and are highly attributable to emotional reactions.

*Individual Effects of Assault*

Past literature has illustrated individual effects on assault for both victims and offenders. Regardless of whether situational and environmental factors are included within models, age remains significantly and negatively related to assault for both victims and offenders (Duncan et al., 2003; Lee, 2000). Studies on gender demonstrate that men are less likely to be concerned with the consequences of fighting (Bouffard, 2007), are at higher risk of victimization (Kennedy & Forde, 1990), yet are more likely to assess risk within their environments (Kavanaugh & Anderson, 2009).
Since the reemergence of ecological studies of crime, most studies on violent crime center around the neighborhood and situational effects. While there has been maintained interest in victim and offender relationships, further development of individual-level factors has received minimal attention. In their study on assault and crime, Finkelhor and Asdigian’s (1996) interpretive analysis of suitable targets with routine activities theory provides significant results within their study. They contend that target suitability should be expanded to assess target vulnerability, gratifiability, and antagonism. There have been various operationalizations of target suitability in prior studies (Miethe & Meier, 1990; Sasse, 2005; Tewksbury et al., 2008). In their study, Finkelhor and Asdigian (1996) assessed victims’ physical and psychological characteristics to examine individual s’ overall degree of vulnerability. These characteristics include physical factors, physical limitations, psychological distress, social competence, and age. Furthermore, they provide additional measures of guardianship and victim behavioral indicators to assess youth’s risk of nonfamily assault. Within the comprehensive model, psychological and behavioral measures demonstrated significant contribution to variance in victimization risk, including psychological distress, failing grade, age, and gender. Finkelhor and Asdigian’s (1996) study signify the need to reassess contextual victimization models within all factors to ensure the most explanatory and eventual parsimonious model to explain violent crime victimization.

Giving credence to Schreck et al.’s (2008) study on victim and offender overlap, Franklin et al. (2012) construct a model to explain crime-specific female victimization that encompasses indicators of both self-control and routine activities. Additionally, the authors make great strides to assess how their model could coincide within feminist
theories of crime to promote female empowerment while making no insinuation of victim blaming. Within their assault victimization model, the model illustrated a substantial impact of self-control on victimization risk. Surprisingly, no measures of exposure (degree of target accessibility) or guardianship, with the exception of residence location, explained variances in personal victimization risk within their analysis. The only other significant predictor of victimization was drug involvement. It should be noted that this diverged significantly from the sexual assault model, in which there were observable effects of exposure. Franklin et al. (2012) posit that this signifies crime-specific victimization risks, as well as distinct predatory approaches of potential offenders. In their analysis of the relationship between gender and barroom assault, Krienert and Vandiver (2009) found that women aggressors of aggravated assault were younger and more likely to use a weapon than their male counterpart; however, they were also more likely to be injured during the assault. They observed similar findings for simple assault; women were younger and more likely to use a weapon. Additionally, women had a greater tendency to assault other women and women whom they know. Within incidence of arrest, no gender differences were found. Krienert and Vandiver’s (2009) state that the frequency of female instigated assault has been overlooked within research and is thus in need of further examination.

*Situational Factors of Assault*

Advancements within routine activities and rational choice theories have led to recognition of importance of place. Previous studies have found that alcohol use affects victimization risks and outcome of crime; however, there has also been a recurrent theme of the effects of alcohol outlet density on changes in violent crime rates. Specifically,
within the assault literature, Pridemore and Grubesic (2011) and Hipp (2007a) found support of the alcohol outlet density effect on assault. Thus, stemming from these conclusions, research has also assessed how bars, as a situational/place variable affect victim-offender relationships and variance in violent crime.

**Environmental Factors of Assault**

Generally, researchers have established a connection between social disorganization indicators and assault. To elaborate, measures of social capital, cohesion, and/or efficacy have found social disorganization to have a negative impact on rates of assault (Bouffard, 2007; Duncan et al., 2003; Kawachi et al., 1999; Lee, 2000; Sun et al., 2004). Furthermore, higher levels of social support may increase self-protection measures and defenses (Kavanaugh & Anderson, 2009). Studies on the mobility effect on assault provided mixed results. Sun et al. (2004), Warner and Pierce (1993), and Hipp (2007a) found a significant and direct relationship between residential mobility and assault. Conversely, while Duncan et al. (2003) found no significant impact of residential mobility on assault, Warner and Pierce (1993) found mobility also had a mediating effect on the relationship between poverty and assault. Additionally, population heterogeneity remains a constant variable regardless of the studies’ models or unit of analyses (Hipp, 2007a; Sun et al., 2004; Warner & Pierce, 1993). Lastly, population density and mixed land use typically increases the likelihood of assault occurrences (Pridemore & Grubesic, 2011; Zhang & Peterson, 2007).

**Conclusion**

Past studies have demonstrated that there is a need to examine all aspects of a crime: the individuals (both victim and offender), as well as the situation and the
environment in which the incident took place. Thus, researchers have begun to (both formally and informally) integrate theories of crime in hopes of providing a better explanation. In order to ensure that an integrated model improves explanation and increases policy implications, integration must be theory driven. Therefore, applying a theoretical model that encompasses the principle elements of each relevant theory may provide a more parsimonious and policy-driven explanation of crime, particularly the convergence of victims and offenders.
Table 1

*Summary Table of Violent Crime Indicators*

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<tr>
<th>Crime</th>
<th>Effect</th>
<th>Indicator</th>
<th>Significant Effects Found</th>
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<td>Homicide</td>
<td>IND</td>
<td>Gender</td>
<td>Messner and Tardiff 1985</td>
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<td>Age</td>
<td>Messner and Tardiff 1985; Duncan et al. 2003</td>
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<td>Employment Status</td>
<td>Messner and Tardiff 1985</td>
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<td>Race</td>
<td>Parker 1989; Shihadeh &amp; Steffensmeir 1994; Vélez, 2009</td>
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<tr>
<td>Homicide</td>
<td>SIT</td>
<td>Victim-Offender Relationship</td>
<td>Chamlin, 1989; Crutchfield, Geerken, &amp; Gove, 1982; Messner &amp; Tardiff 1985; Parker 1989; Tita &amp; Griffiths, 2005</td>
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<td>Classifications of Homicide</td>
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<td></td>
<td>Victim-Offender Overlap</td>
<td>Broidy et al., 2006; Dobrin 2001; Wolfgang, 1959</td>
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<td></td>
<td>Alcohol and Drugs</td>
<td>Goodman et al. 1986; Pridemore and Eckhardt 2008</td>
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CHAPTER IV
METHODOLOGY

The purpose of this study was to examine how community and individual characteristics affect the convergence of offenders and victims within space and time. Furthermore, the study aimed to test a new expanded ecological model for explaining crime that encompassed traditional measures within a socio-spatial resiliency framework. Using measures that include geographic, community, structural, and individual factors within United States cities, the study employed a contextual theoretical model that was sequentially expanded upon to examine the effects of individual, environmental, and incident factors on two measures of victim-offender convergence: the previous relationship between the victim and the offender, and the place of the crime. Unlike previous literature on victim-offender relationships, the goal of this study was to contextualize victim-offender convergence, thus analyzing the social, spatial, situational, and individual context of victim-offender relationships and the place of crime. Prior to constructing the contextual model, the study first analyzed the individual and community effects separately on both the place of crime and victim-offender relationships.

While the study focused on social resiliency, the goal was to use a measure that still encompassed the traditional measures of ecological theories of crime. With the continuous expansions and integrations of social disorganization theory with routine activities theory and collective efficacy, there are oftentimes multiple variables within one model that are distinct, even though they are treated as constructs of an overall measure (e.g., the ecological effects of crime). These expansions can affect overall parsimony of both the statistical and theoretical model. The Resiliency Capacity Index
developed by Foster (2010, 2013) has been used as a measure of resiliency within both regions and metropolitan areas. Furthermore, the measure encompasses the general foundations of environmental criminology. The Resiliency Capacity Index is a second order factor model that allows the analyst to assess a number of independent measures that comprise three factors, which can then be used to create one second-order factor. Foster (2010, 2013) recognizes that the scale does not provide a full measure of resiliency, and thus, does not encompass all elements of environmental criminology. Therefore, additional factors were used within the same model, including social and physical disorder, and resource dependency.

Units of Analysis

In order to assess community differences on individual relationships, the study focused upon two units of analysis: cities and incidents of crime. Using the Uniform Crime Report (ucr.gov) and the Justice Research Statistics Association (jrsa.org), cities were included for analysis contingent upon meeting two criteria: having a population between 50,000-499,000, and being a participating agency of NIBRS from 2005-2009. Thus, the resulting sample of cities was 90 (n=90). (See Table 2 for a list of cities with crime rates and rates of change.).

NIBRS data were then collected, which included detailed incident reports and victim/offender characteristics for each incident of crime, as well as data on each crime within an incident. Data included within the analysis from NIBRS data were incidents of homicide, robbery, rape, sodomy, sexual assault with an object, aggravated assault, and simple assault (see Chapter I for definitions of crimes) for the 90 agencies previously selected through the Uniform Crime Report. In order to simplify the analysis, only first
order victims and offenders were included resulting in a final sample of 834,517 incidents within 90 city agencies.

**Data**

The goal of this study was to strengthen the current literature on violent crime and victim-offender relationships. In order to meet this goal, a number of data sources were employed. These include the Uniform Crime Report, the National Incident Based Reporting System (NIBRS), the LEOKA Police Employment Data through the Uniform Crime Report (UCR), the Census and the American Community Survey, and the Old Farmer’s Almanac digital data.

*Uniform Crime Report.* Published through the Federal Bureau of Investigation, the Uniform Crime Report was first established in 1929, and presently remains the most comprehensive source on crime in the United States. The Uniform Crime Report provides measures of violent and property crime, including homicide, forcible rape, robbery, aggravated assault, burglary, larceny, arson, and motor vehicle theft (Wilson & Petersilia, 2011; Zimring & Leon, 2008). Particularly prior to the development of other data sources, the Uniform Crime Report has been used as the primary data source assess the effects of violent and property crime (Chamlin, 1989; Cohen & Felson, 1979; Kawachi et al., 1999; Miethe et al., 1991; Stucky & Ottensman, 2009; Warr, 1988). Data collection for the Uniform Crime Report is contingent upon police agencies volunteering to submit the data to the Federal Bureau of Investigations. The data operates under the hierarchy rule, thus when multiple crimes are committed within one incident, only the most serious crime is reported. While the validity of the Uniform Crime Report has been questioned due to its reliance on reported incidents of crime, it remains the most comprehensive
summary of statistics on crime. Data from the Uniform Crime Report were collected through the Federal Bureau of Investigation’s online data tool for city agencies with a population of 50,000-499,999 from 2005-2009.

Table 2

Community Characteristics

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<td>Worcester</td>
<td>176810.38</td>
<td>0.13</td>
<td>0.1</td>
</tr>
<tr>
<td>Wyoming</td>
<td>70318.33</td>
<td>-0.75</td>
<td>0.3</td>
</tr>
<tr>
<td>Youngstown</td>
<td>77619.29</td>
<td>-0.17</td>
<td>-0.5</td>
</tr>
</tbody>
</table>

National Incident Based Reporting System.

The National Incident Based Reporting System, also run by the FBI, is an expansion on the Uniform Crime Report (Dunn & Zelenock, 1999). NIBRS provides supplemental information to the Uniform Crime Report and has no hierarchy rule, thus, all crimes within an incident are included within reports. The data program first began in 1987 in the State of South Carolina, however, presently covers over 50% of 22 states in the U.S. (jrsa.org). NIBRS data provide information pertaining to the victim, offender, and arrestee, which allows for further analysis than aggregated data. The data contain information about all Index crimes (group A offenses) as well as arrest records for disorderly crimes (group B offenses) (Dunn & Zelenock, 1999; Howard et al., 2000; Maxfield, 1999). What is unique about NIBRS is that it presents the situation within a crime incident, which allows for better more detailed analyses. This has made it an incredibly popular data source in criminological literature (Akiyama & Nolan, 1999; D’alessio & Stolzenberg, 2010; Felson & Cundiff, 2012; Madsen, Bush, Jones, & Wynn,
There are a number of limitations that arise when using NIBRS data. First, similar to the UCR, NIBRS is limited only to incidents of crime which were reported to the police, thus has no measure for the *dark figure of crime*. Furthermore, NIBRS fails to be a nationally comprehensive measure of reported crime within the U.S., as a number of police agencies and states have refused to participate in the program (See Figure 4). Lastly, while its detail is an obvious strength, it also leads to more discretion from the agency on how to classify various crimes and events, which can lead to erroneous interpretations (Howard, Newman, & Pridemore, 2000; Maxfield; 1999; Seidman & Couzens, 1973). For purposes of analysis, extract data files were obtained through the *Interuniversity Consortium for Political and Social Research organization* (www.icspr.umich.edu) which is available through the University of Michigan. NIBRS extract files for years 2005-2009 were collected, then reduced by city agencies and crimes included in the present study. Once segments were merged and reduced to the applicable agencies and cases, all years were merged into one primary dataset. Incident, victim, and offender characteristics were included in the analysis (see *measures* for details).

**LEOKA police employment data.** In addition to providing summary statistics, the Uniform Crime Report also publishes data through the *Interuniversity Consortium for Political and Social Research Organization’s website* (www.icspr.umich.edu) for public access. The data pertain to information about police agencies across the United States (McCarty, Ren, & Zhao, 2012). Although the data contains numerous variables pertaining to police data, only one variable was extracted for purposes of this study:
applicable agencies’ number of police. This number was then used to construct a measure of resource dependency (see Measures for details).

*The United States Census*

Arguably, the census is one of the most prevalent data sources used within community and crime research (Cancino et al., 2009; Chambliss, 1994; Duncan et al., 2011; Hipp, 2007a; Parker, 1989; Shihadeh & Steffensmeir, 1994; Stucky & Ottensman, 2009; Warner & Rountree, 1997; Warr, 1988). Researchers often use the data to assess sociodemographic characteristics of certain areas, whether it be census blocks, tracts, cities, counties, or states. First developed in 1790, the Census attempts to survey every household within the United States every ten years to collect socio-demographic information on every individual. Furthermore, within recent years the Census has provided a number of data sources that provide more detailed information about geographic areas during years between the Census. One of the most popular of these is the Census’ American Community Survey, which was developed in 2005, and provides estimates of populations between the Decennial Census. The data are collected monthly from approximately 250,000 households (census.gov). The survey provides more in-depth information on community characteristics. For purposes of this analysis, the American Community Survey one and three year estimates were used from 2008 (which have a population threshold of 65,000+ according to Census.gov).

*Almanac digital data.* The Old Farmer’s Almanac (www.almanac.com) provides digitized historical weather information for areas, including daily average, high, and low temperatures. Although not used within prior research (to the best of the researcher’s knowledge) research has been conducted to examine the relationship between weather
and crime. However, prior research has predominantly focused on aggregate measures of weather and seasonality. Therefore, the average for the area was matched with each agency’s incidents from 2005 to 2009 to assess the relationship between weather and crime at the incident level.

Dependent Measures

*Crime rate.* In order to assess community effects on crime, the study used all second level variables as independent variables to explain crime rates. The research assessed the rate of violent crime by the number of violent crime incidents for each agency reported in NIBRS per year. This was then used to assess the rate of violent crime (frequency of crimes/100,000 persons) from 2005 to 2009.

*Change in crime rate.* Ecological theories of crime and resiliency theories emphasize how communities affect change and how change affects community. Therefore, changes in community-level variables may affect the overall crime rate. Thus, a measure of average change in crime rate was calculated as the ratio of the mean absolute value difference between each year to the overall crime rate.

*Place of crime.* Within their original formulation of routine activities theory, Cohen and Felson (1979) postulated that place was imperative to understanding target suitability and offender motivation, particularly by examining the proposed guardianship of an area. Felson (2000) expanded on this with the VIVA assessment of the suitable target (visibility, inertia, value, and accessibility) and how the place where the crime is commissioned may affect a motivated offender’s opportunity. This effect is not only due to guardianship, but also its proximity to a safe place after the offender has retrieved his or her target. Thus, place is used as both an independent and dependent variable. For
purposes of the dependent variable the original categories were collapsed into three dummy-coded variables.

The first was public, which includes bank/savings and loans, convenience store, department/discount store, drug store, doctor’s office, hospital, grocery/supermarket, restaurants, hotel/motel, rental storage facility, service/gas station, specialty store, liquor store, nightclubs, bars, air/bus/train terminal, church, commercial/office building, government/public building, jail/prison, and school/college (1=yes, 0=no). The second was outdoors, which includes construction sight, field/woods, parking lot, parking garage, highway, lake, and waterway. Lastly, is residence, which include whether the offense took place in either the residence/home.

**Victim-offender relationship.** One of the limitations on past victim-offender relationship research is that it typically dichotomizes relationships to include either a nonstranger or stranger category (Decker, 1993; Spohn & Homey, 1993). Because nonstrangers encompasses varying degrees of intimacy, these previous measures are insufficient. Therefore, this study aims to measure various types of nonstranger relationships. These categories include family member, (victim was grandchild, spouse, common-law spouse, parent, sibling, child, grandparent, grandchild, in-law, stepparent, stepchild, stepsibling, or other family member, ex-spouse) romantic relationship (boyfriend/girlfriend or homosexual relationship), acquaintance (friend/acquaintance, babysitter, babysittee, child of boyfriend/girlfriend, employee, employer) and lastly stranger. Victim-offender relationship is also included as an independent dichotomized measure within place models.
Figure 4. A geographic illustration of the Status of NIBRS in the States. Information collected from the Justice Research Statistics Association (www.jrsa.org).
Individual Level Measures

Demographic characteristics of the community, offender, and victim, were used as control variables within the final model. All individual control measures were collected from the NIBRS data from 2005-2009 for each incident, and community. Demographics were collected through the American Community Survey one and three year estimates.

Type of crime. As can be observed in Table 3, UCR offense codes were collapsed to measure four types of violent crime: homicide (including murder and nonnegligent manslaughter), simple assault, aggravated assault, and sexual assault (including forcible rape, forcible sodomy, sexual assault with an object, and forcible fondling). In order for the incident to be included in the analysis, the top ranked crime had to classified as one of the original offense codes. Offenses were then collapsed to increase the frequency of each type of violent crime, which in turn increases variability. Each model accounted for one of the aforementioned crimes.

Table 3

<table>
<thead>
<tr>
<th>Code</th>
<th>Label</th>
<th>Collapsed</th>
</tr>
</thead>
<tbody>
<tr>
<td>13A</td>
<td>Aggravated Assault</td>
<td>1 Aggravated Assault</td>
</tr>
<tr>
<td>13B</td>
<td>Simple Assault</td>
<td>2 Simple Assault</td>
</tr>
<tr>
<td>09A</td>
<td>Murder and Nonnegligent Manslaughter</td>
<td>3 Homicide</td>
</tr>
<tr>
<td>11A</td>
<td>Forcible Rape</td>
<td>4 Sexual Assault</td>
</tr>
<tr>
<td>11B</td>
<td>Forcible Sodomy</td>
<td>4 Sexual Assault</td>
</tr>
<tr>
<td>11C</td>
<td>Sexual Assault with an Object</td>
<td>4 Sexual Assault</td>
</tr>
<tr>
<td>11D</td>
<td>Forcible Fondling</td>
<td>4 Sexual Assault</td>
</tr>
</tbody>
</table>

2 Homicide was later excluded from the analyses, due to a low frequency of incidents.
Victim race. Victim Race was included for the first victim of each incident. The variable is dummy coded as a dichotomous measure (0=white, 1=nonwhite).

Offender race. Offender Race was included for the first victim of each incident. The variable is dummy coded as a dichotomous measure (0=white, 1=nonwhite).

Offender age. The age of the offender was included within the analysis as either offender age or arrestee age (the value of the variables’ cases was equal; however, depending on the model, either offender or arrestee is used). Age was measured on the ratio level; with the exception of coding for offenders who were over 98 years old were coded as 99.

Victim age. The age of the victim was included within the analysis. Age was measured on the ratio level; with the exception of coding for victims who are over 98 years old are coded as 99.

Offender sex. Sex of the offender (or arrestee) was dummy coded as a dichotomous variable (0=Female, 1=Male).

Victim sex. Sex of the victim was dummy coded as a dichotomous variable (0=Female, 1=Male).

Community age. Collected from the American Community Survey three year estimates, community age was measured as the percentage of population under 25 years old.

Community population. Population estimates were collected from the American Community Survey three year estimates. Population was measured at the ratio level, representing actual count of individuals within the city.
Community sex. Collected from the American Community Survey three year estimate. Gender was coded as the percentage of population that was female.

Incident Variables

Incident variables were included in the analysis to assess how the situation and commission of a crime may affect the relationship between the victim and offender and the place in which the crime occurred. All incident-level variables were derived from NIBRS data with the exception of temperature which was taken from the Almanac Referenced Digital Data.

Incident date. The incident date was recorded as an eight digit numeric value, beginning with the year, followed by the month and the date.

Time of day. Each incident has a corresponding variable that includes the time of the incident on military time (0= Midnight, 12=Noon). All incidents that had accurate measures of incident time (and are not measures of the time of the report) were included in the analysis.

Drug use\(^3\). Past research has indicated a significant relationship between alcohol, drugs, and types of crime (Goodman et al., 1986; Martinez, Lee, & Nielsen, 2004; Pridemore & Eckhardt, 2008). Offender drug use is measured by two variables: whether the offender was suspected of using drugs, and what type of drug the offender was suspected of using (which is dummy-coded into multiple variables). Offender suspected of using was coded as a dichotomous variable (0=alcohol, 1=drugs). For cases with offenders suspected of using drugs, the second variable drug type, provided more information on the type of drug. Based on preliminary analyses of frequencies, only four

\(^3\) Preliminary analyses revealed the majority of agencies provided no information on drug use. Therefore, it was excluded from the analysis.
drugs had counts of 5% or more: crack cocaine, cocaine, heroin, and marijuana. Crack cocaine and cocaine were collapsed as one variable (1=Yes, 0= No) and marijuana and hashish were collapsed into one dummy variable (1=yes, 0=no). Because Heroin was generally infrequent, it was collapsed with all remaining drugs as a dummy-coded variable, other narcotic. Other narcotic included: heroin, morphine, opium, PCP, hallucinogens, LSD, amphetamines, methamphetamines, stimulants, depressants, and antidepressants.

*Place of crime.* Research on situational crime prevention and routine activities have indicated that proximity to a safe place (Felson, 2000), and the place itself affects characteristics of violent crime. Furthermore, research on urban resiliency has demonstrated that place and risk management is positively associated with resilience (Cumming, 2011; Sapountzaki, 2007). Research has also shown that certain crimes, like sexual assault tend to take place within the home (Warr, 1988). Place of crime was dichotomized as the crime either occurring in the residence (of the victim or the offender) or in a public area. The type of location for each crime incident was included within the victim-offender relationship models.

*Victim-offender relationship.* Within place models, the victim-offender relationship was dichotomized as stranger or nonstranger to assess its effects on the classification of the place where the crime occurred.

*Temperature.* The relationship between crime and climate has been assessed typically using aggregated data for average temperatures of seasons (Baron & Ransberger, 1978; Cohn, 1990; Cohn & Rotton, 2000). For purposes of this model, the analyst incorporated individual-level data for each crime incident. Using the Almanac
digital data, agencies’ corresponding cities were used to find historical temperature data for each incident date. The average temperature for each day was then paired with the corresponding incident date and agency.

Social Measures

In order to construct a model to measure the effects of resilience on victim-offender relationships, the Resilience Capacity Index (Foster, 2010, 2013) was used as a foundation and then expanded upon to better encompass the prior discussed ecological theories of crime. Resilience measures have been modified within the literature, (Mabbot, Jennings, & Remillard, 2009; Reams, Lam, & Baker, 2012), and due to the interdisciplinary nature of resilience, there is a general need to fit the model for purposes of applicability to the given subject. Thus, the following measures provide explanation of the resilience capacity index (Foster, 2010), and then provides measures for the factors which were included in the expanded resilience model, specifically, disorder (physical and social), exposure (suitable target and social exposure), and resource dependency (police within a city).

*Resilience capacity index.* Developed by Kathryn Foster, through the MacArthur Foundation, the Resilience Capacity Index provides a parsimonious measure of environmental effects on individuals. Foster (2010) proposed the index was constructed to include three factors, which are each represented by four indicators (see Figure 5). Factor one represents economic capacity, specifically income equality, economic diversification, regional affordability, and business environment. Factor two represents socio-demographic capacity, specifically, educational attainment, without disability, out of poverty, and having health insurance. Both factor one and factor two are appropriate
representations of expansions on the social disorganization model, specifically assessing socio-economic status, education, and access to resources. The last factor is community connectivity and is used as a general representation of social cohesion and collective efficacy. Specifically, it includes four indicators, including civic infrastructure, metropolitan stability, homeownership, and voter participation (Foster, 2010; 2013). Table 3 provides specific measures of each indicator.

While Foster (2010) proposed these specific factors, no factor analysis was conducted to determine whether these factors fit. In fact, Foster (2010) made note that certain items may be unrelated to one another; however, purported it was the totality of the index that provided a strong description of the resilience of the area. Thus, for purposes of this analysis an exploratory factor analysis was conducted and two distinct factors were identified (see factor analysis and reliability).

_Social disorder._ Social disorder has often been measured as social incivilities, which are events of minor crime, including public intoxication, loitering, etc. (Kelling & Coles, 1996; Sampson & Raudenbush, 2004). In context of these measures, the analyst took a new approach to measuring social disorder. Arrest rates for NIBRS group B offenses, specifically; curfew/loitering/vagrancy violations, disorderly conduct, and drunkenness were summed and aggregated for each city to create a measure of social disorder.

_Physical disorder._ Disorder has often been treated as one construct; however, research has indicated that physical and social disorder are two distinct measures of a community (Yang, 2010). Physical disorder is continual and is often classified by the physical state of structures within a community (Wilson & Kelling, 1982; Kelling &
Coles, 1996). Due to limitations of the present data, physical disorder was measured as the percentage of unoccupied housing within a community (Rountree & Land, 1993). This measure was collected using the American Community Survey, 2008 three-year estimates.

**Social exposure.** Defensible space (Newman, 1973) has been used within routine activities and situational crime prevention literature as a method of preventing crime through both social and structural designs. Similarly, spatial resiliency typically has examined how structural and community planning can better prepare communities for disasters/negative events. Moreover, spatial resiliency has assessed how geographic barriers can be used as protection against exposure, and decrease risk to communities. This is similar to situational crime prevention, which has assessed how design of places can decrease target exposure and decrease offenders’ opportunities. Therefore, to assess social barriers, two measures were used that have not been mutually included within prior literature: reliance on tourism for employment purposes (looking at the relationship between tourism and crime; Pizam, 1982) and population increase by workers. Modeling Giacopassi, Stitt, and Nichols’ (2000) measure of the economic impact of tourism, the current study examines the percentage of employment that relies on tourism, including entertainment and travel. The second variable, change in daytime population by workers, assesses the percentage change of population due to outside commuters. Both of these were used as indicators of social exposure.

**Resource dependency.** While police presence is a measure of social control, it is also a measure of resource dependency, which is indicative of social resiliency (Adger, 2000). Within the criminal justice literature, resource dependency has been assessed by
the number of police officers within an area, as it signifies the overall economic capital of the area (McCarty et al., 2012; Pfeffer & Salancik, 2003). Therefore, the number of police officers per agency was collected through the LEOKA police employment data. This measure is then used as a ratio of police to population per square mile (McCarty et al., 2012) to assess the effect of formal resources (here, police) on crime rates and victim-offender relationships.

*Figure 5.* Resilience Capacity Index (Foster, 2010), provides a concept map of the originally formulated Resilience Capacity Index, with the exception of Mobility, which was changed for purposes of this study.
Table 4

*Resiliency Capacity Index Measures* (Foster, 2010)

<table>
<thead>
<tr>
<th>Item</th>
<th>Comparable Construct</th>
<th>Specific Measure</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income Inequality</td>
<td>Economic Disadvantage</td>
<td><em>Gini Coefficient</em></td>
<td>Census</td>
</tr>
<tr>
<td>Economic Diversification</td>
<td>Socio-Economic Status</td>
<td><em>Differences between economy of the community versus the national population</em></td>
<td>Census</td>
</tr>
<tr>
<td>Regional Affordability</td>
<td>Economic Disadvantage</td>
<td>% households within a city that are spending less than 35% of their overall salary on housing</td>
<td>ACS</td>
</tr>
<tr>
<td>Business Environment</td>
<td>Situational Crime Prevention (Structural Design)</td>
<td><em>Venture Capital Investment, Broadband density, Churn (rate of entry within business firms), and % of large to small business sizes.</em></td>
<td>Indiana Business Center</td>
</tr>
<tr>
<td>Educational Attainment</td>
<td>Education</td>
<td>% with a bachelor’s degree of higher</td>
<td>ACS</td>
</tr>
<tr>
<td>Without Disability</td>
<td>Suitable Target (RA)</td>
<td>% who requires no disability care</td>
<td>ACS</td>
</tr>
<tr>
<td>Out of Poverty</td>
<td>Socio-Economic Status</td>
<td>% whose salary is above poverty level</td>
<td>ACS</td>
</tr>
<tr>
<td>Health-Insured</td>
<td>Socio-Economic Status</td>
<td>% who has health insurance</td>
<td>ACS</td>
</tr>
<tr>
<td>Civic Infrastructure</td>
<td>Social Capital</td>
<td><em>The ratio of civic organizations to population</em></td>
<td>Census</td>
</tr>
<tr>
<td>Metropolitan Stability</td>
<td>Social Cohesion/Mobility</td>
<td>% who has been in residence for one year or over</td>
<td>ACS</td>
</tr>
<tr>
<td>Homeownership</td>
<td>Social Cohesion/Mobility</td>
<td>% who own their homes</td>
<td>ACS</td>
</tr>
</tbody>
</table>

Hypotheses

The current study examined how community and individual-level factors affect victim-offender relationships, and the convergence of victims and offenders through time and space. Therefore, for purposes of the analysis, hypotheses are divided into three
sections: crime hypotheses, victim-offender relationship hypotheses, and place of crime hypotheses. The following hypotheses were developed to provide answers to research questions presented in Chapter I.

H1: There is an effect of the resilience capacity index on community rates of crime controlling for all other effects.

H2: There is an effect of changes in the resilience capacity index on changes in community crime rates controlling for all other effects.

H3: There is an effect of situational characteristics of crime (incident time, incident day, climate,) on the victim-offender relationship controlling for all other effects.

H4: There is an effect of victim demographics on the victim-offender relationship controlling for all other effects

H5: There is an effect of resiliency on the victim-offender relationship controlling for all other effects

H6: The effects of target suitability (victim demographics) on victim-offender relationships vary across communities

H7: The effects of situational variables (incident hour and incident place) on victim-offender relationships vary across communities

H8: There is an effect of situational characteristics of crime (incident time, incident day, climate, and victim-offender relationship) on the place of crime controlling for all other effects.

H9: There is an effect of victim demographics on the place of crime controlling for all other effects

H10: There is an effect of resiliency on the place of crime controlling for all other effects
Analysis

Factor Analysis

Prior to any statistical analysis for purposes of hypotheses testing, Principle Axis Factor Analyses with a direct Oblimin rotation were constructed for the resilience capacity index (Foster, 2010), as well as the proposed expansions of spatial and social resilience. The proposed expansions on the resilience capacity index (Foster, 2010) were assessed based on their theoretical importance to the model (determined by previous literature), as well as their overall fit within the factor model. The expanded model included all items for the resilience capacity index (12 total items), as well as exposure variables (travel accommodations, change in daytime population, and entertainment accommodations), and disorder variables (including both social and physical disorder).

Working under the assumption that all these items were related, a principal axis factor analysis with a direct Oblimin extraction was used. The initial findings demonstrated that physical and social disorder did not load together within one factor, and therefore were excluded. Furthermore, economic diversity (RC12) and resource dependency did not load significantly on any factors and thus, were also excluded. Additionally, civic infrastructure (RC19), loaded on a factor by itself and was therefore excluded. Lastly, voter participation (RC112) and Health insurance (RC18) loaded on a factor by themselves. The analyst could not theoretically justify why these two would be a distinct factor, thus, they were excluded from the analysis.

As can be observed in table 5, the final model demonstrated three distinct factors, two which represent the resilience capacity index (factor one and two) and one which
represents exposure (factor three). Although social and physical disorder did not load onto their own factor, both were included in the final analysis as separate variables.

Reliability

Prior to constructing the scales, reliability of the items was analyzed using Cronbach’s Alpha. As can be observed in table 6, both the resilience scales showed strong reliability (.757 and .743). The exposure scale demonstrated only moderate reliability at .646.

Table 5

*Exploratory Factor Analysis of Community Variables*

<table>
<thead>
<tr>
<th>Item</th>
<th>Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>RCI 6 Without Disability</td>
<td>.878</td>
</tr>
<tr>
<td>RCI 5 Educational Attainment</td>
<td>.770</td>
</tr>
<tr>
<td>RCI 4 Business Environment</td>
<td>.659</td>
</tr>
<tr>
<td>RCI10 Stability</td>
<td>.408</td>
</tr>
<tr>
<td>RCI 11 Home Ownership</td>
<td>.380</td>
</tr>
<tr>
<td>RCI 7 Out of Poverty</td>
<td></td>
</tr>
<tr>
<td>RCI 1 Income Equality</td>
<td></td>
</tr>
<tr>
<td>RCI3 Regional Affordability</td>
<td></td>
</tr>
<tr>
<td>Travel Accommodations</td>
<td></td>
</tr>
<tr>
<td>Entertainment Accommodations</td>
<td></td>
</tr>
<tr>
<td>Change in Daytime Population</td>
<td></td>
</tr>
<tr>
<td>Eigenvalue</td>
<td>3.026</td>
</tr>
<tr>
<td>Percent of Variance Explained</td>
<td>27.51</td>
</tr>
</tbody>
</table>

Table 6

*Cronbach’s Alpha for Social Scales*

<table>
<thead>
<tr>
<th>Scale</th>
<th>Cronbach’s Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resilience Capacity Index—Social (Factor 1)</td>
<td>.757</td>
</tr>
<tr>
<td>Resilience Capacity Index – Economic (Factor 2)</td>
<td>.743</td>
</tr>
<tr>
<td>Exposure</td>
<td>.646</td>
</tr>
</tbody>
</table>
Univariate Statistics

Frequencies and descriptives (mean, range, and standard deviation) were run and reported for all variables within the study. Overall themes within the data were assessed. Any records of missing data result in either case deletion (dependent on the frequency of missing data) or imputation methods to predict the value for the missing case.

Bivariate Statistics

Pearson’s correlation coefficients were used to analyze the relationship between community variables and crime rates. Pearson’s $r$ correlation coefficient ranges from -1 to 1, a value of 0 indicating the absence of a relationship and the value of +/- 1 indicating a perfect relationship. In order to assess the relationships between crime rates and resiliency, Pearson’s $r$ correlation coefficients were analyzed. Pearson’s $r$ correlation coefficients were also analyzed to assess the relationship between changes in resiliency and changes in crime.

Due to both the dependent variables of the main models being categorical, contingency tables were constructed to examine the differences in groups between the categorical independent variables and the two categorical dependent variables, for purposes of preliminary analysis. Cross tabulations were used to assess the differences between frequencies of groups. Specifically, cross tabulations were used to examine the effects of the following control variables: victim race, offender race, offender age, victim age, offender sex. Contingency tables and chi square were also analyzed for place, drug use, drug type$^4$, and place of crime.

$^4$ Neither drug type nor drug use was included in the final analysis
Multivariate Statistics

To assess community effects on crime rates, an ordinary least squares regression model was constructed. Ordinary least squares regression provides probability estimates of relationship between independent measures and the dependent variable while holding all other variables within the model constant. The analyst examined the relationship of each measure with the average five year (from 2005-2009) crime rate for each city, controlling for all other effects.

In order to run preliminary analyses for the community and individual effects on victim-offender relationships, multinomial logistic regression models were constructed. Multinomial Logistic regression calculates odds ratios to assess the overall likelihood of a case being classified as each group of the dependent variable (Field, 2009). To assess the individual and community independent measures separately on victim-offender relationships, seven multinomial logistic models were constructed, one including community-level factors, and one including individual-level factors for each type of crime were analyzed to assess the effects of each variable controlling for all other related effects. These seven models were run for both dependent variables: victim-offender relationship status and place of crime.

Multilevel Models

One of the primary criticisms of quantitative methods is its inability to explain context (Luke, 2004). Furthermore, data are oftentimes aggregated to make inferences

---

5 Victim-Offender relationships were predominantly stranger for robbery and thus, no model that examined the effects of victim-offender relationships within robbery was constructed.
about individuals from groups of people, which can create an *ecological fallacy* (Luke, 2004; Maxfield & Babbie, 2010) or inferences are made about groups from individual level data, which can create an *atomistic fallacy* (Luke, 2004). While all data analyses have their limitations; historically, quantitative methods have demonstrated little understanding beyond the isolative phenomenon of only those individuals being studied.

To combat this limitation; however, multilevel models have been constructed to provide a contextual model of explanation. Traditional multilevel models include two levels, one being micro and the other macro (Heck, Thomas, & Tabata, 2010). The model allows for the analyst to assess variance between groups of individuals, thus, similar to an ANOVA (SSBetween/SSWithin) assessing the variance between groups to the variance within groups. To explain further, it allows the analyst to see how individuals differ within one group, while controlling for the commonalities that are attributable to belonging to that group.

Generally, multilevel models focus on linear outcomes, and thus, examine the random and fixed effects through the slope and intercept of the various levels (typically two levels). However, as previously stated, the two dependent variables were measured on a nominal level, and thus, the model must examine the probability of an event as the natural logarithm of the odds. Furthermore, the purpose of this analysis was to assess the individual fixed effects, specifically, the differences between individuals that are due to the correlation between the independent individual-level effects (for instance, the difference between race and gender on victim-offender relationships). Multilevel models tend to focus on random effects, which operate under the assumption that differences are attributable to the hierarchical structure of the data and thus no difference is accounted
for by differences between the first level individual predictors. Within this analysis the goal was to assess both the effects of individual predictors and differences between groups on the individual categorical outcomes (victim-offender relationship and place of crime). Using a generalized linear mixed model that included linear predictors and a multinomial logit link allowed the analyst to assess fixed and random effects, and as well as the effects of individual-level variables in relation to the level two predictors.

In order to determine whether a multilevel model was appropriate for analysis, the research questions had to entail both micro and macro level focuses (Heck et al., 2010). Moreover, the various groups must demonstrate more than 5% variance in outcomes, which, assesses the ratio of the difference to the error \( \rho = \sigma^2_b / (\sigma^2_b + \sigma^2_w) \).

Because of the categorical nature of the outcome, variance is harder to assess. Hence, testing the null model for both the level one and level two models was deemed appropriate for the present analysis (Heck et al., 2010). For purposes of this analysis the null model at level one was constructed as \( \eta_{ij} = \log(\pi_{ij}/(1-\pi_{ij})) = \beta_{0j} \), where \( \pi_i \) is the probability, \( i \) is individual within the city, represented by \( j \), the ratio of \( \pi_{ij}/(1-\pi_{ij}) \) represents the natural log odds link between the expected value of the level one outcome \( (\eta_{ij}) \) (Heck et al., 2010). The level two null model must assess both the fixed and random effects between groups, which was calculated by assessing the sum of the natural logarithm of the odds of the outcome \( (\eta_{ij} = \gamma_{00} + u_{0j}) \), where \( u_{0j} \) represents the variance of the parameters.

In order to assess the effects within the level one model, the categorical outcome was treated as a continuous variable, thus considering the link between the expected and predicted values as a linear outcome. The level one model was constructed formulaically
as \( \eta_{cij} = \log \left( \frac{\pi_{cij}}{\pi_{c1j}} \right) = \beta_{0j(c)} \sum_{q=1}^{Q} \beta_{qj(c)} X_{qij} \), where \( \eta_{cij} \) represents the probability of each category versus its reference category (so the likelihood of the victim-offender being family versus strangers or acquaintances versus strangers). Within this model \( i \) represents individual, \( j \) represents group, \( \beta \) is the intercept, \( c \) is a measure of each category to then compare to the reference category (C), and \( q \) represents each predictor within the model, in comparison to \( Q \) which is the linear combination of the predictors in the model (Heck et al., 2010). The level two model was constructed formulaically as

\[
\beta_{qc} = \gamma_{q0j(c)} + \sum_{s=1}^{S} \gamma_{qs(c)} W_{sj} + u_{qj(c)}.
\]

Here, \( W \) represents the level 1 intercepts or slopes relationship with the level 2 predictors regarding their variance. The final model was developed after preliminary analyses were conducted.

Summary

The current study had two primary purposes: to provide a contextual model that explains the convergence of offenders and victims through time and space, and to do so within a more parsimonious manner by using a resiliency framework. In order to meet these goals, the analyst used data from a number of sources (NIBRS, UCR, Census, American Community Survey, and the Election Atlas) to compile a dataset that includes both macro (level two) and micro (level one) measures. By providing a contextual model, the primary goal was to better understand the relationships between victims and offenders, and how individual, situational, and environmental characteristics affect the odds of relationship and place of crime classification.
CHAPTER V

RESULTS

Introduction

The principal goal of this study was twofold. The first goal was to examine the macro (second level or level two) and micro (first level or level one) effects of victim-offender convergence. Victim-offender convergence was measured using two dependent variables: the place/location of the crime (public, residence, or outdoors) and the relationship type of the victim and offender for each incident of crime (family member, romantic partner, acquaintance, or stranger). The final analysis included four types of violent crime: sexual assault, aggravated assault, simple assault, and robbery. Each crime was tested separately with each dependent variable (with the exception of the effects on victim-offender relationships for robbery, due to approximately 90% of robberies being committed by strangers). Thus, a total of seven base models were constructed (the first and second level effects of the place of crime within incidents of sexual assault, aggravated assault, etc. and the first and second level effects of the victim-offender relationship within incidents of sexual assault, aggravated assault, etc.).

The second goal of the current study was to test the utility of resilience theory in comparison to other criminological theories to determine its effects on victim-offender convergence. Therefore, a modified resilience capacity index (Foster, 2010) was used within the models to test victim-offender convergence. Additional measures were included for social disorganization, including physical and social disorder, (Shaw & Mckay, 1932, 1942) and routine activities theory, including resource dependency and social exposure (Cohen & Felson, 1979).
Initial results from the preliminary analyses demonstrated that some changes should be made to the proposed analyses. First, homicide incidents were not included within the final study because of a low occurrence. There were only 3579 homicide incidents from 2005-2009, and when examining the frequency by city, multiple cities had less than ten incidents of homicide. Multilevel models require larger sample sizes within level 1 data (Hecht, 2010); therefore, homicide incidents were excluded in order to avoid violating this assumption. Furthermore, the data reflected low reporting of drug and/or alcohol use, demonstrating that most agencies did not report drug or alcohol use. Therefore, both the offender was suspected of using drugs and drug type were excluded from the analysis.

As previously stated, data were separated by type of crime for purposes of analysis. Furthermore, all social data (resource dependency, social and economic resilience, social and physical disorder, and population demographics) were matched to each incident of crime; however, they were also analyzed to determine level two relationships, specifically between violent crime and city characteristics. Thus, to accomplish these objectives, the results of the preliminary analyses were divided into three parts. The first part assessed the main effects of the social variables on two dependent variables: violent crime rate (from 2005 to 2009) and the average rate of change within violent crime from 2005 to 2009. The second part reports the frequencies, descriptives, and correlations for all cases that were included in the analysis. The last part provides preliminary results of the data for each type of crime (sexual assault, robbery, aggravated assault, and simple assault) by each dependent variable (victim-offender relationship and place of incident).
Preliminary Analyses

Social Effects on Crime Rate

Correlations. In order to determine the effects of selected social forces on violent crime, a correlation matrix was first constructed (see Table 7). This was constructed for two purposes: first, to assess the overall correlations between the social forces (resilience capacity social scale, resilience capacity economic scale, physical disorder, social disorder, exposure, and population) and the two dependent variables (violent crime rate and change in crime rate), and second to assess multicollinearity between the independent variables. As can be observed in Table 7, there appears to be a moderate to strong negative correlation between violent crime and resilience capacity economy (\(-.460\)) and resilience capacity social (\(-.541\)). Furthermore, there appeared to be a moderate to strong correlation between violent crime and social disorder (.434), and a weak to moderate relationship between violent crime and population (.151). Neither physical disorder nor exposure was significantly related to violent crime (\(-.067\) and .087). Only two variables showed a significant relationship with change in crime rate, resilience capacity economy (\(-.326\)) and resilience capacity social (.297). None of the other variables were significantly related to change in violent crime.

There appeared to be no issues with multicollinearity between the social variables. The strongest correlation exists between social disorder and RCI economy (.362), demonstrating that only 13.14% of the variance was shared between the two independent variables.
Regression. To test Hypotheses 1 and 2, the analyst constructed two regression models to assess the effects of the social variables on crime rate and average change in crime rate within all cities (n=90). Table 8 provides the results of the first regression model (effects on violent crime rate). Overall, the model explained approximately 54% of the variance ($R^2 = .541$, $R^2_{adj} = .526$). As expected from the correlations, neither physical disorder nor exposure showed significant effects on violent crime rate; however, all other variables were significant. Social resiliency (RCI social) had the strongest impact on violent crime rate ($\beta = -.403$), demonstrating that for every one standard deviation increase in RCI social, there was a .539 decrease in violent crime, controlling for all other effects. Resilience capacity economic (RCI economic) had the second strongest impact on the dependent variable ($\beta = -.376$), demonstrating that for every one standard deviation increase in RCI economic, there was a .498 decrease in violent crime, controlling for all

---

6 H1: There is an effect of the Resiliency Capacity Index on community rates of crime controlling for all other effects.
H2: There is an effect of changes in the Resiliency Capacity Index on changes in community crime rates controlling for all other effects)
other effects. Additionally, both population and social disorder were positively significantly related to violent crime.

Table 8

*OLS Regression Analysis of Violent Crime Rate*

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-.154</td>
<td>.073</td>
<td>-2.094*</td>
<td></td>
</tr>
<tr>
<td>RCI Economic</td>
<td>-.498</td>
<td>.072</td>
<td>-.376</td>
<td>-6.870**</td>
</tr>
<tr>
<td>RCI Social</td>
<td>-.539</td>
<td>.071</td>
<td>-.403</td>
<td>-7.532**</td>
</tr>
<tr>
<td>Physical Disorder</td>
<td>.010</td>
<td>.055</td>
<td>.010</td>
<td>.176</td>
</tr>
<tr>
<td>Social Disorder</td>
<td>.301</td>
<td>.053</td>
<td>.300</td>
<td>5.678**</td>
</tr>
<tr>
<td>Population</td>
<td>1.044E-06</td>
<td>.000</td>
<td>.146</td>
<td>2.905**</td>
</tr>
<tr>
<td>Exposure</td>
<td>-.059</td>
<td>.067</td>
<td>-.045</td>
<td>-.872</td>
</tr>
</tbody>
</table>

Notes: $R^2 = .541$, $R^2_{adj} = .526$.

* $p < .05$. ** $p < .01$.

As can be observed in Table 9, only two variables significantly explained variability within the average rate of change of violent crime, RCI economic and exposure. RCI economic showed the strongest explanatory value ($β = .380$), demonstrating that for every one unit change in RCI economic, there was a .028 increase in the average rate of change of violent crime, controlling for all other effects. Thus, while both resilience scales had a negative effect on violent crime, both resilience scales showed positive effects on changes in violent crime, demonstrating that increases in resilience (both social and economic) increased changes in crime rates. Furthermore, exposure had a significant negative effect on change for violent crime, demonstrating that for every one unit increase in exposure, there was a -.013 decrease in change of violent crime, controlling for all other effects.
Table 9

**OLS Regression Analysis of Mean Rate of Change for Violent Crime 2005-2009**

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>.114</td>
<td>.005</td>
<td>21.704**</td>
<td></td>
</tr>
<tr>
<td>RCI Economic</td>
<td>.028</td>
<td>.008</td>
<td>.380</td>
<td>3.605**</td>
</tr>
<tr>
<td>RCI Social</td>
<td>.005</td>
<td>.008</td>
<td>.064</td>
<td>.622</td>
</tr>
<tr>
<td>Physical Disorder</td>
<td>-.003</td>
<td>.006</td>
<td>-.062</td>
<td>-.595</td>
</tr>
<tr>
<td>Social Disorder</td>
<td>-.005</td>
<td>.006</td>
<td>-.099</td>
<td>-.975</td>
</tr>
<tr>
<td>Population</td>
<td>.008</td>
<td>.007</td>
<td>.104</td>
<td>1.058</td>
</tr>
<tr>
<td>Exposure</td>
<td>-.013</td>
<td>.005</td>
<td>-.244</td>
<td>-2.528*</td>
</tr>
</tbody>
</table>

Notes: $R^2 = .228$. $R^2_{adj} = .173$.
*p < .05. **p < .01.

**Descriptives and Frequencies**

*Frequencies*. Frequencies were analyzed for all variables (both dependent and independent) that were measured on a nominal level. As can be observed in Table 10, residence was by far the most common place where a violent crime occurred (65.2% of all crimes), followed by an outdoor area (21.2%), and a retail/service area (13.6%).

While acquaintance was the most common victim-offender relationship (37.6%), romantic relationships followed closely with 33.8%. Additionally, family only comprised 14.3% of all victim-offender relationships for all incidents of violent crime. Victims were predominantly female (61.8%), while offenders were most oftentimes male (77.1%).

Both offenders and victims were mostly white (62.6% and 52.9%).

Table 10

**Frequencies for All Incidents of Violent Crime**

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Place</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retail/Service/Public</td>
<td>113960</td>
<td>13.6%</td>
</tr>
<tr>
<td>Outdoor Area</td>
<td>177377</td>
<td>21.2%</td>
</tr>
<tr>
<td>Residence</td>
<td>544886</td>
<td>65.2%</td>
</tr>
</tbody>
</table>
Table 10 (continued).

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>VO Relationship</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Romantic</td>
<td>282346</td>
<td>33.8%</td>
</tr>
<tr>
<td>Family</td>
<td>119435</td>
<td>14.3%</td>
</tr>
<tr>
<td>Acquaintance</td>
<td>314705</td>
<td>37.6%</td>
</tr>
<tr>
<td>Stranger</td>
<td>119737</td>
<td>14.3%</td>
</tr>
<tr>
<td>Victim Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>319325</td>
<td>38.2%</td>
</tr>
<tr>
<td>Female</td>
<td>516898</td>
<td>61.8%</td>
</tr>
<tr>
<td>Offender Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>644961</td>
<td>77.1%</td>
</tr>
<tr>
<td>Female</td>
<td>191262</td>
<td>22.9%</td>
</tr>
<tr>
<td>Victim Race</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nonwhite</td>
<td>312890</td>
<td>37.4%</td>
</tr>
<tr>
<td>White</td>
<td>523333</td>
<td>62.6%</td>
</tr>
<tr>
<td>Offender Race</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nonwhite</td>
<td>393636</td>
<td>47.1%</td>
</tr>
<tr>
<td>White</td>
<td>442587</td>
<td>52.9%</td>
</tr>
</tbody>
</table>

Descriptives. As one can observe from Table 11, the average temperature for the area in which the crime took place was 56.82, with a standard deviation of 17.89, thus demonstrating a great variability in temperature across cities within the analysis. Incident hour, which was measured from 0 (equaling midnight) to 23 (equaling 11 pm) had a mean of 12.36, showing the average time of crime was midday. Day of the week was measured from 1 (equaling Sunday) to 7 (equaling Saturday), with an average of midweek (4.035). Victim and offender mean ages were relatively equal (29.59 versus 29.48). For level two variables, one can observe that social disorder has a mean of .5814 incidents of disorderly crime per 10,000 residents; however, its standard deviation demonstrates substantial variability across cities (1.38). It should be noted that both resilience capacity scales (RCI economic and RCI social) were standardized prior to the
preliminary analysis. Thus, one can observe that RCI economic has a higher mean than RCI social (-.19 versus -.45). Cities’ resource dependency has a mean of .57, demonstrating that there were approximately .56 police officers per 1000 people. Cities’ physical disorder (the percentage of abandoned homes) averaged at 8.39%. Moreover, cities has an average population of 187,946, yet vastly varied (standard deviation=118579.85). Lastly, cities’ mean demographics were 36.31% under the age of 25, 33.21% nonwhite, and 51.23% female.

Table 11

<table>
<thead>
<tr>
<th>Description</th>
<th>Range</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>118.00</td>
<td>56.82</td>
<td>17.89</td>
</tr>
<tr>
<td>Incident Hour</td>
<td>23.00</td>
<td>12.36</td>
<td>7.64</td>
</tr>
<tr>
<td>Week Day</td>
<td>6.00</td>
<td>4.0355</td>
<td>2.07337</td>
</tr>
<tr>
<td>Victim Age</td>
<td>98.90</td>
<td>29.59</td>
<td>13.68</td>
</tr>
<tr>
<td>Offender Age</td>
<td>98.00</td>
<td>29.48</td>
<td>12.209</td>
</tr>
<tr>
<td>Social Disorder</td>
<td>5.68</td>
<td>.5814</td>
<td>1.38</td>
</tr>
<tr>
<td>RCI Economic</td>
<td>3.92</td>
<td>-.1953</td>
<td>.7238</td>
</tr>
<tr>
<td>RCI Social</td>
<td>4.15</td>
<td>-.4479</td>
<td>.6621</td>
</tr>
<tr>
<td>Resource Dependency</td>
<td>5.01</td>
<td>.5681</td>
<td>1.09</td>
</tr>
<tr>
<td>Population</td>
<td>373295.14</td>
<td>187946.04</td>
<td>118579.85</td>
</tr>
<tr>
<td>Temperature</td>
<td>119.10</td>
<td>55.10</td>
<td>96</td>
</tr>
<tr>
<td>Physical Disorder</td>
<td>4.71</td>
<td>.0839</td>
<td>.8269</td>
</tr>
<tr>
<td>% under 25</td>
<td>34.10</td>
<td>36.31</td>
<td>4.02</td>
</tr>
<tr>
<td>% Nonwhite</td>
<td>54.18</td>
<td>33.21</td>
<td>16.34</td>
</tr>
<tr>
<td>% Female</td>
<td>5.35</td>
<td>51.23</td>
<td>1.22</td>
</tr>
</tbody>
</table>

Correlations. In order to assess any issues of multicollinearity with the first level independent variables, a correlation matrix was constructed. As can be observed from Table 12, while there were multiple significant relationships between the independent variables, no two variables demonstrate a strong relationship. The highest proportion of shared variance was between the race of the victim and the offender (r=.408; r² = .1665),
demonstrating only 16.65% of the variance was shared between the two variables. All other Pearson $r$ correlation coefficients were less than .2, thus there appeared to be no issue with multicollinearity between any of the level one independent variables.

Table 12

*Correlations of all Level One Independent Variables*

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Week Day</td>
<td>-0.028**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incident Hour</td>
<td>0.006*</td>
<td>-0.010**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Victim Age</td>
<td>0.000</td>
<td>0.009**</td>
<td>0.048**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Victim Race</td>
<td>0.010**</td>
<td>0.017**</td>
<td>0.025**</td>
<td>0.089**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Victim Sex</td>
<td>0.018**</td>
<td>-0.001</td>
<td>-0.023**</td>
<td>-0.189**</td>
<td>0.011**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offender Age</td>
<td>0.039**</td>
<td>-0.006*</td>
<td>0.030**</td>
<td>0.057**</td>
<td>-0.027**</td>
<td>-0.035**</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offender Race</td>
<td>0.008**</td>
<td>0.027**</td>
<td>0.007*</td>
<td>0.131**</td>
<td>0.408**</td>
<td>-0.052**</td>
<td>-0.013**</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Offender Sex</td>
<td>-0.005*</td>
<td>-0.007*</td>
<td>-0.023**</td>
<td>-0.071**</td>
<td>-0.014**</td>
<td>0.055**</td>
<td>-0.141**</td>
<td>0.004</td>
<td>1</td>
</tr>
</tbody>
</table>

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

*Descriptives and Frequencies by Type of Crime*

For the multilevel analysis, the data were segregated by type of crime; therefore, for purposes of the preliminary analysis, both frequencies and descriptives were assessed by the type of crime (sexual assault, robbery, aggravated assault, or simple assault), as well as by each dependent variables (victim-offender relationship and place of incident).

*Frequencies by victim-offender relationship.* Table 13 provides cross tabulations of all level one categorical variables separated by type of crime and victim offender relationship. Sexual assaults that took place in a public area and within a residence were predominantly committed by acquaintances (62.8% and 55.2%). Male and female victims were most often acquainted with their offender (56.7% and 57%). The same can be said for nonwhite and white victims (58.7% and 53.3%), male and female offenders (57% and
56.4%), and white and nonwhite offenders (61.1% and 54.8%). This demonstrates little variability across these variables within sexual assault.

Robbery was predominantly committed by strangers (76.5% of public incidents and 55.6% of residence incidents). Closer examination revealed that both relationship and family robberies were rare (less than 10% of the sample). This demonstrated that examining the effects of victim-offender relationships within robberies was unfeasible due to the lack of variability. Thus, incidents of robbery were only used to assess the effects of place (the second dependent variable). Within aggravated assault, while the majority of offenses which took place in public were committed by acquaintances to the victim (49.7%), strangers closely followed (35%). While male victims of aggravated assault most often were acquainted with their attacker (49.2%), females were most often romantically involved with their attacker (40.6%). A higher percentage of white victims (23%) than nonwhite victims (13.3%) did not know their attackers. Moreover, more white offenders (21.2%) than nonwhite offenders (16.8%) were strangers to their victim. Lastly, female offenders and male offenders were most often acquainted with their victim (43.2% and 43.7%). Simple assaults were most common within victims and offenders who were either acquainted or romantically involved. To illustrate, 49% of simple assaults that took place in a residence were committed by a romantic partner, and 51.7% of public simple assaults were committed by an acquaintance. Female victims were most often romantically involved with their offender (50.6%), while female offenders were most often only acquainted with their victim (43.5%).

Frequencies by place of incident. Table 14 provides cross tabulations for all categorical variables by place of incident and by type of violent crime. Across all
independent groups, sexual assault most often occurred within a residence (all above 70%); while robbery most often took place outdoors (all above 40%). While both aggravated and simple assault were mostly committed in the residence, aggravated assaults were commonly committed outdoors (ranging from 22.8% to 35.1%). The least common place across all crimes and independent variables was a public indoor area.

**Descriptives by victim-offender relationship.** Means were compared across both crime and victim-offender relationship. As one can observe in Table 15, temperature hardly varied across all crimes and victim-offender relationships (ranging from 55.5 to 58 degrees Fahrenheit). Similarly, there was little variation in either day of week or incident hour. Victim age; however, vastly differed across crimes and victim-offender relationships, particularly within sexual assault. While the average age of a victim was 25.5 when the victim and offender were romantically involved, the mean age dropped to 10.6 when the offender was a family member. Moreover, mean age dropped 2.1 years when simple assaults were committed by acquaintances rather than romantic partners. While the age of the offender remained relatively constant in the late twenties to early thirties, there was slight variation, particularly within aggravated assault across victim-offender relationships (ranging from 28.2 to 33.3).

**Descriptives by type of crime and place of incident.** Means were also compared across both crime and place of incidents. As one can observe in Table 16, temperature remained relatively constant across all crimes and place of incident.

There was little difference in temperature for all crimes when crimes took place outdoors (ranging from 56.5-58.8). Day of the week showed no real difference across crimes or place, while incident hour showed some variability. For instance, the incident
hour was especially high in robberies that took place in a public area (13.2 or 1:20pm), demonstrating the average hour of robberies in a public place was 13 (1:00 pm).

Furthermore, sexual assaults which took place in the residence occurred somewhat earlier than crimes that took place outdoors or in public; specifically, the mean hour was 10.5 (10:30am) for sexual assaults occurring in the residence while sexual assaults which took place in public or outdoors was 11.2 and 11.4 (11:20am and 11:40am). Victim age was substantially different across place of crime, particularly within sexual assault; specifically, when the sexual assault took place in a residence, the mean age was only 17.8, which increased to 23.2 when the sexual assault took place outdoors. Robberies which took place in the home had the highest mean age of victims (35.8). Similarly, both aggravated and simple assaults, which took place in the home, had the highest offender mean ages (31.4 and 31.2).

Generally, the preliminary analyses have demonstrated that the independent variables appear to vary across types of crime, thus, was separated for the data analytic models, meaning each dependent variable is analyzed separately for each crime, thus eight total base models were constructed to determine the first and second level effects of place of crime on aggravated assault, sexual assault, simple assault, and robbery, as well as the first and second level effects of victim-offender relationship on aggravated assault, sexual assault, and simple assault. Additionally, the independent variables appeared to vary across both dependent variables (place and victim-offender relationship). These effects were further examined within the base and multilevel models.
Table 13

*Frequencies by Victim-Offender Relationship*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Romantic</th>
<th>Family</th>
<th>Acquaintance</th>
<th>Stranger</th>
</tr>
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<tbody>
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<td></td>
<td></td>
<td>$f$</td>
<td>%</td>
<td>$f$</td>
<td>%</td>
</tr>
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<td></td>
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<td></td>
</tr>
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Table 13 (continued).

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<th>Romantic %</th>
<th>Family $f$</th>
<th>Family %</th>
<th>Acquaintance $f$</th>
<th>Acquaintance %</th>
<th>Stranger $f$</th>
<th>Stranger %</th>
</tr>
</thead>
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<td>7452</td>
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<td>13203</td>
<td>43.2</td>
<td>2833</td>
<td>9.3</td>
</tr>
</tbody>
</table>

Simple Assault

| Place       | Public        | 40910        | 21.2 | 9940 | 5.2 | 99665           | 51.7 | 42301        | 21.9 |
|            | Res.          | 203695       | 49.0 | 81112 | 19.5 | 117805          | 28.3 | 13416        | 3.2  |
| Victim Sex  | Male          | 41359        | 20.0 | 31793 | 15.4 | 95556           | 46.2 | 38144        | 18.4 |
|            | Female        | 203246       | 50.6 | 59259 | 14.7 | 121914          | 30.3 | 17573        | 4.4  |
| Victim Race | Nonwhite      | 95457        | 41.4 | 35985 | 15.6 | 87004           | 37.7 | 12302        | 5.3  |
|            | White         | 149148       | 39.4 | 55067 | 14.6 | 130466          | 34.5 | 43415        | 11.5 |
| Offender Race | Nonwhite    | 110948       | 39.5 | 37564 | 13.4 | 109252          | 38.9 | 22975        | 8.2  |
|            | White         | 133657       | 40.7 | 53488 | 16.3 | 108218          | 33.0 | 32742        | 10.0 |
| Offender Sex | Male         | 202412       | 44.6 | 57867 | 12.8 | 149865          | 33.0 | 43451        | 9.6  |

Table 14

*Frequencies by Place of Crime and Type of Crime*

<table>
<thead>
<tr>
<th>Crime Variable</th>
<th>Category</th>
<th>Public $f$</th>
<th>Public %</th>
<th>Outdoors $f$</th>
<th>Outdoors %</th>
<th>Residence $f$</th>
<th>Residence %</th>
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</thead>
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<td>438</td>
<td>6.6%</td>
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<tr>
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<td>Female</td>
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<td>4284</td>
<td>9.6%</td>
<td>34279</td>
<td>77.0%</td>
</tr>
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<td>Nonwhite</td>
<td>1450</td>
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<td>9.0%</td>
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<td>77.3%</td>
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<td>30.6%</td>
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<td>55.4%</td>
<td>5021</td>
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<td>15996</td>
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<td>47.8%</td>
<td>3802</td>
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</table>
Table 14 (continued).

| Variable      | Category | Public | | | Outdoors | | | Residence | |
|---------------|----------|--------|---|---|--------|---|---|-----------|
|               |          | $f$    | % | | $f$    | % | | $f$    | % |
| Offender Sex  | Male     | 8398   | 19.2% | | 23810   | 54.3% | | 11637   | 26.5% |
|               | Female   | 710    | 21.6% | | 1424    | 43.3% | | 1158    | 35.2% |
| Homicide      |          |        |     | |        |     | |        |     |
| Victim Sex    | Male     | 118    | 9.8% | | 407    | 33.8% | | 679    | 56.4% |
|               | Female   | 34     | 6.8% | | 72     | 14.3% | | 396    | 78.9% |
|               | Nonwhite | 62     | 7.0% | | 294    | 33.3% | | 528    | 59.7% |
| Victim Race   | White    | 90     | 10.9% | | 185    | 22.5% | | 547    | 66.5% |
|               | Nonwhite | 82     | 8.3% | | 333    | 33.7% | | 574    | 58.0% |
| Offender Race | White    | 70     | 9.8% | | 146    | 20.4% | | 501    | 69.9% |
|               | Male     | 140    | 9.4% | | 451    | 30.3% | | 895    | 60.2% |
|               | Female   | 12     | 5.5% | | 28     | 12.7% | | 180    | 81.8% |
| Aggravated Assault | | | | | | | | |
| Victim Sex    | Male     | 9633   | 13.4% | | 25292   | 35.1% | | 37103   | 51.5% |
|               | Female   | 4524   | 8.2% | | 12590   | 22.8% | | 38177   | 69.0% |
| Victim Race   | Nonwhite | 4170   | 8.0% | | 15546   | 29.9% | | 32251   | 62.1% |
|               | White    | 9987   | 13.3% | | 22336   | 29.6% | | 43029   | 57.1% |
| Offender Race | Nonwhite | 5833   | 9.4% | | 19111   | 30.8% | | 37043   | 59.8% |
|               | White    | 8324   | 12.7% | | 18771   | 28.7% | | 38237   | 58.5% |
| Offender Sex  | Male     | 11073  | 11.4% | | 30408   | 31.4% | | 55273   | 57.1% |
|               | Female   | 3084   | 10.1% | | 7474    | 24.5% | | 20007   | 65.5% |
| Simple Assault | | | | | | | | |
| Victim Sex    | Male     | 42682  | 20.6% | | 48195   | 23.3% | | 115975  | 56.1% |
|               | Female   | 41074  | 10.2% | | 60865   | 15.1% | | 300053  | 74.6% |
| Victim Race   | Nonwhite | 24225  | 10.5% | | 43698   | 18.9% | | 162825  | 70.6% |
|               | White    | 59531  | 15.7% | | 65362   | 17.3% | | 253203  | 67.0% |
| Offender Race | Nonwhite | 35469  | 12.6% | | 55920   | 19.9% | | 189350  | 67.4% |
|               | White    | 48287  | 14.7% | | 53140   | 16.2% | | 226678  | 69.1% |
| Offender Sex  | Male     | 58939  | 13.0% | | 81316   | 17.9% | | 313340  | 69.1% |
|               | Female   | 24817  | 16.0% | | 27744   | 17.9% | | 102688  | 66.1% |
Table 15

*Means by Victim-Offender Relationship*

<table>
<thead>
<tr>
<th>Crime</th>
<th>Variable</th>
<th>Romantic Mean</th>
<th>Family Mean</th>
<th>Acquaintance Mean</th>
<th>Stranger Mean</th>
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Table 16

*Means by Place of Crime*

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</tr>
<tr>
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<td>Robbery</td>
<td>Temperature</td>
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<td>56.5</td>
<td>56.0</td>
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<td>4.1</td>
<td>4.0</td>
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<td>24.6</td>
<td>26.4</td>
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<td>Aggravated Assalt</td>
<td>Temperature</td>
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<td>58.7</td>
<td>56.7</td>
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Table 16 (continued).

<table>
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<th>Outdoors Mean</th>
<th>Residence Mean</th>
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<td>4.1</td>
<td>4.0</td>
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<td></td>
<td>Incident Hour</td>
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<td>12.6</td>
<td>12.2</td>
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<td></td>
<td>Victim Age</td>
<td>29.1</td>
<td>28.8</td>
<td>31.6</td>
</tr>
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<td></td>
<td>Offender Age</td>
<td>27.8</td>
<td>27.9</td>
<td>31.4</td>
</tr>
<tr>
<td>Simple Assault</td>
<td>Temperature</td>
<td>54.7</td>
<td>58.8</td>
<td>56.7</td>
</tr>
<tr>
<td>Simple Assault</td>
<td>Week Day</td>
<td>4.1</td>
<td>4.1</td>
<td>4.0</td>
</tr>
<tr>
<td>Simple Assault</td>
<td>Incident Hour</td>
<td>11.3</td>
<td>12.9</td>
<td>12.5</td>
</tr>
<tr>
<td>Simple Assault</td>
<td>Victim Age</td>
<td>27.9</td>
<td>27.6</td>
<td>31.2</td>
</tr>
<tr>
<td>Simple Assault</td>
<td>Offender Age</td>
<td>26.3</td>
<td>27.8</td>
<td>31.2</td>
</tr>
</tbody>
</table>

**Primary Data Analysis**

For purposes of the present analysis, it was determined that multilevel multinomial (also referred to as polychotomous, Field, 2009) logistic regression models were fit to the data. There were two central justifications for employing such a model: the categorical nature of both dependent variables and the emphasis on contextualization of the hypotheses; more specifically, to assess the effects of space and time on victim-offender convergence (Cohen & Felson, 1979). To expand, both dependent variable were measured on a nominal level with multiple categories. While it was feasible to collapse those categories to create dichotomous outcomes, past literature has emphasized the importance of expanding these categorical variables to better understand the variability between each group. This was particularly true when examining victim-offender relationships (Broidy et al., 2006 Parker, 1989). Therefore, as noted earlier, victim-offender relationship was expanded to include four groups: family, acquaintance, romantic relationship, and stranger. Following suit with this expansion of groups, place was also expanded to include three categories: public area, outdoor area, or residence.
Cohen and Felson (1979) emphasized the importance of place in context of the suitable target, purporting that some type of decision making occurred prior to engaging in a criminal act. Thus, dichotomizing such a variable fails to truly demonstrate the relationship between place, victims, and offenders.

For both the dependent variables, multilevel models were constructed in an effort to assess both the first level (micro) and second level (macro) effects. Furthermore, both the fixed effects and random effects are assessed within each multilevel model. As previously stated, level one models were formulaically defined as

$$\eta_{ij} = \log \left( \frac{\pi_{ij}}{1 - \pi_{ij}} \right) = \beta_{0j(c)} + \sum_{q=1}^{Q} \beta_{qj(c)} X_{qij},$$

where $\eta_{ij}$ represents the probability of each category versus its reference category (so the likelihood of the victim-offender being family versus strangers or acquaintances versus strangers). Within this model $i$ represents individual, $j$ represents group, $\beta$ is the intercept, $c$ is a measure of each category to then compare to the reference category (C), and $q$ represents each predictor within the model, in comparison to $Q$ which is the linear combination of the predictors in the model (Heck et al., 2010). Probabilities within the level one model were predicted through a prediction equation very similar to that of ordinary least squares regression, yet calculates the predicted log odds of the corresponding category of the dependent variable. For example, the predictive equation for victim-offender relationship ($\eta_1$=relationship, $\eta_2$ = family, $\eta_3$ = acquaintance) with three of the independent level one variables (place, temperature, and day of week). This allows the analyst to compare the predicted probabilities across all groups (Heck et al., 2010).

---

7 Fixed effects are those effects over the entire population, while random effects are tested within the model with random slopes to examine the effects across communities (Snijders, 2005).
\[ \eta_{1ij} = \log \left( \frac{\pi_{1ij}}{\pi_{cij}} \right) = \beta_0j(1) + \beta_1 \text{Place}_{ij(x)} + \beta_2 \text{Temperature}_{ij(x)} + \beta_3 \text{DayofWeek}_{ij(x)} \]

\[ \eta_{2ij} = \log \left( \frac{\pi_{1ij}}{\pi_{cij}} \right) = \beta_0j(1) + \beta_1 \text{Place}_{ij(x)} + \beta_2 \text{Temperature}_{ij(x)} + \beta_3 \text{DayofWeek}_{ij(x)} \]

\[ \eta_{3ij} = \log \left( \frac{\pi_{1ij}}{\pi_{cij}} \right) = \beta_0j(1) + \beta_1 \text{Place}_{ij(x)} + \beta_2 \text{Temperature}_{ij(x)} + \beta_3 \text{DayofWeek}_{ij(x)} \]

Additionally, level two models were represented as:

\[ \beta_{qic} = \gamma_{q0j(c)} + \sum_{s=1}^{S_q} \gamma_{qs(c)} W_{sj} + u_{qj(c)} \]

Here, \( W \) represents the level 1 intercepts or slopes relationship with the level 2 predictors regarding their variance, while \( u_{qj(c)} \) represents the random slope across cities. The prediction equation vastly mirrors that of the level one model. For example, to assess the effects of both social disorder and physical disorder on victim-offender relationships across cities, \( (B_{0j(1)} = \text{relationship}, B_{0j(2)} = \text{family}, \text{and } B_{0j(3)} = \text{acquaintance}) \), the analyst could again compare the predicted probabilities of the level two variables; however, now the purposes is to construct a model for intercepts (Heck et al., 2010).

\[ B_{0j(1)} = \gamma_{00(1)} + \gamma_{01(x)} \text{SocialDisorder}_j + \gamma_{02(x)} \text{PhysicalDisorder}_j + u_{0j(1)} \]

\[ B_{0j(2)} = \gamma_{00(2)} + \gamma_{01(x)} \text{SocialDisorder}_j + \gamma_{02(x)} \text{PhysicalDisorder}_j + u_{0j(2)} \]

\[ B_{0j(2)} = \gamma_{00(3)} + \gamma_{01(x)} \text{SocialDisorder}_j + \gamma_{02(x)} \text{PhysicalDisorder}_j + u_{0j(3)} \]

**Random Slopes Investigated within the Models**

Within both models, the analyst hypothesized that certain independent variables would significantly vary across cities. Thus, the random slopes\(^8\) of these predictors were investigated. Specifically, for victim-offender relationships, place (dichotomized to represent either public or residence; Scott & Beaman, 2004) incident hour, victim age, victim sex, and victim race were all investigated to determine whether these varied across communities.

---

\(^8\) Random slopes were used to examine whether the relationship between the independent variables and dependent variables varied across communities.
cities. Specifically, the analyst sought to determine whether the effects of time (incident hour) and space (place of crime) on victim-offender convergence (victim-offender relationship) varied across cities. Furthermore, the analyst sought to examine whether the effects of target suitability (here represented by physical attributes of individuals) on victim-offender relationships varied across cities.

For the second dependent variable, place, the following random slopes were investigated: incident hour, victim age, victim sex, and victim race. Thus, again to determine whether the effects of time (incident hour) on space (place) varied across cities, as well as whether the effects of target suitability (victim physical attributes) on space (place) varied across cities.

For all models, each variable’s random slope parameter was iteratively added to the model. If initially significant, the variable remained in the model, regardless of whether it remained significant (p< .05). If initially nonsignificant (p > .05), the variable was discarded from the random effects model. For purposes of parsimony, only the final random slope parameters were reported within these results. Formulaically, random slopes were just added to the full model in addition to the initial random effect parameter (intercept), thus \( u_{oj(1)} + u_{1j(x)} + u_{2j(1)} \), where \( u_1 \) would equal the first random slope investigated (within victim-offender relationships, this would be place).

Procedure

All models were constructed in SPSS. Because all items for the resilience capacity scales had to be standardized to construct each scale, all other level one and level two variables were also standardized for purposes of uniformity. Thus, there was no
need to center\(^9\) any of the variables. Therefore, for purposes of interpretation, each unit increase or decrease is represented by a change of one standard deviation, regardless of whether it is a level one or level two variable.

To test hypotheses three, four, eight and nine,\(^{10}\) a multinomial regression was constructed for each proposed model, which was used as the preliminary model. Currently, SPSS does not provide pseudo r square measures within its generalized mixed models, thus, using a multinomial logistic regression provides some basis for the explanatory power of the level one model (Heck et al., 2010).

This was particularly important; as fit indices reported in subsequent models (Bayesian and Alkaline) were calculated from the pseudo negative log likelihood. The pseudo negative log likelihood was calculated using quasi-maximum likelihood techniques, which are unreliable measures for purposes of model fit comparison (SAS user guide; Heck et al., 2010). This was oftentimes due to changes within parameters form model to model. Thus, while both the Bayesian and Akaike fit indices were reported (BIC and AIC) for their corresponding models, they were not used to determine the fit of the model.

Following the preliminary model, the level one model was constructed, which provides all level one fixed effects with the addition of the random intercept, therefore to assess whether each dependent variable varies across cities. To test hypotheses five and

\(^9\) Centered refers to variables being recalculated so that each value is equal to its original value minus the grand mean or group mean, depending on the data (Field, 2009). Since all variables measured on an interval or ratio level were converted to z scores, they were already centered in relation to the grand mean.
\(^{10}\) H3: There is an effect of situational characteristics of crime on the victim-offender relationship controlling for all other effects
H4: There is an effect of victim demographics on the victim-offender relationship
H8: There is an effect of situational characteristics of crime on the place of crime
H9: There is an effect of victim demographics on the place of crime controlling for all other effects
ten\textsuperscript{11} the third model provides both level one and level two fixed effects (maintaining the random intercept). Lastly, to test hypotheses six, seven, eleven, and twelve,\textsuperscript{12} random slopes of the aforementioned variables were added to the model to determine their variability across cities.

For purposes of consistency, models were presented by dependent variable and by type of crime. More specifically, all victim-offender relationship models were presented in order of crime: simple assault, aggravated assault, and sexual assault. Place of incident models were then presented in the same order, with the excepted addition of robbery, thus: simple assault, aggravated assault, robbery, and sexual assault. Additional information about level one and level two sample sizes per each crime are also presented.

Effects of Victim-Offender Relationships within Simple Assaults

Sample Size

Of the 834,517 incidents of crime simple assault comprised 72.9\% of these crimes (n=608844) within 90 cities (n=90). However, due to a lack of variance within simple assault for two cities, the level one model and all subsequent models had a decreased level two sample size of 88, which decreased the level one sample size to 602,388. Thus, on average each city agency reported 6,845 incidents of simple assault from 2005-on average, to 2009.

\begin{itemize}
  \item H5: There is an effect of resiliency on the victim-offender relationship
  \item H10: There is an effect of resiliency on the place of crime
  \item H6: The effects of target suitability (victim demographics) on victim-offender relationships vary across communities
  \item H7: The effects of situational variables (incident hour and incident place) on victim-offender relationships vary across communities
  \item H11: The effects of target suitability (victim demographics) on place of crimes vary across communities
  \item H12: The effects of situational variables (incident hour and incident place) on place of crimes vary across communities
\end{itemize}
Preliminary Model

Table 17 provides the results of the preliminary (multinomial logistic) model of the effects on victim-offender relationships within simple assaults. The model explains approximately 31.7% of the variance in victim-offender relationships (Nagelkerke $R^2 = .317$). However, it should be noted that pseudo $r$ square measures tend to underestimate the explanatory power of the model. As one can observe, all independent variables within each category (romantic, family, and acquaintance) were significant, demonstrating each independent variable significantly predicted whether the victim-offender relationship was romantic relationship versus stranger, family versus stranger, or acquaintance versus stranger. To further illustrate, temperature within the area on the day of the incident significantly predicted whether the victim and offender were romantically involved or strangers, $b = -.057$, Wald $\chi^2(1) = 111.587$, $p<.01$. To further explain, odds of a victim being romantically involved rather than being strangers with his or her offender was .9 times less likely for every one standard deviation increase in temperature, controlling for all other effects. Simply put, this shows that the higher the temperature, the more likely the victim did not know his or her offender. This remains consistent for family and acquaintance relationships. Again, one can observe that all other level one variables within the preliminary model were significant.

Level One Model

Similar to the preliminary model, Table 18 provides the fixed effects of all level one variables; however, is now controlling for the random intercept. Again, one can observe that all variables were significant across all categories of the dependent variable in comparison to the reference group (stranger).
### Table 17

**Simple Assault Multinomial Logistic Regression (Victim-Offender Relationship)**

<table>
<thead>
<tr>
<th>Victim-Offender Relationship</th>
<th>B</th>
<th>SE(B)</th>
<th>Exp(B)</th>
<th>Wald</th>
</tr>
</thead>
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<td>Romantic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>.037</td>
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<td>.012</td>
<td>12.280</td>
<td>44617.222**</td>
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<td>.005</td>
<td>.944</td>
<td>111.587**</td>
</tr>
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<td>Day of Week</td>
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<td>.005</td>
<td>.945</td>
<td>114.790**</td>
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<td>Incident Hour</td>
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<td>.005</td>
<td>1.083</td>
<td>217.450**</td>
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<td>.006</td>
<td>.952</td>
<td>70.057**</td>
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<td>.375</td>
<td>4329.126**</td>
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<td>.011</td>
<td>8.021</td>
<td>33409.360**</td>
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<tr>
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<td>.006</td>
<td>1.093</td>
<td>229.656**</td>
</tr>
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<td>Offender Race</td>
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<td>1.806</td>
<td>1920.705**</td>
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<tr>
<td>Offender Sex</td>
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<td>.013</td>
<td>.834</td>
<td>205.960**</td>
</tr>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>.044</td>
<td>.044</td>
<td>22202.666**</td>
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<td>.015</td>
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<td>.006</td>
<td>.918</td>
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<td>.927</td>
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<td>.279</td>
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<td>10386.552**</td>
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<td>.725</td>
<td>2272.842**</td>
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<tr>
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<td>2.472**</td>
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<td>.014</td>
<td>1.838**</td>
<td>2025.214</td>
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</tr>
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<td>.011</td>
<td>3.573**</td>
<td>12963.935</td>
</tr>
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<td>.005</td>
<td>.903**</td>
<td>392.864</td>
</tr>
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<td>Day of Week</td>
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<td>.005</td>
<td>.954**</td>
<td>88.462</td>
</tr>
<tr>
<td>Incident Hour</td>
<td>.135</td>
<td>.005</td>
<td>1.145**</td>
<td>687.941</td>
</tr>
<tr>
<td>Victim Age</td>
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<td>.005</td>
<td>.854**</td>
<td>822.633</td>
</tr>
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<td>.014</td>
<td>.450**</td>
<td>3383.609</td>
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<td>.011</td>
<td>2.375**</td>
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<td>.006</td>
<td>.855**</td>
<td>790.321</td>
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<td>.012</td>
<td>1.197**</td>
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</tr>
<tr>
<td>Offender Sex</td>
<td>.355</td>
<td>.012</td>
<td>1.427**</td>
<td>917.937</td>
</tr>
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</table>

*p<.01; *p<.05
Multinomial Nagelkerke $R^2 = .317$

*Note. Reference Category= Stranger.*
Table 18

*Simple Assault Level One Model Fixed Effects (Victim-Offender Relationship)*

<table>
<thead>
<tr>
<th>Victim-Offender Relationship</th>
<th>Coefficient</th>
<th>SE(B)</th>
<th>Exp(Coefficient)</th>
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</tr>
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<td><strong>Romantic</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-4.570</td>
<td>.1636</td>
<td>.010</td>
<td>-27.927**</td>
</tr>
<tr>
<td>Place</td>
<td>2.546</td>
<td>.0429</td>
<td>12.761</td>
<td>59.310**</td>
</tr>
<tr>
<td>Temperature</td>
<td>-.048</td>
<td>.0089</td>
<td>.953</td>
<td>-5.360**</td>
</tr>
<tr>
<td>Day of Week</td>
<td>-.054</td>
<td>.0069</td>
<td>.947</td>
<td>-7.820**</td>
</tr>
<tr>
<td>Incident Hour</td>
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<td>.0139</td>
<td>1.051</td>
<td>3.555**</td>
</tr>
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<td>.0164</td>
<td>.960</td>
<td>-2.504**</td>
</tr>
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<td>.0333</td>
<td>.367</td>
<td>-30.031**</td>
</tr>
<tr>
<td>Victim Sex</td>
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<td>.0491</td>
<td>8.186</td>
<td>42.839**</td>
</tr>
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<td>Offender Age</td>
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<td>.0188</td>
<td>1.102</td>
<td>5.161**</td>
</tr>
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<td>Offender Race</td>
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<td>.0315</td>
<td>1.718</td>
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<td><strong>Family</strong></td>
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<td></td>
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<tr>
<td>Intercept</td>
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<td>.002</td>
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</tr>
<tr>
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<td>.0339</td>
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</tr>
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<td>Offender Sex</td>
<td>.596</td>
<td>.0357</td>
<td>1.816</td>
<td>16.698**</td>
</tr>
<tr>
<td><strong>Acquaintance</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-1.124</td>
<td>.1143</td>
<td>.325</td>
<td>-9.828**</td>
</tr>
<tr>
<td>Place</td>
<td>1.234</td>
<td>.0323</td>
<td>3.436</td>
<td>38.201**</td>
</tr>
<tr>
<td>Temperature</td>
<td>-.046</td>
<td>.0084</td>
<td>.955</td>
<td>-5.518**</td>
</tr>
<tr>
<td>Day of Week</td>
<td>-.043</td>
<td>.0065</td>
<td>.958</td>
<td>-6.621**</td>
</tr>
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<td>Incident Hour</td>
<td>.121</td>
<td>.0129</td>
<td>1.129</td>
<td>9.389**</td>
</tr>
<tr>
<td>Victim Age</td>
<td>-.164</td>
<td>.0216</td>
<td>.849</td>
<td>-7.587**</td>
</tr>
<tr>
<td>Victim Race</td>
<td>-.736</td>
<td>.0340</td>
<td>.479</td>
<td>-21.654**</td>
</tr>
<tr>
<td>Victim Sex</td>
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<td>.0412</td>
<td>2.252</td>
<td>19.714**</td>
</tr>
<tr>
<td>Offender Age</td>
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<td>.0212</td>
<td>.844</td>
<td>-8.006**</td>
</tr>
<tr>
<td>Offender Race</td>
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<td>.0291</td>
<td>1.318</td>
<td>9.490**</td>
</tr>
<tr>
<td>Offender Sex</td>
<td>.392</td>
<td>.0296</td>
<td>1.480</td>
<td>13.234**</td>
</tr>
</tbody>
</table>

*p<.01; *p<.05

Note. Reference Category = Stranger.
Note. AIC=7793465.524; BIC=7793499.482.
For the level one model, what was most important for the analyst to observe was whether the intercept of each category of the dependent variable significantly varies across all cities. As can be observed in Table 19, the analyst can conclude that all three intercepts vary across cities ($\sigma^2_{\mu_{0j(1)}} = 0.417, SE=.064$; $\sigma^2_{\mu_{0j(2)}} = 0.507, SE=.078$; $\sigma^2_{\mu_{0j(3)}} = 0.509, SE=.078$). In all instances, $z$ tests demonstrate significant variability between cities in victim-offender relationships.

**Level Two Model**

Table 20 provides the fixed effects of all level one and level two variables. One can observe that all level one variables remain significant, with the exception of offender sex within family victim-offender relationships (OR= 1.812, $p>.05$). Of the ten additional level two variables added to the model, within the romantic group (comparing to the reference group strangers), the following were significant predictors: RCI social (OR=1.300, $p<.05$), percent of population under 25 years of age (OR=1.150, $p<.05$) and percent of population that was female (OR=1.1659, $p<.05$). For the family group (comparing to the reference group, strangers) percent of population under 25 remained significant (OR=1.201, $p<.01$), as did percent of population that was female (OR=1.211, $p<.01$), and lastly RCI Economic was significant (OR=.941, $p<.01$). Within the acquaintance group, only the percentage of population under 25 (OR=1.175, $p<.01$) and

<table>
<thead>
<tr>
<th>Victim-Offender Relationship</th>
<th>Estimate</th>
<th>SE</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relationship</td>
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<td>.064</td>
<td>6.525**</td>
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<tr>
<td>Family</td>
<td>.507</td>
<td>.078</td>
<td>6.539**</td>
</tr>
<tr>
<td>Acquaintance</td>
<td>.509</td>
<td>.078</td>
<td>6.537**</td>
</tr>
</tbody>
</table>

**p<.01; *p<.05**
the percentage of the population that was female (OR=1.602, p<.05) were significant predictors of victim-offender relationship. Race (percentage of population that was nonwhite) was consistently nonsignificant through all categories of the model.

Table 20

*Simple Assault Level Two Model Fixed Effects (Victim-Offender Relationship)*

<table>
<thead>
<tr>
<th>Victim-Offender Relationship</th>
<th>Coefficient</th>
<th>SE(B)</th>
<th>Exp(Coefficient)</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Romantic</strong></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-4.547</td>
<td>.2124</td>
<td>.011</td>
<td>-21.411**</td>
</tr>
<tr>
<td>Place</td>
<td>2.541</td>
<td>.0429</td>
<td>12.697</td>
<td>59.193**</td>
</tr>
<tr>
<td>Temperature</td>
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<td>.0089</td>
<td>.953</td>
<td>-5.346**</td>
</tr>
<tr>
<td>Day of Week</td>
<td>-.054</td>
<td>.0069</td>
<td>.947</td>
<td>-7.862**</td>
</tr>
<tr>
<td>Incident Hour</td>
<td>.050</td>
<td>.0140</td>
<td>1.051</td>
<td>3.572**</td>
</tr>
<tr>
<td>Victim Age</td>
<td>-.043</td>
<td>.0166</td>
<td>.958</td>
<td>-2.578*</td>
</tr>
<tr>
<td>Victim Race</td>
<td>-1.001</td>
<td>.0336</td>
<td>.368</td>
<td>-29.789**</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>2.102</td>
<td>.0495</td>
<td>8.185</td>
<td>42.475**</td>
</tr>
<tr>
<td>Offender Age</td>
<td>.097</td>
<td>.0190</td>
<td>1.101</td>
<td>5.093**</td>
</tr>
<tr>
<td>Offender Race</td>
<td>.542</td>
<td>.0317</td>
<td>1.719</td>
<td>17.069**</td>
</tr>
<tr>
<td>Offender Sex</td>
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<td>.0725</td>
<td>.816</td>
<td>-2.803**</td>
</tr>
<tr>
<td>RCI Economic</td>
<td>.086</td>
<td>.0902</td>
<td>1.090</td>
<td>.952</td>
</tr>
<tr>
<td>RCI Social</td>
<td>.262</td>
<td>.1266</td>
<td>1.300</td>
<td>2.071*</td>
</tr>
<tr>
<td>Social Disorder</td>
<td>.052</td>
<td>.0528</td>
<td>1.054</td>
<td>.993</td>
</tr>
<tr>
<td>Resource Dependency</td>
<td>.026</td>
<td>.1417</td>
<td>1.026</td>
<td>.181</td>
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<tr>
<td>Population</td>
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<td>.1108</td>
<td>.914</td>
<td>-.810</td>
</tr>
<tr>
<td>Physical Disorder</td>
<td>.060</td>
<td>.0855</td>
<td>1.062</td>
<td>.701</td>
</tr>
<tr>
<td>% under 25</td>
<td>.140</td>
<td>.0583</td>
<td>1.150</td>
<td>2.396*</td>
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<tr>
<td>% Nonwhite</td>
<td>-.058</td>
<td>.0910</td>
<td>.944</td>
<td>-.633</td>
</tr>
<tr>
<td>% Female</td>
<td>.156</td>
<td>.0783</td>
<td>1.169</td>
<td>1.989*</td>
</tr>
<tr>
<td>Exposure</td>
<td>.045</td>
<td>.1451</td>
<td>1.046</td>
<td>.310</td>
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<td><strong>Family</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
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<td>.2247</td>
<td>.002</td>
<td>-28.332**</td>
</tr>
<tr>
<td>Place</td>
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<td>.0431</td>
<td>23.522</td>
<td>73.257**</td>
</tr>
<tr>
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<td>.0105</td>
<td>.934</td>
<td>-6.498**</td>
</tr>
<tr>
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<td>.0085</td>
<td>.932</td>
<td>-8.345**</td>
</tr>
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<td>.0142</td>
<td>1.280</td>
<td>17.334**</td>
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<tr>
<td>Victim Age</td>
<td>.114</td>
<td>.0428</td>
<td>1.121</td>
<td>2.657**</td>
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<tr>
<td>Victim Race</td>
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<td>.0449</td>
<td>.283</td>
<td>-28.167**</td>
</tr>
<tr>
<td>Victim Sex</td>
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<td>.0420</td>
<td>3.609</td>
<td>30.546**</td>
</tr>
<tr>
<td>Offender Age</td>
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<td>.0316</td>
<td>.724</td>
<td>-10.218**</td>
</tr>
<tr>
<td>Offender Race</td>
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<td>.0342</td>
<td>2.436</td>
<td>26.039**</td>
</tr>
<tr>
<td>Offender Sex</td>
<td>.594</td>
<td>.0361</td>
<td>1.812</td>
<td>16.446</td>
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</table>
Table 20 (continued).

**Victim Offender Relationship**

<table>
<thead>
<tr>
<th>Family</th>
<th>Coefficient</th>
<th>SE(B)</th>
<th>Exp(Coefficient)</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
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<td>.941</td>
<td>-.627**</td>
</tr>
<tr>
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<td>.1269</td>
<td>1.568</td>
<td>3.548</td>
</tr>
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<td>Social Disorder</td>
<td>.051</td>
<td>.0491</td>
<td>1.052</td>
<td>1.043</td>
</tr>
<tr>
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<td>.1486</td>
<td>.972</td>
<td>-.191</td>
</tr>
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<td>Population</td>
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<td>.779</td>
<td>-1.862</td>
</tr>
<tr>
<td>Physical Disorder</td>
<td>.138</td>
<td>.0901</td>
<td>1.148</td>
<td>1.535</td>
</tr>
<tr>
<td>% under 25</td>
<td>.184</td>
<td>.0610</td>
<td>1.201</td>
<td>3.010**</td>
</tr>
<tr>
<td>% Nonwhite</td>
<td>.046</td>
<td>.0901</td>
<td>1.047</td>
<td>.513</td>
</tr>
<tr>
<td>% Female</td>
<td>.192</td>
<td>.0865</td>
<td>1.211</td>
<td>2.218**</td>
</tr>
<tr>
<td>Exposure</td>
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<td>1.077</td>
<td>.473</td>
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<td>Acquaintance</td>
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<td></td>
</tr>
<tr>
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<td>38.028**</td>
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<td>.0084</td>
<td>.955</td>
<td>-5.522**</td>
</tr>
<tr>
<td>Day of Week</td>
<td>-.043</td>
<td>.0065</td>
<td>.958</td>
<td>-6.632**</td>
</tr>
<tr>
<td>Incident Hour</td>
<td>.121</td>
<td>.0130</td>
<td>1.129</td>
<td>9.346**</td>
</tr>
<tr>
<td>Victim Age</td>
<td>-.163</td>
<td>.0218</td>
<td>.849</td>
<td>-7.500**</td>
</tr>
<tr>
<td>Victim Race</td>
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<td>.0342</td>
<td>.479</td>
<td>-21.534**</td>
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<tr>
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<td>2.242</td>
<td>19.525**</td>
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<td>.0214</td>
<td>.844</td>
<td>-7.920**</td>
</tr>
<tr>
<td>Offender Race</td>
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<td>.0295</td>
<td>1.320</td>
<td>9.411**</td>
</tr>
<tr>
<td>Offender Sex</td>
<td>.393</td>
<td>.0299</td>
<td>1.482</td>
<td>13.159**</td>
</tr>
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<td>.0903</td>
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<td>-1.636</td>
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<td>1.726</td>
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<td>.0444</td>
<td>1.030</td>
<td>.662</td>
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<td>.1261</td>
<td>.919</td>
<td>-.668</td>
</tr>
<tr>
<td>Population</td>
<td>-.135</td>
<td>.1144</td>
<td>.874</td>
<td>-1.179</td>
</tr>
<tr>
<td>Physical Disorder</td>
<td>.102</td>
<td>.1030</td>
<td>1.108</td>
<td>.994</td>
</tr>
<tr>
<td>% under 25</td>
<td>.161</td>
<td>.0496</td>
<td>1.175</td>
<td>3.247**</td>
</tr>
<tr>
<td>% Nonwhite</td>
<td>.149</td>
<td>.0995</td>
<td>1.161</td>
<td>1.502</td>
</tr>
<tr>
<td>% Female</td>
<td>.155</td>
<td>.0703</td>
<td>1.167</td>
<td>2.202*</td>
</tr>
<tr>
<td>Exposure</td>
<td>.130</td>
<td>.1076</td>
<td>1.138</td>
<td>1.205</td>
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</tbody>
</table>

**Note.** Reference Category= Stranger.

**Note.** AIC=7713105.9; BIC=7713139.825

*p<.01; *p<.05
Table 21 provides the subsequent test to determine whether the random intercept remains significant across cities with the inclusion of level two fixed effects. As can be observed, all intercepts remain significant, \( \sigma^2_{\mu_0 j(1)} = 0.434, SE = .071; \sigma^2_{\mu_0 j(2)} = 0.468, SE = .07; \sigma^2_{\mu_0 j(3)} = .513, SE = .085 \) meaning that with the addition of the level two variables the intercepts for each category of the dependent variable remain significantly different across cities.

### Table 21

**Simple Assault Level Two Model Random Intercept (Victim-Offender Relationship)**

<table>
<thead>
<tr>
<th>Victim-Offender Relationship</th>
<th>Estimate</th>
<th>SE</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relationship</td>
<td>.434</td>
<td>.071</td>
<td>6.087**</td>
</tr>
<tr>
<td>Family</td>
<td>.468</td>
<td>.077</td>
<td>6.074**</td>
</tr>
<tr>
<td>Acquaintance</td>
<td>.513</td>
<td>.085</td>
<td>6.074**</td>
</tr>
</tbody>
</table>

**p<.01; *p<.05**

### Random Slopes

As previously stated, for all victim-offender relationship models, the following variables were examined to determine whether their effects on victim-offender relationships varied across cities: incident hour, place, victim age, victim race, and victim sex. Additionally, only those that were significant at the initial iteration were retained within the model. As can be observed in Table 22, all slopes were significant. More specifically, the effects of incident hour on victim-offender relationship (for all categories) varied significantly across cities (\( \sigma^2_{\mu 1(1)} = 0.077, SE = .101; \sigma^2_{\mu 1(2)} = 0.085, SE = .071; \sigma^2_{\mu 1(3)} = 0.076, SE = .014 \)). Additionally, the effects of place (public or residence) on victim-offender relationships (across all categories) varied significantly across cities (\( \sigma^2_{\mu 2(1)} = 0.003, SE = .001; \sigma^2_{\mu 2(2)} = 0.005, SE = .001; \sigma^2_{\mu 2(3)} = 0.003 \)).
Similarly, the effects of victims’ age, race, and sex, on victim offender relationships (across all categories) varies significantly across cities.

Table 22

**Simple Assault Significant Random Effects (Victim-Offender Relationship)**

<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
<th>SE</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Romantic</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>.531</td>
<td>.101</td>
<td>5.274**</td>
</tr>
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<td>Incident Hour</td>
<td>.077</td>
<td>.014</td>
<td>5.372**</td>
</tr>
<tr>
<td>Place</td>
<td>.003</td>
<td>.001</td>
<td>3.795**</td>
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<td>Victim Age</td>
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<td>.002</td>
<td>4.895**</td>
</tr>
<tr>
<td>Victim Race</td>
<td>.010</td>
<td>.003</td>
<td>2.935**</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>.105</td>
<td>.018</td>
<td>5.789**</td>
</tr>
<tr>
<td><strong>Family</strong></td>
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</tr>
<tr>
<td>Intercept</td>
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<td>.102</td>
<td>4.997**</td>
</tr>
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<td>.017</td>
<td>4.886**</td>
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<td>.001</td>
<td>3.825**</td>
</tr>
<tr>
<td>Victim Age</td>
<td>.070</td>
<td>.011</td>
<td>6.192**</td>
</tr>
<tr>
<td>Victim Race</td>
<td>.052</td>
<td>.012</td>
<td>4.347**</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>.056</td>
<td>.011</td>
<td>4.898**</td>
</tr>
<tr>
<td><strong>Acquaintance</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>.554</td>
<td>.102</td>
<td>5.410**</td>
</tr>
<tr>
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<td>.076</td>
<td>.014</td>
<td>5.446**</td>
</tr>
<tr>
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<td>.001</td>
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<td>.004</td>
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<tr>
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<td>5.348**</td>
</tr>
</tbody>
</table>

**p<.01; *p<.05
Note. AIC=7774552.900; BIC=7774756.453

Effects of Victim-Offender Relationships within Aggravated Assaults

**Sample Size**

Of the 834,517 incidents of crime, aggravated assault comprised 15.2% of these crimes (n=127,319) within 90 cities (n=90). However, due to a lack of variance within simple assault for two cities, the level one model and all subsequent models had a decreased level two sample size of 88, which decreased the level one sample size to
127,229. Thus, each city had on average 1445.8 incidents of aggravated assault from 2005 to 2009.\textsuperscript{13}

\textit{Preliminary Model}

Table 23 provides the results of the preliminary (multinomial logistic) model of the effects on victim-offender relationships within aggravated assaults. As can be observed, the model explains approximately 33.4\% of the variance in victim-offender relationships (Nagelkerke $R^2 = .334$). One can observe that across all categories of the dependent variable (when compared to the reference group, stranger) all independent variables significantly predict classification, with the exception of victim age within romantic relationships ($b = -.007$, Wald $\chi^2(1) = .441$, $p>.05$). For place, the odds of a victim being romantically involved with his or her offender rather than not knowing his or her offender was 10.5 times more likely when the crime took place in public rather than in the residence, controlling for all other effects. Essentially, this demonstrates that within aggravated assaults, a victim in his or her home was more likely to be assaulted by a family member, romantic partner, or acquaintance rather than a stranger. To provide further example, one can observe that age was significant across all categories of the dependent variable, with the exception of romantic partners. Additionally, the odds of a victim and offender being acquaintances rather than strangers was .5 times less likely with every one unit increase in age, controlling for all other effects. Generally, this demonstrates that those who were younger were more likely to be victimized by strangers.

\textsuperscript{13}Due to the large sample size for aggravated assaults, it is important to note that any significant fixed effects should be interpreted with caution, and more attention should be given to the overall effect of each independent variable on the dependent variable.
Table 23

Aggravated Assault Multinomial Logistic Regression (Victim-Offender Relationship)

<table>
<thead>
<tr>
<th>Victim-Offender Relationship</th>
<th>B</th>
<th>SE(B)</th>
<th>Exp(B)</th>
<th>Wald</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Romantic</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-7.363</td>
<td>.072</td>
<td></td>
<td>10480.117**</td>
</tr>
<tr>
<td>Place</td>
<td>2.352</td>
<td>.022</td>
<td>10.506</td>
<td>11313.45**</td>
</tr>
<tr>
<td>Temperature</td>
<td>-.083</td>
<td>.010</td>
<td>.920</td>
<td>67.321**</td>
</tr>
<tr>
<td>Day of Week</td>
<td>-.051</td>
<td>.010</td>
<td>.950</td>
<td>27.863**</td>
</tr>
<tr>
<td>Incident Hour</td>
<td>.070</td>
<td>.010</td>
<td>1.072</td>
<td>52.318**</td>
</tr>
<tr>
<td>Victim Age</td>
<td>-.007</td>
<td>.011</td>
<td>.993</td>
<td>.441</td>
</tr>
<tr>
<td>Victim Race</td>
<td>-.654</td>
<td>.027</td>
<td>.520</td>
<td>584.361**</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>2.147</td>
<td>.022</td>
<td>8.559</td>
<td>9538.581**</td>
</tr>
<tr>
<td>Offender Age</td>
<td>.313</td>
<td>.011</td>
<td>1.367</td>
<td>794.799**</td>
</tr>
<tr>
<td>Offender Race</td>
<td>.360</td>
<td>.026</td>
<td>1.433</td>
<td>191.869**</td>
</tr>
<tr>
<td>Offender Sex</td>
<td>1.122</td>
<td>.026</td>
<td>3.070</td>
<td>1858.772**</td>
</tr>
<tr>
<td><strong>Family</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-7.618</td>
<td>.085</td>
<td></td>
<td>8113.935**</td>
</tr>
<tr>
<td>Place</td>
<td>3.009</td>
<td>.029</td>
<td>20.267</td>
<td>10854.031**</td>
</tr>
<tr>
<td>Temperature</td>
<td>-.086</td>
<td>.011</td>
<td>.918</td>
<td>56.139**</td>
</tr>
<tr>
<td>Day of Week</td>
<td>-.064</td>
<td>.011</td>
<td>.938</td>
<td>34.154**</td>
</tr>
<tr>
<td>Incident Hour</td>
<td>.223</td>
<td>.011</td>
<td>1.250</td>
<td>405.962**</td>
</tr>
<tr>
<td>Victim Age</td>
<td>-.220</td>
<td>.012</td>
<td>.803</td>
<td>310.538**</td>
</tr>
<tr>
<td>Victim Race</td>
<td>-.914</td>
<td>.031</td>
<td>.401</td>
<td>845.766**</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>1.104</td>
<td>.024</td>
<td>3.016</td>
<td>2065.426**</td>
</tr>
<tr>
<td>Offender Age</td>
<td>.055</td>
<td>.013</td>
<td>1.057</td>
<td>18.387**</td>
</tr>
<tr>
<td>Offender Race</td>
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<td>.031</td>
<td>1.876</td>
<td>425.004**</td>
</tr>
<tr>
<td>Offender Sex</td>
<td>1.199</td>
<td>.028</td>
<td>3.317</td>
<td>1807.992**</td>
</tr>
<tr>
<td><strong>Acquaintance</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-1.450</td>
<td>.054</td>
<td>3.249</td>
<td>729.834**</td>
</tr>
<tr>
<td>Place</td>
<td>1.178</td>
<td>.018</td>
<td>.944</td>
<td>4485.768**</td>
</tr>
<tr>
<td>Temperature</td>
<td>-.058</td>
<td>.008</td>
<td>.975</td>
<td>47.094**</td>
</tr>
<tr>
<td>Day of Week</td>
<td>-.025</td>
<td>.008</td>
<td>1.144</td>
<td>9.786**</td>
</tr>
<tr>
<td>Incident Hour</td>
<td>.135</td>
<td>.008</td>
<td>.867</td>
<td>292.446**</td>
</tr>
<tr>
<td>Victim Age</td>
<td>-.143</td>
<td>.009</td>
<td>.533</td>
<td>244.997**</td>
</tr>
<tr>
<td>Victim Race</td>
<td>-.629</td>
<td>.021</td>
<td>1.862</td>
<td>870.198**</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>.622</td>
<td>.019</td>
<td>1.042</td>
<td>1083.549**</td>
</tr>
<tr>
<td>Offender Age</td>
<td>.042</td>
<td>.009</td>
<td>1.080</td>
<td>19.342**</td>
</tr>
<tr>
<td>Offender Race</td>
<td>.077</td>
<td>.020</td>
<td>1.947</td>
<td>14.644**</td>
</tr>
<tr>
<td>Offender Sex</td>
<td>.666</td>
<td>.023</td>
<td>824.617**</td>
<td></td>
</tr>
</tbody>
</table>

*p<.01; *p<.05
Multinomial Nagelkerke $R^2=334$

Note. Reference Category= Stranger.
**Level One Model**

Similar to the preliminary model, Table 24 provides the fixed effects of all level one variables; however, was now controlling for the random intercept. One can observe that victim age was no longer significant for family (OR=.812, p>.05), and remained non-significant for romantic partners (OR=.979, p>.05). Additionally, offender age remained nonsignificant, and temperature was now nonsignificant within acquaintance (OR=1.000, p>.04). All other variables remained significant predictors of victim-offender relationships. As can be observed in Table 25, the intercepts significantly vary across all categories of the dependent variable ($\sigma^2_{\mu_0j(1)} = 0.376, \text{SE}=.060; \sigma^2_{\mu_0j(2)} = 0.427, \text{SE}=.069; \sigma^2_{\mu_0j(3)} = .470, \text{SE}=.073$).

**Level Two Model**

Table 26 provides the fixed effects of level one and two variables on victim-offender relationships. Of specific interest were the level two variables across categories of the dependent variable. As can be observed, of the ten social variables (level two variables) added to the model, for victims and offenders who were romantic partners, social disorder was the only significant predictor (OR=1.115, p<.05), demonstrating that the odds of a victim being romantically involved with his or her offender rather than being strangers was 1.1 times greater for every one standard deviation increase in social disorder, controlling for all other effects. For familial relationships, RCI social, social disorder, and percent of population that was female were positive significant predictors of victim-offender relationships (family versus stranger). For victims and offenders who were acquaintances, only the percent of population that was female was statistically significant (OR=1.235, p<.01).
Table 24

*Aggravated Assault Level One Model Fixed Effects (Victim-Offender Relationship)*

<table>
<thead>
<tr>
<th>Victim-Offender Relationship</th>
<th>Coefficient</th>
<th>SE(B)</th>
<th>Exp(Coefficient)</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Romantic</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-7.083</td>
<td>.2293</td>
<td>.001</td>
<td>-30.893**</td>
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<tr>
<td>Place</td>
<td>2.388</td>
<td>.0563</td>
<td>10.891</td>
<td>42.388**</td>
</tr>
<tr>
<td>Temperature</td>
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<td>.0094</td>
<td>.935</td>
<td>-7.129**</td>
</tr>
<tr>
<td>Day of Week</td>
<td>-0.050</td>
<td>.0098</td>
<td>.951</td>
<td>-5.141**</td>
</tr>
<tr>
<td>Incident Hour</td>
<td>0.038</td>
<td>.0146</td>
<td>1.039</td>
<td>2.616**</td>
</tr>
<tr>
<td>Victim Age</td>
<td>-0.022</td>
<td>.0262</td>
<td>.979</td>
<td>-8.21</td>
</tr>
<tr>
<td>Victim Race</td>
<td>-0.733</td>
<td>.0632</td>
<td>.480</td>
<td>-11.601**</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>2.148</td>
<td>.0654</td>
<td>8.566</td>
<td>32.825**</td>
</tr>
<tr>
<td>Offender Age</td>
<td>0.332</td>
<td>.0248</td>
<td>1.394</td>
<td>13.367**</td>
</tr>
<tr>
<td>Offender Race</td>
<td>0.292</td>
<td>.0469</td>
<td>1.340</td>
<td>6.236**</td>
</tr>
<tr>
<td>Offender Sex</td>
<td>1.122</td>
<td>.0710</td>
<td>3.070</td>
<td>15.801**</td>
</tr>
<tr>
<td><strong>Family</strong></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-7.319</td>
<td>.2122</td>
<td>.001</td>
<td>-34.499**</td>
</tr>
<tr>
<td>Place</td>
<td>3.016</td>
<td>.0594</td>
<td>20.413</td>
<td>50.740**</td>
</tr>
<tr>
<td>Temperature</td>
<td>-0.070</td>
<td>.0147</td>
<td>.932</td>
<td>-4.785**</td>
</tr>
<tr>
<td>Day of Week</td>
<td>-0.062</td>
<td>.0125</td>
<td>.940</td>
<td>-4.949**</td>
</tr>
<tr>
<td>Incident Hour</td>
<td>0.258</td>
<td>.0164</td>
<td>1.295</td>
<td>15.778**</td>
</tr>
<tr>
<td>Victim Age</td>
<td>-0.208</td>
<td>.0172</td>
<td>.812</td>
<td>-1.939</td>
</tr>
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<td>Victim Race</td>
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<td>.0686</td>
<td>.382</td>
<td>-14.018**</td>
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<td>.0441</td>
<td>2.980</td>
<td>24.766**</td>
</tr>
<tr>
<td>Offender Age</td>
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<td>.0855</td>
<td>1.046</td>
<td>.529</td>
</tr>
<tr>
<td>Offender Race</td>
<td>0.598</td>
<td>.0551</td>
<td>1.819</td>
<td>10.854**</td>
</tr>
<tr>
<td>Offender Sex</td>
<td>1.161</td>
<td>.0757</td>
<td>3.194</td>
<td>15.348**</td>
</tr>
<tr>
<td><strong>Acquaintance</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-1.519</td>
<td>.1328</td>
<td>.219</td>
<td>-11.437**</td>
</tr>
<tr>
<td>Place</td>
<td>1.184</td>
<td>.0341</td>
<td>3.269</td>
<td>34.750**</td>
</tr>
<tr>
<td>Temperature</td>
<td>0.000</td>
<td>.0098</td>
<td>1.000</td>
<td>.049</td>
</tr>
<tr>
<td>Day of Week</td>
<td>-0.022</td>
<td>.0085</td>
<td>.978</td>
<td>-2.624**</td>
</tr>
<tr>
<td>Incident Hour</td>
<td>0.132</td>
<td>.0118</td>
<td>1.141</td>
<td>11.151**</td>
</tr>
<tr>
<td>Victim Age</td>
<td>-0.170</td>
<td>.0217</td>
<td>.844</td>
<td>-7.829**</td>
</tr>
<tr>
<td>Victim Race</td>
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<td>.0559</td>
<td>.544</td>
<td>-10.887**</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>0.583</td>
<td>.0428</td>
<td>1.792</td>
<td>13.609**</td>
</tr>
<tr>
<td>Offender Age</td>
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<td>.0260</td>
<td>1.040</td>
<td>1.520</td>
</tr>
<tr>
<td>Offender Race</td>
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<td>.0410</td>
<td>1.204</td>
<td>4.535**</td>
</tr>
<tr>
<td>Offender Sex</td>
<td>0.632</td>
<td>.0410</td>
<td>1.880</td>
<td>15.407**</td>
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</table>

*p<.01; *p<.05

Note. Reference Category = Stranger.

Note. AIC=1579003.776; BIC= 1579033.038.
### Table 25

**Aggravated Assault Level One Model Random Intercept (Victim-Offender Relationship)**

<table>
<thead>
<tr>
<th>Victim-Offender Relationship</th>
<th>Estimate</th>
<th>SE</th>
<th>Z</th>
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</thead>
<tbody>
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<td>.060</td>
<td>6.253**</td>
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<tr>
<td>Family</td>
<td>.427</td>
<td>.069</td>
<td>6.226**</td>
</tr>
<tr>
<td>Acquaintance</td>
<td>.470</td>
<td>.073</td>
<td>6.398**</td>
</tr>
</tbody>
</table>

**p<.01; *p<.05**

### Table 26

**Aggravated Assault Level Two Model Fixed Effects (Victim-Offender Relationship)**

<table>
<thead>
<tr>
<th>Victim-Offender Relationship</th>
<th>Coefficient</th>
<th>SE(B)</th>
<th>Exp(Coefficient)</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Romantic Intercept</td>
<td>-7.138</td>
<td>.2462</td>
<td>.001</td>
<td>-28.989**</td>
</tr>
<tr>
<td>Place</td>
<td>2.384</td>
<td>.0566</td>
<td>10.850</td>
<td>42.135**</td>
</tr>
<tr>
<td>Temperature</td>
<td>-.066</td>
<td>.0094</td>
<td>.936</td>
<td>-7.040**</td>
</tr>
<tr>
<td>Day of Week</td>
<td>-.049</td>
<td>.0098</td>
<td>.952</td>
<td>-5.022**</td>
</tr>
<tr>
<td>Incident Hour</td>
<td>.038</td>
<td>.0146</td>
<td>1.038</td>
<td>2.578*</td>
</tr>
<tr>
<td>Victim Age</td>
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<td>.0263</td>
<td>.976</td>
<td>-.915</td>
</tr>
<tr>
<td>Victim Race</td>
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<td>.0635</td>
<td>.483</td>
<td>-11.479**</td>
</tr>
<tr>
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<td>.0660</td>
<td>8.586</td>
<td>32.566**</td>
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<tr>
<td>Offender Age</td>
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<td>.0250</td>
<td>1.398</td>
<td>13.405**</td>
</tr>
<tr>
<td>Offender Race</td>
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<td>.0466</td>
<td>1.336</td>
<td>6.216**</td>
</tr>
<tr>
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<td>3.067</td>
<td>15.657**</td>
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<tr>
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<td>1.117</td>
<td>1.184</td>
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<tr>
<td>RCI Social</td>
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<td>.1161</td>
<td>1.136</td>
<td>1.102</td>
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<td>.0482</td>
<td>1.115</td>
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<td>Resource Dependency</td>
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<td>.1287</td>
<td>1.052</td>
<td>.394</td>
</tr>
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<td>.0919</td>
<td>.909</td>
<td>-1.042</td>
</tr>
<tr>
<td>Physical Disorder</td>
<td>-.035</td>
<td>.0864</td>
<td>.966</td>
<td>-.400</td>
</tr>
<tr>
<td>% under 25</td>
<td>.041</td>
<td>.0604</td>
<td>1.042</td>
<td>.681</td>
</tr>
<tr>
<td>% Nonwhite</td>
<td>-.114</td>
<td>.0861</td>
<td>.892</td>
<td>-1.327</td>
</tr>
<tr>
<td>% Female</td>
<td>.222</td>
<td>.0829</td>
<td>1.249</td>
<td>2.676</td>
</tr>
<tr>
<td>Exposure</td>
<td>.064</td>
<td>.1339</td>
<td>1.067</td>
<td>.481</td>
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</table>

| Family                       |            |      |                   |       |
| Intercept                    | -7.315     | .2240| .001             | -32.652**|
| Place                        | 3.016      | .0600| 20.413           | 50.237**|
| Temperature                  | -.070      | .0147| .932             | -4.774**|
| Day of Week                  | -.062      | .0126| .940             | -4.929**|
Table 26 (continued).

<table>
<thead>
<tr>
<th>Victim-Offender Relationship</th>
<th>Coefficient</th>
<th>SE(B)</th>
<th>Exp(Coefficient)</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incident Hour</td>
<td>.258</td>
<td>.0163</td>
<td>1.295</td>
<td>15.822**</td>
</tr>
<tr>
<td>Victim Age</td>
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<td>.1077</td>
<td>.808</td>
<td>-1.981*</td>
</tr>
<tr>
<td>Victim Race</td>
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<td>.383</td>
<td>-13.891**</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>1.093</td>
<td>.0446</td>
<td>2.982</td>
<td>24.510**</td>
</tr>
<tr>
<td>Offender Age</td>
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<td>.0859</td>
<td>1.051</td>
<td>.579</td>
</tr>
<tr>
<td>Offender Race</td>
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<td>.0550</td>
<td>1.815</td>
<td>10.842**</td>
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<tr>
<td>Offender Sex</td>
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<td>.0757</td>
<td>3.210</td>
<td>15.413**</td>
</tr>
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<td>.090</td>
</tr>
<tr>
<td>RCI Social</td>
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<td>.1251</td>
<td>1.302</td>
<td>2.112*</td>
</tr>
<tr>
<td>Social Disorder</td>
<td>.098</td>
<td>.0457</td>
<td>1.103</td>
<td>2.143*</td>
</tr>
<tr>
<td>Resource dependency</td>
<td>-.065</td>
<td>.1271</td>
<td>.937</td>
<td>-5.10</td>
</tr>
<tr>
<td>Population</td>
<td>-.177</td>
<td>.0960</td>
<td>.838</td>
<td>-1.840</td>
</tr>
<tr>
<td>Physical Disorder</td>
<td>-.015</td>
<td>.0952</td>
<td>.985</td>
<td>-1.160</td>
</tr>
<tr>
<td>% under 25</td>
<td>.112</td>
<td>.0611</td>
<td>1.119</td>
<td>1.835</td>
</tr>
<tr>
<td>% Nonwhite</td>
<td>-.027</td>
<td>.0754</td>
<td>.974</td>
<td>-3.52</td>
</tr>
<tr>
<td>% Female</td>
<td>.278</td>
<td>.0882</td>
<td>1.320</td>
<td>3.150**</td>
</tr>
<tr>
<td>Exposure</td>
<td>.108</td>
<td>.1481</td>
<td>1.114</td>
<td>.730</td>
</tr>
<tr>
<td>Acquaintance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-1.492</td>
<td>.1656</td>
<td>.225</td>
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<td>.068</td>
</tr>
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<td>Day of Week</td>
<td>-.022</td>
<td>.0085</td>
<td>.978</td>
<td>-2.564**</td>
</tr>
<tr>
<td>Incident Hour</td>
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<td>.0118</td>
<td>1.142</td>
<td>11.276**</td>
</tr>
<tr>
<td>Victim Age</td>
<td>-.170</td>
<td>.0219</td>
<td>.844</td>
<td>-7.767**</td>
</tr>
<tr>
<td>Victim Race</td>
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<td>.0565</td>
<td>.545</td>
<td>-10.745**</td>
</tr>
<tr>
<td>Victim Sex</td>
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<td>.0431</td>
<td>1.787</td>
<td>13.462**</td>
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<td>.0261</td>
<td>1.043</td>
<td>1.620</td>
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<td>.0410</td>
<td>1.204</td>
<td>4.528**</td>
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<td>.0412</td>
<td>1.884</td>
<td>15.366**</td>
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<td>.0877</td>
<td>.925</td>
<td>-8.92</td>
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<tr>
<td>RCI Social</td>
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<td>.1233</td>
<td>1.123</td>
<td>.940</td>
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<td>.0484</td>
<td>1.062</td>
<td>1.245</td>
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<tr>
<td>Resource Dependency</td>
<td>-.055</td>
<td>.1198</td>
<td>.947</td>
<td>-4.59</td>
</tr>
<tr>
<td>Population</td>
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<td>.1073</td>
<td>.871</td>
<td>-1.285</td>
</tr>
<tr>
<td>Physical Disorder</td>
<td>.066</td>
<td>.0901</td>
<td>1.069</td>
<td>.737</td>
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<tr>
<td>% under 25</td>
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<td>.0517</td>
<td>1.096</td>
<td>1.774</td>
</tr>
<tr>
<td>% Nonwhite</td>
<td>.065</td>
<td>.0903</td>
<td>1.067</td>
<td>.719</td>
</tr>
<tr>
<td>% Female</td>
<td>.211</td>
<td>.0663</td>
<td>1.235</td>
<td>3.183**</td>
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<td>.129</td>
<td>.0941</td>
<td>1.138</td>
<td>1.370</td>
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</table>

**p<.01; *p<.05
Note: Reference Category= Stranger.
Note: AIC=11566531.635; BIC=1566560.870
Table 27 provides the subsequent test to determine whether the random intercept remains significant across cities with the inclusion of level two fixed effects. As can be observed, all intercepts remain significant, \( (\sigma^2_{\mu_j(1)} = 0.375; \text{SE} = 0.064, \sigma^2_{\mu_j(2)} = 0.410, \text{SE} = 0.071; \sigma^2_{\mu_j(3)} = 0.484, \text{SE} = 0.081). \) Thus, the analyst can conclude that the results from the z tests, which were used to determine whether the intercepts of each group of the dependent variable varied significantly across cities, were significant, thus all intercepts varied significantly across cities.

Table 27

\textbf{Aggravated Assault Level Two Model Random Intercept (Victim-Offender Relationship)}

<table>
<thead>
<tr>
<th>Victim-Offender Relationship</th>
<th>Estimate</th>
<th>SE</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relationship</td>
<td>.375</td>
<td>.064</td>
<td>5.838**</td>
</tr>
<tr>
<td>Family</td>
<td>.410</td>
<td>.071</td>
<td>5.794**</td>
</tr>
<tr>
<td>Acquaintance</td>
<td>.484</td>
<td>.081</td>
<td>5.952**</td>
</tr>
</tbody>
</table>

**p<.01; *p<.05

Random Slopes

For all victim-offender relationship models, the following variables were examined to determine whether their effects on victim-offender relationships varied across cities: incident hour, place, victim age, victim race, and victim sex. Additionally, only those that were significant at the initial iteration were retained within the model. As can be observed in Table 28, all slopes were significant with the exception of incident hour. The effects of place (public or residence) on victim-offender relationships varied significantly across all victim-offender relationship groups \( (\sigma^2_{\mu_2(1)} = 0.064, \text{SE} = 0.016; \sigma^2_{\mu_2(2)} = 0.061, \text{SE} = 0.017; \sigma^2_{\mu_2(3)} = 0.025, \text{SE} = 0.008). \) Additionally, the effects of victim age on victim-offender relationships varied significantly across cities \( (\sigma^2_{\mu_3(1)} = 0.014, \text{SE} = 0.004; \sigma^2_{\mu_3(2)} = 0.073, \text{SE} = 0.014; \sigma^2_{\mu_3(3)} = 0.014, \text{SE} = 0.004). \) The effects of victim race (white or
nonwhite) on victim-offender relationships varied significantly across cities for all victim-offender relationships groups ($\sigma^2_{\mu 4(1)} = 0.033, SE=.010$; $\sigma^2_{\mu 4(2)} = 0.027, SE=.010$; $\sigma^2_{\mu 4(3)} = 0.027, SE=.008$). Lastly, the effects of victim sex on victim-offender relationships significantly varied across cities for all groups within the dependent variable ($\sigma^2_{\mu 5(1)} = 0.195, SE=.004$; $\sigma^2_{\mu 5(2)} = 0.038, SE=.012$; $\sigma^2_{\mu 5(3)} = 0.055, SE=.014$).

Table 28

Aggravated Assault Significant Random Effects (Victim-Offender Relationship)

<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
<th>SE</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Romantic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>.453</td>
<td>.109</td>
<td>4.153**</td>
</tr>
<tr>
<td>Place</td>
<td>.064</td>
<td>.016</td>
<td>4.050**</td>
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<tr>
<td>Victim Age</td>
<td>.014</td>
<td>.004</td>
<td>3.887**</td>
</tr>
<tr>
<td>Victim Race</td>
<td>.033</td>
<td>.012</td>
<td>2.800**</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>.195</td>
<td>.037</td>
<td>5.207**</td>
</tr>
<tr>
<td>Family</td>
<td></td>
<td></td>
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<tr>
<td>Intercept</td>
<td>.292</td>
<td>.082</td>
<td>3.571**</td>
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<tr>
<td>Place</td>
<td>.061</td>
<td>.017</td>
<td>3.481**</td>
</tr>
<tr>
<td>Victim Age</td>
<td>.073</td>
<td>.014</td>
<td>5.340**</td>
</tr>
<tr>
<td>Victim Race</td>
<td>.027</td>
<td>.010</td>
<td>2.714**</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>.038</td>
<td>.012</td>
<td>3.056**</td>
</tr>
<tr>
<td>Acquaintance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>.407</td>
<td>.085</td>
<td>4.808**</td>
</tr>
<tr>
<td>Place</td>
<td>.025</td>
<td>.008</td>
<td>3.284**</td>
</tr>
<tr>
<td>Victim Age</td>
<td>.014</td>
<td>.004</td>
<td>4.134**</td>
</tr>
<tr>
<td>Victim Race</td>
<td>.027</td>
<td>.008</td>
<td>3.434**</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>.055</td>
<td>.014</td>
<td>4.039**</td>
</tr>
</tbody>
</table>

**p<.01; *p<.05
Note. AIC=1580712.015; BIC=1580858.191

Effects of Victim-Offender Relationships within Sexual Assault

Sample Size

Of the 827,940 incidents of crime, sexual assault comprised 6.2% of these crimes (n=51,217) within 90 cities (n=90). However, due to a lack of variance within simple assault for two cities, the level one model and all subsequent models had a decreased
level two sample size of 88, which decreased the level one sample size to 50,665. Therefore, on average each city agency reported 575.7 incidents of sexual assault from 2005-2009.

Preliminary Model

In order to assess the effects of level one predictors on victim-offender relationships within sexual assault, a multinomial logistic model was constructed as the preliminary model. As can be observed in Table 29, the model explains approximately 33.5% of the variance (Nagelkerke $R^2 = .335$). Furthermore, it can be concluded that all level one predictors were significant, with the exception of incident hour within romantic relationships ($b = .039$, Wald $\chi^2(1) = 3.639$, $p>.05$), day of week within familial relationships ($b = -.034$, Wald $\chi^2(1) = .3222$, $p>.05$), and within acquaintance relationships, day of week ($b = -.012$, Wald $\chi^2(1) = .608$, $p>.05$) and offender age ($b = .001$, Wald $\chi^2(1) = .1001$, $p>.05$). All other variables were significant across all groups. For instance, for place one could conclude that the odds of a victim being romantically involved with his or her offender rather than not knowing his or her offender was 8.2 times more likely when the crime took place in public rather than in the residence. The same holds true for both family and acquaintance; specifically, the odds of a victim and offender being family members rather than strangers was 17.2 times more likely for crimes that occurring in public rather than within the home controlling for all other effects. Also, the odds of the victim and offender being acquaintances rather than strangers was 3.228 times more likely for crimes that took place in public rather than residences controlling for all other effects. Thus, if one were attacked in public, there were greater odds that the offender was a stranger to the victim rather than known in any
capacity. To provide further illustration, temperature had a consistent negative effect on all victim-offender relationships. Thus, the odds of a victim and offender being romantic partners, acquaintances, or family members rather than strangers were approximately .9 times less with every one standard deviation increase in temperature controlling for all other effects. Essentially, the analyst can conclude that increases in temperature increase the likelihood that the offender was a stranger to the victim within sexual assaults.

Table 29

*Sexual Assault Multinomial Logistic Regression (Victim-Offender Relationship)*

<table>
<thead>
<tr>
<th>Victim-Offender Relationship</th>
<th>B</th>
<th>SE(B)</th>
<th>Exp(B)</th>
<th>Wald</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Romantic</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-7.376</td>
<td>.326</td>
<td>512.423**</td>
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<tr>
<td>Place</td>
<td>2.103</td>
<td>.052</td>
<td>8.194</td>
<td>1626.461**</td>
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<td>Temperature</td>
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<td>.021</td>
<td>.873</td>
<td>43.859**</td>
</tr>
<tr>
<td>Day of Week</td>
<td>-.043</td>
<td>.021</td>
<td>.958</td>
<td>4.325*</td>
</tr>
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<td>Incident Hour</td>
<td>.039</td>
<td>.021</td>
<td>1.040</td>
<td>3.639</td>
</tr>
<tr>
<td>Victim Age</td>
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<td>.023</td>
<td>1.261</td>
<td>106.256**</td>
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<tr>
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<td>.058</td>
<td>.571</td>
<td>93.993**</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>1.362</td>
<td>.113</td>
<td>3.905</td>
<td>145.042**</td>
</tr>
<tr>
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<td>.023</td>
<td>.735</td>
<td>184.511**</td>
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<tr>
<td>Offender Race</td>
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<td>.052</td>
<td>2.133</td>
<td>212.503**</td>
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<tr>
<td>Offender Sex</td>
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<td>.172</td>
<td>1.979</td>
<td>15.704**</td>
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<tr>
<td><strong>Family</strong></td>
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<td>1031.252**</td>
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<td>2688.448**</td>
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<td>.018</td>
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<td>59.904**</td>
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<td>.967</td>
<td>3.222</td>
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<td>Incident Hour</td>
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<td>.019</td>
<td>.964</td>
<td>3.829*</td>
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<td>.122</td>
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<td>.583</td>
<td>100.600**</td>
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<td>.060</td>
<td>.734</td>
<td>26.169**</td>
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<td>463.368**</td>
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<td>.049</td>
<td>2.376</td>
<td>306.281**</td>
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<td>.140</td>
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<tr>
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<td>.198</td>
<td>23.238**</td>
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</table>
Table 29 (continued).

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE(B)</th>
<th>Exp(B)</th>
<th>Wald</th>
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<td>.882</td>
<td>69.289**</td>
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<tr>
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<td>.015</td>
<td>.988</td>
<td>.608</td>
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<td>.015</td>
<td>1.037</td>
<td>5.640*</td>
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<td>.648</td>
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<td>.769</td>
<td>41.349**</td>
</tr>
<tr>
<td>Victim Sex</td>
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<td>.054</td>
<td>.728</td>
<td>34.114**</td>
</tr>
<tr>
<td>Offender Age</td>
<td>.001</td>
<td>.015</td>
<td>1.001</td>
<td>.006</td>
</tr>
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<td>2.659</td>
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</table>

**p<.01; *p<.05
Multinomial Nagelkerke R²= .335
Note. Reference Category= Stranger.

**Level One Model**

In order to assess the same level one fixed effects as the preliminary model with the addition of the random intercept, the analyst constructed a base multilevel multinomial logistic regression model. The data in Table 30 indicated that day of week and incident hour were nonsignificant across all groups of the dependent variable. Similar to the preliminary model, offender age remained nonsignificant within the acquaintance category (OR=1.004, p>.05). All other level one independent predictors remained significant.

Most important within the level one model was to assess whether the intercept of each group of the dependent variable varies significantly across cities. The data in Table 31 indicated that all intercepts were significant, demonstrating significant variability in the intercepts of all categories in the dependent variable across cities ($\sigma^2_{\mu_{0j(1)}} = 0.409$, SE=0.073; $\sigma_{\mu_{0j(2)}} = 0.480$, SE=0.082; $\sigma^2_{\mu_{0j(3)}} = 0.341$, SE=0.059).
### Table 30

*Sexual Assault Level One Model Fixed Effects (Victim-Offender Relationship)*

<table>
<thead>
<tr>
<th>Victim-Offender Relationship</th>
<th>Coefficient</th>
<th>SE(B)</th>
<th>Exp(Coefficient)</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Romantic</td>
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<td></td>
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</tr>
<tr>
<td>Intercept</td>
<td>-6.945</td>
<td>.3623</td>
<td>.001</td>
<td>-19.171**</td>
</tr>
<tr>
<td>Place</td>
<td>2.106</td>
<td>.0611</td>
<td>8.213</td>
<td>34.475**</td>
</tr>
<tr>
<td>Temperature</td>
<td>-.123</td>
<td>.0217</td>
<td>.884</td>
<td>-5.669**</td>
</tr>
<tr>
<td>Day of Week</td>
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<td>.0220</td>
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<td>Incident Hour</td>
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<td>1.040</td>
<td>1.087</td>
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<tr>
<td>Victim Age</td>
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<td>1.302</td>
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<td>.0660</td>
<td>.535</td>
<td>-9.472**</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>1.359</td>
<td>.1504</td>
<td>3.892</td>
<td>9.039**</td>
</tr>
<tr>
<td>Offender Age</td>
<td>-.313</td>
<td>.0349</td>
<td>.731</td>
<td>-8.981**</td>
</tr>
<tr>
<td>Offender Race</td>
<td>.658</td>
<td>.0602</td>
<td>1.931</td>
<td>10.929**</td>
</tr>
<tr>
<td>Offender Sex</td>
<td>.664</td>
<td>.1645</td>
<td>1.942</td>
<td>4.034**</td>
</tr>
<tr>
<td>Family</td>
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<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-6.947</td>
<td>.3130</td>
<td>.001</td>
<td>-22.193**</td>
</tr>
<tr>
<td>Place</td>
<td>2.822</td>
<td>.0901</td>
<td>16.806</td>
<td>31.325**</td>
</tr>
<tr>
<td>Temperature</td>
<td>-.148</td>
<td>.0178</td>
<td>.863</td>
<td>-8.297**</td>
</tr>
<tr>
<td>Day of Week</td>
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<td>.976</td>
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<tr>
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<td>.0454</td>
<td>.928</td>
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</tr>
<tr>
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<td>-2.046</td>
<td>.0558</td>
<td>.129</td>
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</tr>
<tr>
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<td>.0799</td>
<td>.529</td>
<td>-7.958**</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>-.312</td>
<td>.0855</td>
<td>.732</td>
<td>-3.644**</td>
</tr>
<tr>
<td>Offender Age</td>
<td>.387</td>
<td>.0260</td>
<td>1.472</td>
<td>14.860**</td>
</tr>
<tr>
<td>Offender Race</td>
<td>.760</td>
<td>.0644</td>
<td>2.139</td>
<td>11.808**</td>
</tr>
<tr>
<td>Offender Sex</td>
<td>1.104</td>
<td>.1250</td>
<td>3.015</td>
<td>8.830**</td>
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<td>Acquaintance</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
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<td>.2192</td>
<td>.468</td>
<td>-3.464**</td>
</tr>
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<td>1.180</td>
<td>.0401</td>
<td>3.255</td>
<td>29.401**</td>
</tr>
<tr>
<td>Temperature</td>
<td>-.099</td>
<td>.0152</td>
<td>.906</td>
<td>-6.513**</td>
</tr>
<tr>
<td>Day of Week</td>
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<td>.0161</td>
<td>.994</td>
<td>-.395</td>
</tr>
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<td>Incident Hour</td>
<td>.019</td>
<td>.0279</td>
<td>1.020</td>
<td>.695</td>
</tr>
<tr>
<td>Victim Age</td>
<td>-.420</td>
<td>.0239</td>
<td>.657</td>
<td>-17.574**</td>
</tr>
<tr>
<td>Victim Race</td>
<td>-.271</td>
<td>.0491</td>
<td>.763</td>
<td>-5.519**</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>-.306</td>
<td>.0770</td>
<td>.736</td>
<td>-3.971**</td>
</tr>
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<td>.004</td>
<td>.0241</td>
<td>1.004</td>
<td>.183</td>
</tr>
<tr>
<td>Offender Race</td>
<td>.272</td>
<td>.0476</td>
<td>1.313</td>
<td>5.714**</td>
</tr>
<tr>
<td>Offender Sex</td>
<td>.976</td>
<td>.1247</td>
<td>2.654</td>
<td>7.830**</td>
</tr>
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</table>

**p<.01; *p<.05

Note. Reference Category = Stranger.

Note. AIC= 6933398.165; BIC= 6933424.694.
Table 31

Sexual Assault Level One Model Random Intercept (Victim-Offender Relationship)

<table>
<thead>
<tr>
<th>Victim-Offender Relationship</th>
<th>Estimate</th>
<th>SE</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relationship</td>
<td>.409</td>
<td>.073</td>
<td>5.643**</td>
</tr>
<tr>
<td>Family</td>
<td>.480</td>
<td>.082</td>
<td>5.886**</td>
</tr>
<tr>
<td>Acquaintance</td>
<td>.341</td>
<td>.059</td>
<td>5.795**</td>
</tr>
</tbody>
</table>

**p<.01; *p<.05

Level Two Model

In order to examine the effects of the social (or second level) predictors, they were simply added to the previous multilevel multinomial base model. Table 32 provides these results. One can observe that of all social variables only RCI Social (OR=1.470, p<.01) and percent of the population that was nonwhite (OR=.817, p < .05) significantly predict classification of either romantic or stranger relationships. RCI social (OR=1.722, p<.01), population (-4.603, p< .01), and percentage of the population under 25 (1.162, p< .05) significantly affected classification of family versus stranger. Lastly, only RCI social (OR=1.482, p<.01) was a significant predictor of acquaintance or stranger. Thus, only RCI social significantly affected victim-offender relationships across all groups of the dependent variable, meaning the greater social resilience within an area, the less likely that a victim was sexually assaulted by a stranger.

Table 33 allows the analyst to determine whether the intercept for all victim-offender relationships has remained significantly different across cities. Here one can conclude that all intercepts remain significantly different across cities ($\sigma^2_{\mu_{0j}(1)} = 0.377$, SE=.072; $\sigma^2_{\mu_{0j}(2)} = 0.380$, SE=.071; $\sigma^2_{\mu_{0j}(3)} = .345$, SE=.063).
### Table 32

**Sexual Assault Level Two Model Fixed Effects (Victim-Offender Relationship)**

<table>
<thead>
<tr>
<th>Victim-Offender Relationship</th>
<th>Coefficient</th>
<th>SE(B)</th>
<th>Exp(Coefficient)</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Romantic</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-6.887</td>
<td>.3696</td>
<td>.001</td>
<td>-18.633**</td>
</tr>
<tr>
<td>Place</td>
<td>2.102</td>
<td>.0619</td>
<td>8.186</td>
<td>33.980**</td>
</tr>
<tr>
<td>Temperature</td>
<td>-.121</td>
<td>.0222</td>
<td>.886</td>
<td>-5.466**</td>
</tr>
<tr>
<td>Day of Week</td>
<td>-.040</td>
<td>.0222</td>
<td>.960</td>
<td>-1.818</td>
</tr>
<tr>
<td>Incident Hour</td>
<td>.039</td>
<td>.0368</td>
<td>1.040</td>
<td>1.070</td>
</tr>
<tr>
<td>Victim Age</td>
<td>.268</td>
<td>.0361</td>
<td>1.307</td>
<td>7.432**</td>
</tr>
<tr>
<td>Victim Race</td>
<td>-.641</td>
<td>.0664</td>
<td>.527</td>
<td>-9.655**</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>1.372</td>
<td>.1533</td>
<td>3.945</td>
<td>8.952**</td>
</tr>
<tr>
<td>Offender Age</td>
<td>-.314</td>
<td>.0352</td>
<td>.730</td>
<td>-8.914**</td>
</tr>
<tr>
<td>Offender Race</td>
<td>.634</td>
<td>.0596</td>
<td>1.884</td>
<td>10.630**</td>
</tr>
<tr>
<td>Offender Sex</td>
<td>.651</td>
<td>.1660</td>
<td>1.918</td>
<td>3.923**</td>
</tr>
<tr>
<td>RCI Economic</td>
<td>.114</td>
<td>.1277</td>
<td>1.120</td>
<td>.890</td>
</tr>
<tr>
<td>RCI Social</td>
<td>.385</td>
<td>.1340</td>
<td>1.470</td>
<td>2.875**</td>
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<tr>
<td>Social Disorder</td>
<td>.077</td>
<td>.0666</td>
<td>1.080</td>
<td>1.154</td>
</tr>
<tr>
<td>Resource Dependency</td>
<td>.009</td>
<td>.1344</td>
<td>1.009</td>
<td>.064</td>
</tr>
<tr>
<td>Population</td>
<td>-.120</td>
<td>.1154</td>
<td>.887</td>
<td>-1.039</td>
</tr>
<tr>
<td>Physical Disorder</td>
<td>-.035</td>
<td>.0829</td>
<td>.966</td>
<td>-.419</td>
</tr>
<tr>
<td>% under 25</td>
<td>.103</td>
<td>.0722</td>
<td>1.108</td>
<td>1.423</td>
</tr>
<tr>
<td>% Nonwhite</td>
<td>-.202</td>
<td>.0953</td>
<td>.817</td>
<td>-2.122*</td>
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<tr>
<td>% Female</td>
<td>.116</td>
<td>.1051</td>
<td>1.123</td>
<td>1.103</td>
</tr>
<tr>
<td>Exposure</td>
<td>.024</td>
<td>.1378</td>
<td>1.024</td>
<td>.171</td>
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<tr>
<td><strong>Family</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-6.888</td>
<td>.3407</td>
<td>.001</td>
<td>-20.218**</td>
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<td>2.815</td>
<td>.0901</td>
<td>16.686</td>
<td>31.229**</td>
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<td>.0179</td>
<td>.863</td>
<td>-8.180**</td>
</tr>
<tr>
<td>Day of Week</td>
<td>-.024</td>
<td>.0209</td>
<td>.977</td>
<td>-1.136</td>
</tr>
<tr>
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<td>.0459</td>
<td>.927</td>
<td>-1.645</td>
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<td>.0566</td>
<td>.130</td>
<td>-36.119**</td>
</tr>
<tr>
<td>Victim Race</td>
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<td>.0811</td>
<td>.517</td>
<td>-8.133**</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>-.306</td>
<td>.0858</td>
<td>.737</td>
<td>-3.560**</td>
</tr>
<tr>
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<td>.387</td>
<td>.0265</td>
<td>1.472</td>
<td>14.612**</td>
</tr>
<tr>
<td>Offender Race</td>
<td>.744</td>
<td>.0633</td>
<td>2.104</td>
<td>11.750**</td>
</tr>
<tr>
<td>Offender Sex</td>
<td>1.099</td>
<td>.1250</td>
<td>3.001</td>
<td>8.791**</td>
</tr>
<tr>
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<td>.1214</td>
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</tr>
<tr>
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<td>.1258</td>
<td>1.722</td>
<td>4.320**</td>
</tr>
<tr>
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<td>.0811</td>
<td>1.076</td>
<td>.901</td>
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<td>.998</td>
<td>-.012</td>
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<td>.695</td>
<td>-4.603**</td>
</tr>
<tr>
<td>Physical Disorder</td>
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<td>.0806</td>
<td>.980</td>
<td>-.254</td>
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</table>
Table 32 (continued).

<table>
<thead>
<tr>
<th>Victim-Offender Relationship</th>
<th>Coefficient</th>
<th>SE(B)</th>
<th>Exp(Coefficient)</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>% under 25</td>
<td>.150</td>
<td>.0709</td>
<td>1.162</td>
<td>2.120*</td>
</tr>
<tr>
<td>% Nonwhite</td>
<td>-.062</td>
<td>.0945</td>
<td>.939</td>
<td>-.661</td>
</tr>
<tr>
<td>% Female</td>
<td>.122</td>
<td>.1063</td>
<td>1.130</td>
<td>1.149</td>
</tr>
<tr>
<td>Exposure</td>
<td>.024</td>
<td>.1429</td>
<td>1.024</td>
<td>.165</td>
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</table>

Acquaintance

<table>
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<th>Estimate</th>
<th>SE</th>
<th>Z</th>
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</thead>
<tbody>
<tr>
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<td>2.599**</td>
</tr>
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<td>29.140**</td>
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<td>.0155</td>
<td>-6.342**</td>
</tr>
<tr>
<td>Day of Week</td>
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<td>.0163</td>
<td>-.419</td>
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<td>.0241</td>
<td>-17.335**</td>
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<td>.0244</td>
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<td>.261</td>
<td>.0469</td>
<td>5.566**</td>
</tr>
<tr>
<td>Offender Sex</td>
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<td>.1244</td>
<td>7.794**</td>
</tr>
<tr>
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<td>.1044</td>
<td>1.085</td>
</tr>
<tr>
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<td>.1310</td>
<td>3.019**</td>
</tr>
<tr>
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<td>.0571</td>
<td>.605</td>
</tr>
<tr>
<td>Resource Dependency</td>
<td>.035</td>
<td>.1197</td>
<td>.288</td>
</tr>
<tr>
<td>Population</td>
<td>-.179</td>
<td>.1025</td>
<td>-1.750</td>
</tr>
<tr>
<td>Physical Disorder</td>
<td>.026</td>
<td>.0669</td>
<td>.394</td>
</tr>
<tr>
<td>% under 25</td>
<td>.139</td>
<td>.0676</td>
<td>2.065</td>
</tr>
<tr>
<td>% Nonwhite</td>
<td>-.071</td>
<td>.0887</td>
<td>-.803</td>
</tr>
<tr>
<td>% Female</td>
<td>.120</td>
<td>.0821</td>
<td>1.463</td>
</tr>
<tr>
<td>Exposure</td>
<td>.134</td>
<td>.1128</td>
<td>1.191</td>
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</table>

**p<.01; *p<.05
Note. Reference Category= Stranger.
Note. AIC=7015406.058; BIC=7015432.553

Table 33

Sexual Assault Level Two Model Random Intercept (Victim-Offender Relationship)

<table>
<thead>
<tr>
<th>Victim-Offender Relationship</th>
<th>Estimate</th>
<th>SE</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relationship</td>
<td>.377</td>
<td>.072</td>
<td>5.244**</td>
</tr>
<tr>
<td>Family</td>
<td>.380</td>
<td>.071</td>
<td>5.351**</td>
</tr>
<tr>
<td>Acquaintance</td>
<td>.345</td>
<td>.063</td>
<td>5.455**</td>
</tr>
</tbody>
</table>

**p<.01; *p<.05
**Random Slopes**

As can be observed in Table 34, all variables were significant for at least one category of the dependent variable, with the exception of victim race, which was nonsignificant across all groups. The effects of incident hour on family relationships versus strangers varied significantly across cities ($\sigma^2_{\mu_1(2)} = 0.007, \text{SE}=0.005$). The effects of place on familial victim-offender relationship versus stranger classification varied significantly across cities ($\sigma^2_{\mu_2(2)} = 0.063, \text{SE}=0.028$). The effects of victim age on victim-offender relationships varied significantly across cities within all groups of the dependent variable ($\sigma^2_{\mu_3(1)} = 0.030, \text{SE}=0.010; \sigma^2_{\mu_3(2)} = 0.097, \text{SE}=0.027; \sigma^2_{\mu_3(3)} = 0.007, \text{SE}=0.004$). The effects of victim sex on victim-offender relationships significantly varied across cities when comparing romantic relationships to stranger relationships ($\sigma^2_{\mu_5(1)} = 0.084, \text{SE}=0.033$).

**Table 34**

*Sexual Assault Significant Random Effects (Victim-Offender Relationship)*

<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
<th>SE</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Romantic</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>.101</td>
<td>.123</td>
<td>.818</td>
</tr>
<tr>
<td>Place</td>
<td>.009</td>
<td>.016</td>
<td>.592</td>
</tr>
<tr>
<td>Incident Hour</td>
<td>.007</td>
<td>.005</td>
<td>1.576</td>
</tr>
<tr>
<td>Victim Age</td>
<td>.030</td>
<td>.010</td>
<td>3.117**</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>.084</td>
<td>.033</td>
<td>2.580*</td>
</tr>
<tr>
<td><strong>Family</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>.345</td>
<td>.117</td>
<td>2.957**</td>
</tr>
<tr>
<td>Place</td>
<td>.063</td>
<td>.028</td>
<td>2.258*</td>
</tr>
<tr>
<td>Incident Hour</td>
<td>.014</td>
<td>.005</td>
<td>2.932**</td>
</tr>
<tr>
<td>Victim Age</td>
<td>.097</td>
<td>.027</td>
<td>3.608**</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>.027</td>
<td>.014</td>
<td>1.905</td>
</tr>
</tbody>
</table>
Table 34 (continued).

<table>
<thead>
<tr>
<th>Acquaintance</th>
<th>Estimate</th>
<th>SE</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>.339</td>
<td>.075</td>
<td>4.536**</td>
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<tr>
<td>Place</td>
<td>.013</td>
<td>.009</td>
<td>1.528</td>
</tr>
<tr>
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<td>.002</td>
<td>.002</td>
<td>1.104</td>
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<tr>
<td>Victim Age</td>
<td>.007</td>
<td>.004</td>
<td>1.994*</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>.014</td>
<td>.010</td>
<td>1.411</td>
</tr>
</tbody>
</table>

**p<.01; *p<.05

Note. AIC= 3054192.343; BIC=3054324.809

Effects of Place of Crime within Simple Assault

**Preliminary Model**

To assess the first level effects of place of crime, a multinomial logistic regression model was constructed. As can be observed from Table 35, the model explains 16.4% of the variance within the dependent variable, place of crime (public, outdoors, or residence). Within the model, residence was used as the reference category, thus, both public and outdoors was compared to residence for purposes of assessing the significance of each first level predictor. One can conclude within this model that all variables were significant across both crimes that took place in public versus within the home and crimes that took place outdoors rather than in the home, with the exception of offender sex for the outdoors category of place ($b = -.013$, Wald $\chi^2(1) = .2.458$, p>.05). To further illustrate the meaning of these effects, one can deduce that the odds of a crime occurring in public rather than a residence were .882 times less with every one standard deviation increase in temperature, and the odds of a crime occurring outdoors rather than a residence were 1.0 times greater with every one standard deviation increase in temperature. Thus, when temperatures increase there was a greater likelihood that the crime was taking place outdoors or within the residence, not in a public indoor area. The
odds of a crime taking place in public rather than in the home were 1.6 times greater for victims who were nonwhite than victims who were white, and the odds of a crime taking place outdoors rather than in the residence was .6 times greater for victims who were nonwhite than victims who were white. Essentially, this demonstrates that if a simple assault was committed within the home, it was more likely that it was a white victim than a nonwhite victim.

Table 35

*Simple Assault Multinomial Logistic Regression (Place of Incident)*

<table>
<thead>
<tr>
<th>Place of Incident</th>
<th>B</th>
<th>SE(B)</th>
<th>Exp(B)</th>
<th>Wald</th>
</tr>
</thead>
<tbody>
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<td>Public</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-3.371</td>
<td>.030</td>
<td>12779.806**</td>
<td></td>
</tr>
<tr>
<td>V-O Relationship</td>
<td>1.970</td>
<td>.013</td>
<td>7.169</td>
<td>24218.981**</td>
</tr>
<tr>
<td>Temperature</td>
<td>-.126</td>
<td>.004</td>
<td>.882</td>
<td>1009.271**</td>
</tr>
<tr>
<td>Day of Week</td>
<td>.063</td>
<td>.004</td>
<td>1.065</td>
<td>251.066**</td>
</tr>
<tr>
<td>Incident Hour</td>
<td>-.140</td>
<td>.004</td>
<td>.869</td>
<td>1187.826**</td>
</tr>
<tr>
<td>Victim Age</td>
<td>-.156</td>
<td>.005</td>
<td>.855</td>
<td>1145.521**</td>
</tr>
<tr>
<td>Victim Race</td>
<td>.464</td>
<td>.011</td>
<td>1.591</td>
<td>1694.930**</td>
</tr>
<tr>
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<td>-.697</td>
<td>.008</td>
<td>.498</td>
<td>7031.133**</td>
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<td>-.352</td>
<td>.005</td>
<td>.704</td>
<td>5190.478**</td>
</tr>
<tr>
<td>Offender Race</td>
<td>-.233</td>
<td>.011</td>
<td>.792</td>
<td>483.553**</td>
</tr>
<tr>
<td>Offender Sex</td>
<td>.209</td>
<td>.009</td>
<td>1.232</td>
<td>558.948**</td>
</tr>
<tr>
<td>Outdoors</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
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<td>.027</td>
<td>47404.643**</td>
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<td>V-O Relationship</td>
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<td>.012</td>
<td>7.261</td>
<td>27264.743**</td>
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<td>Temperature</td>
<td>.104</td>
<td>.004</td>
<td>1.109</td>
<td>799.757**</td>
</tr>
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<td>Day of Week</td>
<td>.038</td>
<td>.004</td>
<td>1.039</td>
<td>114.458**</td>
</tr>
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<td>Incident Hour</td>
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<td>.004</td>
<td>1.074</td>
<td>371.595**</td>
</tr>
<tr>
<td>Victim Age</td>
<td>-.247</td>
<td>.004</td>
<td>.781</td>
<td>3387.087**</td>
</tr>
<tr>
<td>Victim Race</td>
<td>.073</td>
<td>.010</td>
<td>1.075</td>
<td>53.503**</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>-.504</td>
<td>.008</td>
<td>.604</td>
<td>4409.379**</td>
</tr>
<tr>
<td>Offender Age</td>
<td>-.165</td>
<td>.004</td>
<td>.848</td>
<td>1563.900**</td>
</tr>
<tr>
<td>Offender Race</td>
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<td>.010</td>
<td>.716</td>
<td>1184.095**</td>
</tr>
<tr>
<td>Offender Sex</td>
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<td>.008</td>
<td>.987</td>
<td>2.458</td>
</tr>
</tbody>
</table>

**p<.01; *p<.05**

Multinomial Nagelkerke $R^2 = .164$

*Note. Reference Category= Residence.*
**Level One Model**

As can be observed in Table 36, all variables remained significant, with the exception of offender sex within the outdoors category, which was nonsignificant in the preliminary model (OR=.991, p > .05). Additionally, (see Table 37) the intercept significantly varies across cities for both categories of the dependent variable ($\sigma^2_{\mu_0j} = 0.092$, SE=.014; $\sigma_{\mu0j(2)} = 0.137$, SE=.021).

Table 36

*Simple Assault Level One Model Fixed Effects (Place of Incident)*

<table>
<thead>
<tr>
<th>Place of Incident</th>
<th>Coefficient</th>
<th>SE(B)</th>
<th>Exp(Coefficient)</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-3.138</td>
<td>.1052</td>
<td>.043</td>
<td>-29.821**</td>
</tr>
<tr>
<td>V-O Relationship</td>
<td>1.954</td>
<td>.0442</td>
<td>7.056</td>
<td>44.225**</td>
</tr>
<tr>
<td>Temperature</td>
<td>-.145</td>
<td>.0063</td>
<td>.865</td>
<td>-22.903**</td>
</tr>
<tr>
<td>Day of Week</td>
<td>.063</td>
<td>.0042</td>
<td>1.065</td>
<td>15.012**</td>
</tr>
<tr>
<td>Incident Hour</td>
<td>-.158</td>
<td>.0113</td>
<td>.854</td>
<td>-13.995**</td>
</tr>
<tr>
<td>Victim Age</td>
<td>-.154</td>
<td>.0118</td>
<td>.858</td>
<td>-13.081**</td>
</tr>
<tr>
<td>Victim Race</td>
<td>.401</td>
<td>.0283</td>
<td>1.493</td>
<td>14.167**</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>-.684</td>
<td>.0302</td>
<td>.504</td>
<td>-22.682**</td>
</tr>
<tr>
<td>Offender Age</td>
<td>-.347</td>
<td>.0285</td>
<td>.707</td>
<td>-12.190**</td>
</tr>
<tr>
<td>Offender Race</td>
<td>-.290</td>
<td>.0267</td>
<td>.748</td>
<td>-10.858**</td>
</tr>
<tr>
<td>Offender Sex</td>
<td>.215</td>
<td>.0349</td>
<td>1.240</td>
<td>6.163**</td>
</tr>
<tr>
<td>Outdoors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-2.486</td>
<td>.0793</td>
<td>.083</td>
<td>-31.362**</td>
</tr>
<tr>
<td>V-O Relationship</td>
<td>2.001</td>
<td>.0413</td>
<td>7.398</td>
<td>48.477**</td>
</tr>
<tr>
<td>Temperature</td>
<td>.139</td>
<td>.0096</td>
<td>1.149</td>
<td>14.550**</td>
</tr>
<tr>
<td>Day of Week</td>
<td>.039</td>
<td>.0039</td>
<td>1.040</td>
<td>10.155**</td>
</tr>
<tr>
<td>Incident Hour</td>
<td>.058</td>
<td>.0079</td>
<td>1.060</td>
<td>7.324**</td>
</tr>
<tr>
<td>Victim Age</td>
<td>-.256</td>
<td>.0136</td>
<td>.774</td>
<td>-18.831**</td>
</tr>
<tr>
<td>Victim Race</td>
<td>.082</td>
<td>.0156</td>
<td>1.085</td>
<td>5.242**</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>-.510</td>
<td>.0183</td>
<td>.600</td>
<td>-27.882**</td>
</tr>
<tr>
<td>Offender Age</td>
<td>-.174</td>
<td>.0139</td>
<td>.840</td>
<td>-12.468**</td>
</tr>
<tr>
<td>Offender Race</td>
<td>-.293</td>
<td>.0201</td>
<td>.746</td>
<td>-14.575**</td>
</tr>
<tr>
<td>Offender Sex</td>
<td>-.009</td>
<td>.0367</td>
<td>.991</td>
<td>-.233</td>
</tr>
</tbody>
</table>

**Note.** Reference Category = Residence.

Note. AIC=5085707.894; BIC=5085730.533

*p<.01; *p<.05
Table 37

*Simple Assault Level One Model Random Intercept (Place of Incident)*

<table>
<thead>
<tr>
<th>Place of Incident</th>
<th>Estimate</th>
<th>SE</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public</td>
<td>.092</td>
<td>.014</td>
<td>6.479**</td>
</tr>
<tr>
<td>Outdoors</td>
<td>.137</td>
<td>.021</td>
<td>6.523**</td>
</tr>
</tbody>
</table>

**p<.01; *p<.05

*Level Two Model*

There was no change in the significance of the first level predictors from the level one model (see Table 38). For the public category of place of crime, no social variables significantly affect the classification of place of crime; however, within the outdoors group of incidents, RCI social has a negative significant effect on classification between outdoors and residence (OR=.793, p<.01), meaning that the odds of a simple assault occurring outdoors rather than within the home was .8 times less for every one standard deviation increase in RCI social. Thus, the greater the social resilience, the less likely the simple assault was occurring outdoors. Furthermore, resource dependency has a significant positive effect on classification between outdoors and residence (OR=1.157, p<.01), demonstrating that the odds of a simple assault occurring outdoors rather than within the home was 1.2 times greater with every one standard deviation increase in resource dependency. Essentially, this demonstrates that the more police per 1000 people, the greater the likelihood that the assault was being committed outdoors rather than within the home. Lastly, the percentage of the population under 25 years of age has a negative significant effect on classification between outdoors and residence, meaning that the odds of a simple assault being committed outdoors was .9 times less for every one standard deviation increase in percentage of percentage under 25 years of age. This
demonstrates that the younger the population, the greater the likelihood that the simple assault was occurring within the residence rather than in an outdoor area.

The significance of the random intercept of both categories of the dependent variable must again be assessed after the addition of all social variables. One can conclude from Table 39 that the intercept for both public and outdoors remains significant ($\sigma^2_{\mu_{0j(1)}} = 0.087, SE=0.14$, $\sigma^2_{\mu_{0j(2)}} = 0.091, SE=0.15$).

Table 38

Simple Assault Level Two Model Fixed Effects (Place of Incident)

<table>
<thead>
<tr>
<th>Place of Incident</th>
<th>Coefficient</th>
<th>SE(B)</th>
<th>Exp(Coefficient)</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-3.176</td>
<td>.1033</td>
<td>.042</td>
<td>-30.742**</td>
</tr>
<tr>
<td>V-O Relationship</td>
<td>1.949</td>
<td>.0443</td>
<td>7.023</td>
<td>43.952**</td>
</tr>
<tr>
<td>Temperature</td>
<td>-.145</td>
<td>.0063</td>
<td>.865</td>
<td>-22.885**</td>
</tr>
<tr>
<td>Day of Week</td>
<td>.063</td>
<td>.0043</td>
<td>1.065</td>
<td>14.887**</td>
</tr>
<tr>
<td>Incident Hour</td>
<td>-.159</td>
<td>.0113</td>
<td>.853</td>
<td>-14.022**</td>
</tr>
<tr>
<td>Victim Age</td>
<td>-.152</td>
<td>.0118</td>
<td>.859</td>
<td>-12.919**</td>
</tr>
<tr>
<td>Victim Race</td>
<td>.400</td>
<td>.0285</td>
<td>1.491</td>
<td>14.017**</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>-.684</td>
<td>.0305</td>
<td>.505</td>
<td>-22.441**</td>
</tr>
<tr>
<td>Offender Age</td>
<td>-.349</td>
<td>.0288</td>
<td>.706</td>
<td>-12.119**</td>
</tr>
<tr>
<td>Offender Race</td>
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<td>.0271</td>
<td>.747</td>
<td>-10.758**</td>
</tr>
<tr>
<td>Offender Sex</td>
<td>.216</td>
<td>.0352</td>
<td>1.241</td>
<td>6.122**</td>
</tr>
<tr>
<td>RCI Economic</td>
<td>.043</td>
<td>.0487</td>
<td>1.044</td>
<td>.893</td>
</tr>
<tr>
<td>RCI Social</td>
<td>-.018</td>
<td>.0514</td>
<td>.982</td>
<td>-.349</td>
</tr>
<tr>
<td>Social Disorder</td>
<td>-.029</td>
<td>.0255</td>
<td>.972</td>
<td>-1.128</td>
</tr>
<tr>
<td>Resource Dependency</td>
<td>-.017</td>
<td>.0479</td>
<td>.983</td>
<td>-.348</td>
</tr>
<tr>
<td>Population</td>
<td>-.037</td>
<td>.0406</td>
<td>.964</td>
<td>-.900</td>
</tr>
<tr>
<td>Physical Disorder</td>
<td>3.981</td>
<td>.0347</td>
<td>1.000</td>
<td>.001</td>
</tr>
<tr>
<td>% under 25</td>
<td>-.041</td>
<td>.0326</td>
<td>.960</td>
<td>-1.266</td>
</tr>
<tr>
<td>% Nonwhite</td>
<td>-.068</td>
<td>.0579</td>
<td>.935</td>
<td>-1.169</td>
</tr>
<tr>
<td>% Female</td>
<td>-.040</td>
<td>.0478</td>
<td>.960</td>
<td>-.847</td>
</tr>
<tr>
<td>Exposure</td>
<td>-.040</td>
<td>.0451</td>
<td>.961</td>
<td>-.880</td>
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<tr>
<td>Outdoors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-2.568</td>
<td>.0840</td>
<td>.077</td>
<td>-30.592**</td>
</tr>
<tr>
<td>V-O Relationship</td>
<td>1.997</td>
<td>.0415</td>
<td>7.368</td>
<td>48.123**</td>
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</tbody>
</table>
Table 38 (continued).

<table>
<thead>
<tr>
<th>Place of Incident</th>
<th>Coefficient</th>
<th>SE (B)</th>
<th>Exp (Coefficient)</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outdoors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td>.139</td>
<td>.0096</td>
<td>1.149</td>
<td>14.546**</td>
</tr>
<tr>
<td>Day of Week</td>
<td>.039</td>
<td>.0039</td>
<td>1.040</td>
<td>10.100**</td>
</tr>
<tr>
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<td>.0080</td>
<td>1.060</td>
<td>7.243**</td>
</tr>
<tr>
<td>Victim Age</td>
<td>-.256</td>
<td>.0137</td>
<td>.774</td>
<td>-18.660**</td>
</tr>
<tr>
<td>Victim Race</td>
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<td>.0157</td>
<td>1.085</td>
<td>5.189**</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>-.508</td>
<td>.0184</td>
<td>.602</td>
<td>-27.649**</td>
</tr>
<tr>
<td>Offender Age</td>
<td>-.173</td>
<td>.0140</td>
<td>.841</td>
<td>-12.354**</td>
</tr>
<tr>
<td>Offender Race</td>
<td>-.293</td>
<td>.0203</td>
<td>.746</td>
<td>-14.413**</td>
</tr>
<tr>
<td>Offender Sex</td>
<td>-.009</td>
<td>.0370</td>
<td>.991</td>
<td>-.234</td>
</tr>
<tr>
<td>RCI Economic</td>
<td>.009</td>
<td>.0418</td>
<td>1.009</td>
<td>.223</td>
</tr>
<tr>
<td>RCI Social</td>
<td>-.232</td>
<td>.0492</td>
<td>.793</td>
<td>-4.719**</td>
</tr>
<tr>
<td>Social Disorder</td>
<td>-.045</td>
<td>.0237</td>
<td>.956</td>
<td>-1.881</td>
</tr>
<tr>
<td>Resource Dependency</td>
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<td>.0511</td>
<td>1.157</td>
<td>2.855**</td>
</tr>
<tr>
<td>Population</td>
<td>.051</td>
<td>.0409</td>
<td>1.053</td>
<td>1.257</td>
</tr>
<tr>
<td>Physical Disorder</td>
<td>.017</td>
<td>.0307</td>
<td>1.018</td>
<td>.568</td>
</tr>
<tr>
<td>% under 25</td>
<td>-.107</td>
<td>.0270</td>
<td>.899</td>
<td>-3.951**</td>
</tr>
<tr>
<td>% Nonwhite</td>
<td>-.099</td>
<td>.0514</td>
<td>.906</td>
<td>-1.917</td>
</tr>
<tr>
<td>% Female</td>
<td>-.023</td>
<td>.0288</td>
<td>.977</td>
<td>-.794</td>
</tr>
<tr>
<td>Exposure</td>
<td>.066</td>
<td>.0427</td>
<td>1.068</td>
<td>1.540</td>
</tr>
</tbody>
</table>

**p<.01; *p<.05

Note. Reference Category= Residence.

Note. AIC=5028911.406; BIC=5028934.024

Table 39

**Simple Assault Level Two Model Random Intercept (Place of Incident)**

<table>
<thead>
<tr>
<th>Place of Incident</th>
<th>Estimate</th>
<th>SE</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public</td>
<td>.087</td>
<td>.014</td>
<td>5.983**</td>
</tr>
<tr>
<td>Outdoors</td>
<td>.091</td>
<td>.015</td>
<td>6.055**</td>
</tr>
</tbody>
</table>

**p<.01; *p<.05

Random Slopes

As previously stated, for all place of crime models, random slopes were investigated for the following level one variables: incident hour, victim age, victim race, and victim sex. Additionally, only those that were significant at the initial iteration were
retained within the model. As can be observed in Table 40, all four variables’ effects on the dependent variable within both groups of the dependent variable significantly varied across cities. More specifically, the effects of incident hour on place of simple assault significantly varied across cities ($\sigma_{\mu 1(1)}^2 = 0.006, \ SE = 0.001; \sigma_{\mu 1(2)}^2 = 0.004, \ SE = 0.001$), as did the effects of victim age ($\sigma_{\mu 2(1)}^2 = 0.026, \ SE = 0.004; \sigma_{\mu 2(2)}^2 = 0.014, \ SE = 0.003$), victim race ($\sigma_{\mu 3(1)}^2 = 0.069, \ SE = 0.013; \sigma_{\mu 3(2)}^2 = 0.010, \ SE = 0.003$), and victim sex ($\sigma_{\mu 4(1)}^2 = 0.038, \ SE = 0.007; \sigma_{\mu 4(2)}^2 = 0.010, \ SE = 0.002$).

Table 40

**Simple Assault Significant Random Effects (Place of Incident)**

<table>
<thead>
<tr>
<th>Public</th>
<th>Estimate</th>
<th>SE</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.372</td>
<td>0.073</td>
<td>5.125**</td>
</tr>
<tr>
<td>Incident Hour</td>
<td>0.006</td>
<td>0.001</td>
<td>4.789**</td>
</tr>
<tr>
<td>Victim Age</td>
<td>0.026</td>
<td>0.004</td>
<td>5.836**</td>
</tr>
<tr>
<td>Victim Race</td>
<td>0.069</td>
<td>0.013</td>
<td>5.279**</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>0.038</td>
<td>0.007</td>
<td>5.463**</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Outdoors</th>
<th>Estimate</th>
<th>SE</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.129</td>
<td>0.025</td>
<td>5.099**</td>
</tr>
<tr>
<td>Incident Hour</td>
<td>0.004</td>
<td>0.001</td>
<td>4.329**</td>
</tr>
<tr>
<td>Victim Age</td>
<td>0.014</td>
<td>0.003</td>
<td>5.301**</td>
</tr>
<tr>
<td>Victim Race</td>
<td>0.010</td>
<td>0.003</td>
<td>3.766**</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>0.010</td>
<td>0.002</td>
<td>4.312**</td>
</tr>
</tbody>
</table>

*p<.01; *p<.05

Note. AIC=5046375.258; BIC=5046488.344

Effects of Place of Crime within Aggravated Assault

**Preliminary Model**

To assess the effects of first-level predictors on place of crime (here, aggravated assault), a multinomial logistic regression model was constructed, which can be observed in Table 41. Overall, the model explains 17.4% of the variance in the dependent variable (Nagelkerke $R^2 = .174$). Neither offender race nor offender sex provided significant
effects of classification for the place of aggravated assault ($b = -.043$, Wald $\chi^2(1) = 3.089$, $p > .05$; $b = -.012$, Wald $\chi^2(1) = .283$, $p > .05$). Additionally, victim race was not a significant predictor within the outdoor model ($b = -.005$, Wald $\chi^2(1) = .084$, $p > .05$).

All other variables within both categories (public and outdoors) were shown to be significant predictors of place of aggravated assault.

Table 41

Aggravated Assault Multinomial Logistic Regression (Place of Incident)

<table>
<thead>
<tr>
<th>Place of Incident</th>
<th>B</th>
<th>SE(B)</th>
<th>Exp(B)</th>
<th>Wald</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-3.540</td>
<td>.068</td>
<td>2746.696**</td>
<td></td>
</tr>
<tr>
<td>V-O Relationship</td>
<td>-.101</td>
<td>.010</td>
<td>.904</td>
<td>112.518**</td>
</tr>
<tr>
<td>Temperature</td>
<td>1.617</td>
<td>.023</td>
<td>5.037</td>
<td>4841.392**</td>
</tr>
<tr>
<td>Day of Week</td>
<td>.039</td>
<td>.009</td>
<td>1.040</td>
<td>18.177**</td>
</tr>
<tr>
<td>Incident Hour</td>
<td>-.140</td>
<td>.009</td>
<td>.869</td>
<td>231.386**</td>
</tr>
<tr>
<td>Victim Age</td>
<td>-.122</td>
<td>.011</td>
<td>.885</td>
<td>130.294**</td>
</tr>
<tr>
<td>Victim Race</td>
<td>.440</td>
<td>.026</td>
<td>1.553</td>
<td>286.569**</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>-.525</td>
<td>.020</td>
<td>.592</td>
<td>663.257**</td>
</tr>
<tr>
<td>Offender Age</td>
<td>-.237</td>
<td>.011</td>
<td>.789</td>
<td>440.907**</td>
</tr>
<tr>
<td>Offender Race</td>
<td>-.043</td>
<td>.024</td>
<td>.958</td>
<td>3.089</td>
</tr>
<tr>
<td>Offender Sex</td>
<td>.012</td>
<td>.023</td>
<td>1.012</td>
<td>.283</td>
</tr>
<tr>
<td>Outdoors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-1.517</td>
<td>.046</td>
<td>1072.536**</td>
<td></td>
</tr>
<tr>
<td>V-O Relationship</td>
<td>1.695</td>
<td>.018</td>
<td>5.444</td>
<td>8900.606**</td>
</tr>
<tr>
<td>Temperature</td>
<td>.102</td>
<td>.007</td>
<td>1.107</td>
<td>213.537**</td>
</tr>
<tr>
<td>Day of Week</td>
<td>.028</td>
<td>.007</td>
<td>1.028</td>
<td>17.602**</td>
</tr>
<tr>
<td>Incident Hour</td>
<td>.088</td>
<td>.007</td>
<td>1.092</td>
<td>171.943**</td>
</tr>
<tr>
<td>Victim Age</td>
<td>-.146</td>
<td>.008</td>
<td>.864</td>
<td>370.728**</td>
</tr>
<tr>
<td>Victim Race</td>
<td>-.005</td>
<td>.018</td>
<td>.995</td>
<td>.084</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>-.484</td>
<td>.014</td>
<td>.616</td>
<td>1198.727**</td>
</tr>
<tr>
<td>Offender Age</td>
<td>-.192</td>
<td>.008</td>
<td>.826</td>
<td>616.923**</td>
</tr>
<tr>
<td>Offender Race</td>
<td>-.154</td>
<td>.018</td>
<td>.857</td>
<td>74.903**</td>
</tr>
<tr>
<td>Offender Sex</td>
<td>-.211</td>
<td>.016</td>
<td>.810</td>
<td>168.811**</td>
</tr>
</tbody>
</table>

**$p < .01$; *$p < .05$**

Multinomial Nagelkerke $R^2 = .174$

Note: Reference Category = Residence.
### Table 42

#### Aggravated Assault Level One Model Fixed Effects (Place of Incident)

<table>
<thead>
<tr>
<th>Place of Incident</th>
<th>Coefficient</th>
<th>SE(B)</th>
<th>Exp(Coefficient)</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Public</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-3.424</td>
<td>.1300</td>
<td>.033</td>
<td>-26.327**</td>
</tr>
<tr>
<td>V-O Relationship</td>
<td>1.623</td>
<td>.0464</td>
<td>5.067</td>
<td>34.974**</td>
</tr>
<tr>
<td>Temperature</td>
<td>-.102</td>
<td>.0088</td>
<td>.903</td>
<td>-11.635**</td>
</tr>
<tr>
<td>Day of Week</td>
<td>.040</td>
<td>.0080</td>
<td>1.041</td>
<td>5.058**</td>
</tr>
<tr>
<td>Incident Hour</td>
<td>-.162</td>
<td>.0148</td>
<td>.850</td>
<td>-10.927**</td>
</tr>
<tr>
<td>Victim Age</td>
<td>-.137</td>
<td>.0159</td>
<td>.872</td>
<td>-8.613**</td>
</tr>
<tr>
<td>Victim Race</td>
<td>.402</td>
<td>.0435</td>
<td>1.494</td>
<td>9.229**</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>-.516</td>
<td>.0334</td>
<td>.597</td>
<td>-15.453**</td>
</tr>
<tr>
<td>Offender Age</td>
<td>-.227</td>
<td>.0302</td>
<td>.797</td>
<td>-7.502**</td>
</tr>
<tr>
<td>Offender Race</td>
<td>-.060</td>
<td>.0347</td>
<td>.942</td>
<td>-1.733</td>
</tr>
<tr>
<td>Offender Sex</td>
<td>.014</td>
<td>.0387</td>
<td>1.014</td>
<td>.353</td>
</tr>
<tr>
<td><strong>Outdoors</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-1.785</td>
<td>.0963</td>
<td>.168</td>
<td>-18.546**</td>
</tr>
<tr>
<td>V-O Relationship</td>
<td>1.752</td>
<td>.0430</td>
<td>5.764</td>
<td>40.690**</td>
</tr>
<tr>
<td>Temperature</td>
<td>.128</td>
<td>.0095</td>
<td>1.136</td>
<td>13.368**</td>
</tr>
<tr>
<td>Day of Week</td>
<td>.028</td>
<td>.0065</td>
<td>1.029</td>
<td>4.370**</td>
</tr>
<tr>
<td>Incident Hour</td>
<td>.072</td>
<td>.0091</td>
<td>1.074</td>
<td>7.863**</td>
</tr>
<tr>
<td>Victim Age</td>
<td>-.165</td>
<td>.0185</td>
<td>.848</td>
<td>-8.915**</td>
</tr>
<tr>
<td>Victim Race</td>
<td>.012</td>
<td>.0224</td>
<td>1.012</td>
<td>.534</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>-.468</td>
<td>.0285</td>
<td>.626</td>
<td>-16.410**</td>
</tr>
<tr>
<td>Offender Age</td>
<td>-.190</td>
<td>.0155</td>
<td>.827</td>
<td>-12.258**</td>
</tr>
<tr>
<td>Offender Race</td>
<td>-.111</td>
<td>.0202</td>
<td>.895</td>
<td>-5.512**</td>
</tr>
<tr>
<td>Offender Sex</td>
<td>-.207</td>
<td>.0264</td>
<td>.813</td>
<td>-7.867**</td>
</tr>
</tbody>
</table>

**p<.01; *p<.05

*Note. Reference Category = Residence.

Note. AIC=1035545.575; BIC=1035565.084.

### Table 43

#### Aggravated Assault Level One Model Random Intercept (Place of Incident)

<table>
<thead>
<tr>
<th>Place of Incident</th>
<th>Estimate</th>
<th>SE</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public</td>
<td>.102</td>
<td>.018</td>
<td>5.703**</td>
</tr>
<tr>
<td>Outdoors</td>
<td>.112</td>
<td>.018</td>
<td>6.140**</td>
</tr>
</tbody>
</table>

**p<.01; *p<.05**
**Level Two Model**

As can be observed in Table 44, there were no notable changes in the significance of the first level predictors from the previous model, thus the analyst can advance to second level predictors. Within the first category, public incidents of aggravated assault, none of the social variables significantly predict classification of the place of crime (being public or within the residence). Within the second category, outdoors, RCI social significantly predicts classification between incidents of aggravated assault occurring outdoors versus in the residence (OR=.872, p < .05), meaning that the odds of an aggravated assault occurring outdoors rather than in the residence was .9 times less for every one standard deviation increase in RCI social. Resource dependency also significantly predicted classification between incidents that occurred outdoors rather than in the residence (OR=2.213, p<.05), meaning that the odds of an aggravated assault occurring outdoors rather than in the home were 2.2 times less for every one standard deviation increase in resource dependency.

The results of the random intercept within the level two model (see Table 45) indicate that both intercepts remain significant, demonstrating they both vary significantly across cities ($\sigma^2_{\mu0j(1)} = 0.090$, SE=.017, $\sigma^2_{\mu0j(2)} = 0.090$, SE=.016).

**Table 44**  
*Aggravated Assault Level Two Model Fixed Effects (Place of Incident)*

<table>
<thead>
<tr>
<th>Place of Incident</th>
<th>Coefficient</th>
<th>SE(B)</th>
<th>Exp(Coefficient)</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public</td>
<td>-3.448</td>
<td>.1218</td>
<td>.032</td>
<td>-28.304**</td>
</tr>
<tr>
<td>V-O Relationship</td>
<td>1.619</td>
<td>.0469</td>
<td>5.049</td>
<td>34.533**</td>
</tr>
<tr>
<td>Temperature</td>
<td>-.102</td>
<td>.0089</td>
<td>.903</td>
<td>-11.491**</td>
</tr>
<tr>
<td>Day of Week</td>
<td>.041</td>
<td>.0080</td>
<td>1.042</td>
<td>5.113**</td>
</tr>
</tbody>
</table>
Table 44 (continued).

<table>
<thead>
<tr>
<th>Place of Incident</th>
<th>Coefficient</th>
<th>SE(B)</th>
<th>Exp(Coefficient)</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Incident Hour</td>
<td>-.165</td>
<td>.0147</td>
<td>.848</td>
<td>-11.177**</td>
</tr>
<tr>
<td>Victim Age</td>
<td>-.136</td>
<td>.0160</td>
<td>.872</td>
<td>-8.540**</td>
</tr>
<tr>
<td>Victim Race</td>
<td>.395</td>
<td>.0439</td>
<td>1.484</td>
<td>9.002**</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>-.516</td>
<td>.0337</td>
<td>.597</td>
<td>-15.315**</td>
</tr>
<tr>
<td>Offender Age</td>
<td>-.227</td>
<td>.0306</td>
<td>.797</td>
<td>-7.438**</td>
</tr>
<tr>
<td>Offender Race</td>
<td>-.061</td>
<td>.0353</td>
<td>.940</td>
<td>1.738</td>
</tr>
<tr>
<td>Offender Sex</td>
<td>.016</td>
<td>.0389</td>
<td>1.017</td>
<td>.423</td>
</tr>
<tr>
<td>RCI Economic</td>
<td>.013</td>
<td>.0554</td>
<td>1.013</td>
<td>.231</td>
</tr>
<tr>
<td>RCI Social</td>
<td>.025</td>
<td>.0640</td>
<td>1.026</td>
<td>.398</td>
</tr>
<tr>
<td>Social Disorder</td>
<td>-.064</td>
<td>.0331</td>
<td>.938</td>
<td>-1.938</td>
</tr>
<tr>
<td>Resource Dependency</td>
<td>-.012</td>
<td>.0536</td>
<td>.988</td>
<td>-2.31</td>
</tr>
<tr>
<td>Population</td>
<td>-.085</td>
<td>.0444</td>
<td>.918</td>
<td>-1.925</td>
</tr>
<tr>
<td>Physical Disorder</td>
<td>.056</td>
<td>.0321</td>
<td>1.058</td>
<td>1.759</td>
</tr>
<tr>
<td>% under 25</td>
<td>-.036</td>
<td>.0363</td>
<td>.964</td>
<td>-.997</td>
</tr>
<tr>
<td>% Nonwhite</td>
<td>-.067</td>
<td>.0613</td>
<td>.935</td>
<td>-1.092</td>
</tr>
<tr>
<td>% Female</td>
<td>.006</td>
<td>.0431</td>
<td>1.006</td>
<td>.141</td>
</tr>
<tr>
<td>Exposure</td>
<td>-.045</td>
<td>.0450</td>
<td>.956</td>
<td>-1.994</td>
</tr>
</tbody>
</table>

| Outdoors Incident Hour | -1.826 | .0951 | .161 | -19.198** |
| V-O Relationship      | 1.749  | .0435 | 5.751 | 40.210**  |
| Temperature           | .128   | .0096 | 1.136 | 13.339**  |
| Day of Week           | .028   | .0065 | 1.028 | 4.308**   |
| Incident Hour         | .071   | .0092 | 1.073 | 7.718**   |
| Victim Age            | -.163  | .0185 | .849  | -8.828**  |
| Victim Race           | .011   | .0225 | 1.011 | .470      |
| Victim Sex            | -.469  | .0287 | .625  | -16.343** |
| Offender Age          | -.192  | .0156 | .825  | -12.374** |
| Offender Race         | -.111  | .0203 | .895  | -5.467**  |
| Offender Sex          | -.206  | .0265 | .814  | -7.763**  |
| RCI Economic          | .002   | .0381 | 1.002 | .046      |
| RCI Social            | -.137  | .0605 | .872  | -2.270*   |
| Social Disorder       | -.024  | .0265 | .976  | -.923     |
| Resource Dependency   | .105   | .0476 | 1.111 | 2.213*    |
| Population            | .000   | .0453 | 1.000 | .005      |
| Physical Disorder     | .040   | .0296 | 1.041 | 1.369     |
| % under 25            | -.081  | .0323 | .923  | -2.497    |
| % Nonwhite            | -.001  | .0481 | .999  | -.011     |
| % Female              | -.012  | .0327 | .988  | -.381     |
| Exposure              | .077   | .0449 | 1.080 | 1.707     |

**p<.01; *p<.05

Note: Reference Category= Residence.

Note: AIC=1026723.792; BIC=1026743.283
Random Slopes

As previously stated, for all place of crime models, random slopes were investigated for the following level one variables: incident hour, victim age, victim race, and victim sex. Additionally, only those that were significant at the initial iteration were retained within the model. As can be observed in Table 46, all four variables’ effects on the dependent variable within both groups of the dependent variable significantly varied across cities. More specifically, the effects of incident hour on place of aggravated assault significantly varied across cities ($\sigma^2_{\mu 1(1)} = 0.005$, SE=.002; $\sigma^2_{\mu 1(2)} = 0.003$, SE=.001), the effects of victim age on place of aggravated assault significantly varied across cities ($\sigma^2_{\mu 2(1)} = 0.018$, SE=.005; $\sigma^2_{\mu 2(2)} = 0.008$, SE=.002). Additionally, the effects of victim race on place of aggravated assault significantly varied across cities for both public and outdoor groups ($\sigma^2_{\mu 3(1)} = 0.030$, SE=.009; $\sigma^2_{\mu 3(2)} = 0.011$, SE=.004), as did the effects of victim sex on place of aggravated assault ($\sigma^2_{\mu 4(1)} = 0.039$, SE=.011; $\sigma^2_{\mu 4(2)} = 0.030$, SE=.008).

Table 45

<table>
<thead>
<tr>
<th>Place of Incident</th>
<th>Estimate</th>
<th>SE</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public</td>
<td>.090</td>
<td>.017</td>
<td>5.181**</td>
</tr>
<tr>
<td>Outdoors</td>
<td>.090</td>
<td>.016</td>
<td>5.729**</td>
</tr>
</tbody>
</table>

**p<.01; *p<.05

Random Slopes
Table 46

Aggravated Assault Significant Random Effects (Place of Incident)

<table>
<thead>
<tr>
<th>Public</th>
<th>Estimate</th>
<th>SE</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>.032</td>
<td>.022</td>
<td>1.460</td>
</tr>
<tr>
<td>Incident Hour</td>
<td>.005</td>
<td>.002</td>
<td>2.687**</td>
</tr>
<tr>
<td>Victim Age</td>
<td>.018</td>
<td>.005</td>
<td>3.722**</td>
</tr>
<tr>
<td>Victim Race</td>
<td>.030</td>
<td>.009</td>
<td>3.393**</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>.039</td>
<td>.011</td>
<td>3.611**</td>
</tr>
<tr>
<td>Outdoors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>.101</td>
<td>.024</td>
<td>4.282**</td>
</tr>
<tr>
<td>Incident Hour</td>
<td>.003</td>
<td>.001</td>
<td>2.362*</td>
</tr>
<tr>
<td>Victim Age</td>
<td>.008</td>
<td>.002</td>
<td>3.732**</td>
</tr>
<tr>
<td>Victim Race</td>
<td>.011</td>
<td>.004</td>
<td>2.649**</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>.030</td>
<td>.008</td>
<td>3.909**</td>
</tr>
</tbody>
</table>

**p<.01; *p<.05

Note. AIC=1027915.089; BIC=1028012.542

Effects of Place of Crime within Robbery

Preliminary Model

Table 47 provides the results of the preliminary model, more specifically, the multinomial logistic regression of place of robbery. This model allows the analyst to assess the level one effects of place. The model explains approximately 9.7% of the variance in the dependent variable (Nagelkerke $R^2 = .097$). As can be observed, all level one predictors were significant within the public category, with the exceptions of: temperature ($b = -.024$, Wald $\chi^2(1) = 2.706$, p>.05), day of week ($b = -.008$, Wald $\chi^2(1) = .290$, p>.05) and offender sex ($b = .000$, Wald $\chi^2(1) = .000$, p>.05). For the outdoor category, all variables were significant with the exception of day of the week ($b = .016$, Wald $\chi^2(1) = 2.082$, p>.05), victim race ($b = -.024$, Wald $\chi^2(1) = .921$, p>.05), and offender race ($b = -.036$, Wald $\chi^2(1) = 1.877$, p>.05).
As can be observed in Table 48 incident hour was no longer significant for either the public or outdoor category (OR=1.018, p<.05; OR=1.007, p<.05). From Table 49 one can deduce that both intercepts vary significantly across cities ($\sigma^2_{\mu 0j(1)} = 0.304$, SE=.053; $\sigma_{\mu 0j(2)} = 0.284$, SE=.049).
### Table 48

*Robbery Level One Model Fixed Effects (Place of Incident)*

<table>
<thead>
<tr>
<th>Place of Incident</th>
<th>Coefficient</th>
<th>SE(B)</th>
<th>Exp(Coefficient)</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public</td>
<td>Intercept</td>
<td>.716</td>
<td>.1048</td>
<td>6.837**</td>
</tr>
<tr>
<td></td>
<td>V-O Relationship</td>
<td>-1.290</td>
<td>.0900</td>
<td>2.75</td>
</tr>
<tr>
<td></td>
<td>Temperature</td>
<td>-.018</td>
<td>.0126</td>
<td>.982</td>
</tr>
<tr>
<td></td>
<td>Day of Week</td>
<td>.008</td>
<td>.0142</td>
<td>1.008</td>
</tr>
<tr>
<td></td>
<td>Incident Hour</td>
<td>.018</td>
<td>.0185</td>
<td>1.018</td>
</tr>
<tr>
<td></td>
<td>Victim Age</td>
<td>-.091</td>
<td>.0212</td>
<td>.913</td>
</tr>
<tr>
<td></td>
<td>Victim Race</td>
<td>-.142</td>
<td>.0591</td>
<td>.868</td>
</tr>
<tr>
<td></td>
<td>Victim Sex</td>
<td>-.271</td>
<td>.0670</td>
<td>.762</td>
</tr>
<tr>
<td></td>
<td>Offender Age</td>
<td>.174</td>
<td>.0351</td>
<td>1.190</td>
</tr>
<tr>
<td></td>
<td>Offender Race</td>
<td>-.289</td>
<td>.0479</td>
<td>.749</td>
</tr>
<tr>
<td></td>
<td>Offender Sex</td>
<td>.014</td>
<td>.0740</td>
<td>1.014</td>
</tr>
<tr>
<td>Outdoors</td>
<td>Intercept</td>
<td>.611</td>
<td>.0898</td>
<td>1.842</td>
</tr>
<tr>
<td></td>
<td>V-O Relationship</td>
<td>-.902</td>
<td>.0768</td>
<td>.406</td>
</tr>
<tr>
<td></td>
<td>Temperature</td>
<td>.088</td>
<td>.0123</td>
<td>1.092</td>
</tr>
<tr>
<td></td>
<td>Day of Week</td>
<td>.019</td>
<td>.0106</td>
<td>1.019</td>
</tr>
<tr>
<td></td>
<td>Incident Hour</td>
<td>.007</td>
<td>.0125</td>
<td>1.007</td>
</tr>
<tr>
<td></td>
<td>Victim Age</td>
<td>-.190</td>
<td>.0134</td>
<td>.827</td>
</tr>
<tr>
<td></td>
<td>Victim Race</td>
<td>-.057</td>
<td>.0463</td>
<td>.944</td>
</tr>
<tr>
<td></td>
<td>Victim Sex</td>
<td>.322</td>
<td>.0486</td>
<td>1.380</td>
</tr>
<tr>
<td></td>
<td>Offender Age</td>
<td>-.060</td>
<td>.0211</td>
<td>.942</td>
</tr>
<tr>
<td></td>
<td>Offender Race</td>
<td>.009</td>
<td>.0326</td>
<td>1.009</td>
</tr>
<tr>
<td></td>
<td>Offender Sex</td>
<td>.205</td>
<td>.0513</td>
<td>1.227</td>
</tr>
</tbody>
</table>

**p<.01; *p<.05

*Note: Reference Category = Residence.*

### Table 49

*Robbery Level One Model Random Intercept (Place of Incident)*

<table>
<thead>
<tr>
<th>Place of Incident</th>
<th>Estimate</th>
<th>SE</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public</td>
<td>.304</td>
<td>.053</td>
<td>5.789**</td>
</tr>
<tr>
<td>Outdoors</td>
<td>.284</td>
<td>.049</td>
<td>5.782**</td>
</tr>
</tbody>
</table>

**p<.01; *p<.05

*Note: AIC=366831.737; BIC=366849.257.*
Level Two Model

In order to assess the effects of all social predictors, they were added to the level one model, which can be observed in Table 50. There were no notable changes in the significance of level one predictors within the model, thus the analyst can assess the second level effects. Within the public category, one can conclude that RCI social had a significant effect on place of crime (OR=1.236, p<.01), demonstrating the odds of a robbery occurring in a public area rather than within the residence were 1.236 times more likely for every one standard deviation in RCI social. The only other significant predictor within the public category was the percentage of the population that was nonwhite (OR=.764, p<.01), meaning that the odds of a robbery occurring in public rather than within the residence were .8 times less for every one standard deviation in percentage of the population that was nonwhite. For the outdoor category, only one second level predictor was significant, social disorder (OR=.886), demonstrating that the odds of a robbery occurring outdoors rather than within the residence was .9 times less likely with every one unit increase in social disorder. Thus, the higher the social disorder, the more likely the crime took place in the residence.

Critical to the analysis was the determination that important that the random intercepts have remained significant with the addition of the second level predictors. As can be observed in Table 51, both intercepts have remained significant ($\sigma^2_{\mu_{0j(1)}} = 0.242, \text{SE}=.045; \sigma_{\mu_{0j(2)}} = 0.259, \text{SE}=.048$).
Table 50

Robbery Level Two Model Fixed Effects (Place of Incident)

<table>
<thead>
<tr>
<th>Place of Incident</th>
<th>Coefficient</th>
<th>SE(B)</th>
<th>Exp(Coefficient)</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>.590</td>
<td>.1268</td>
<td>1.805</td>
<td>4.655**</td>
</tr>
<tr>
<td>V-O Relationship</td>
<td>-.1296</td>
<td>.0901</td>
<td>.274</td>
<td>-14.385**</td>
</tr>
<tr>
<td>Temperature</td>
<td>-.017</td>
<td>.0127</td>
<td>.983</td>
<td>-1.325</td>
</tr>
<tr>
<td>Day of Week</td>
<td>.008</td>
<td>.0142</td>
<td>1.008</td>
<td>.588</td>
</tr>
<tr>
<td>Incident Hour</td>
<td>.018</td>
<td>.0187</td>
<td>1.018</td>
<td>.943</td>
</tr>
<tr>
<td>Victim Age</td>
<td>-.092</td>
<td>.0212</td>
<td>.912</td>
<td>-4.332**</td>
</tr>
<tr>
<td>Victim Race</td>
<td>-.137</td>
<td>.0593</td>
<td>.872</td>
<td>-2.313*</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>-.274</td>
<td>.0671</td>
<td>.760</td>
<td>-4.088**</td>
</tr>
<tr>
<td>Offender Age</td>
<td>.173</td>
<td>.0352</td>
<td>1.189</td>
<td>4.913**</td>
</tr>
<tr>
<td>Offender Race</td>
<td>-.282</td>
<td>.0492</td>
<td>.755</td>
<td>-5.723**</td>
</tr>
<tr>
<td>Offender Sex</td>
<td>.017</td>
<td>.0743</td>
<td>1.017</td>
<td>.233</td>
</tr>
<tr>
<td>RCI Economic</td>
<td>-.006</td>
<td>.0792</td>
<td>.994</td>
<td>-.076</td>
</tr>
<tr>
<td>RCI Social</td>
<td>.234</td>
<td>.0813</td>
<td>1.263</td>
<td>2.872**</td>
</tr>
<tr>
<td>Social Disorder</td>
<td>-.014</td>
<td>.0461</td>
<td>.986</td>
<td>.312</td>
</tr>
<tr>
<td>Resource Dependency</td>
<td>.110</td>
<td>.1125</td>
<td>1.116</td>
<td>.978</td>
</tr>
<tr>
<td>Population</td>
<td>-.187</td>
<td>.1438</td>
<td>.829</td>
<td>-1.303</td>
</tr>
<tr>
<td>Physical Disorder</td>
<td>.021</td>
<td>.0576</td>
<td>1.021</td>
<td>.362</td>
</tr>
<tr>
<td>% under 25</td>
<td>.016</td>
<td>.0535</td>
<td>1.016</td>
<td>.304</td>
</tr>
<tr>
<td>% Nonwhite</td>
<td>-.270</td>
<td>.0724</td>
<td>.764</td>
<td>-3.724**</td>
</tr>
<tr>
<td>% Female</td>
<td>.010</td>
<td>.0745</td>
<td>1.010</td>
<td>.128</td>
</tr>
<tr>
<td>Exposure</td>
<td>-.076</td>
<td>.0858</td>
<td>.927</td>
<td>-.886</td>
</tr>
<tr>
<td>Outdoors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>.582</td>
<td>.0960</td>
<td>1.790</td>
<td>6.062**</td>
</tr>
<tr>
<td>V-O Relationship</td>
<td>-.905</td>
<td>.0771</td>
<td>.405</td>
<td>-11.728**</td>
</tr>
<tr>
<td>Temperature</td>
<td>.088</td>
<td>.0123</td>
<td>1.092</td>
<td>7.113**</td>
</tr>
<tr>
<td>Day of Week</td>
<td>.019</td>
<td>.0105</td>
<td>1.019</td>
<td>1.781</td>
</tr>
<tr>
<td>Incident Hour</td>
<td>.006</td>
<td>.0125</td>
<td>1.006</td>
<td>.501</td>
</tr>
<tr>
<td>Victim Age</td>
<td>-.191</td>
<td>.0135</td>
<td>.826</td>
<td>-14.077**</td>
</tr>
<tr>
<td>Victim Race</td>
<td>-.059</td>
<td>.0468</td>
<td>.942</td>
<td>-1.266</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>.322</td>
<td>.0488</td>
<td>1.380</td>
<td>6.603**</td>
</tr>
<tr>
<td>Offender Age</td>
<td>-.059</td>
<td>.0212</td>
<td>.943</td>
<td>-2.789**</td>
</tr>
<tr>
<td>Offender Race</td>
<td>.006</td>
<td>.0328</td>
<td>1.006</td>
<td>.169</td>
</tr>
<tr>
<td>Offender Sex</td>
<td>.204</td>
<td>.0515</td>
<td>1.227</td>
<td>3.961**</td>
</tr>
<tr>
<td>RCI Economic</td>
<td>-.021</td>
<td>.0823</td>
<td>.979</td>
<td>-.259</td>
</tr>
<tr>
<td>RCI Social</td>
<td>-.160</td>
<td>.1025</td>
<td>.853</td>
<td>-1.556</td>
</tr>
<tr>
<td>Social Disorder</td>
<td>-.121</td>
<td>.0431</td>
<td>.886</td>
<td>-2.803**</td>
</tr>
<tr>
<td>Resource Dependency</td>
<td>.170</td>
<td>.0911</td>
<td>1.185</td>
<td>1.864</td>
</tr>
<tr>
<td>Population</td>
<td>.018</td>
<td>.0749</td>
<td>1.018</td>
<td>.242</td>
</tr>
</tbody>
</table>
Table 50 (continued).

<table>
<thead>
<tr>
<th>Outdoors</th>
<th>Coefficient</th>
<th>SE(B)</th>
<th>Exp(Coefficient)</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Disorder</td>
<td>.019</td>
<td>.0558</td>
<td>1.020</td>
<td>.349</td>
</tr>
<tr>
<td>% under 25</td>
<td>-.061</td>
<td>.0678</td>
<td>.941</td>
<td>-.898</td>
</tr>
<tr>
<td>% Nonwhite</td>
<td>-.043</td>
<td>.0865</td>
<td>.958</td>
<td>-.497</td>
</tr>
<tr>
<td>% Female</td>
<td>-.006</td>
<td>.0691</td>
<td>.994</td>
<td>-.089</td>
</tr>
<tr>
<td>Exposure</td>
<td>.001</td>
<td>.1031</td>
<td>1.001</td>
<td>.014</td>
</tr>
</tbody>
</table>

* *p<.01; *p<.05

Note. Reference Category= Residence.
Note. AIC=365840.714; BIC=365858.227

Table 51

*Robbery Level Two Model Random Intercept (Place of Incident)*

<table>
<thead>
<tr>
<th>Place of Incident</th>
<th>Estimate</th>
<th>SE</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public</td>
<td>.242</td>
<td>.045</td>
<td>5.344**</td>
</tr>
<tr>
<td>Outdoors</td>
<td>.259</td>
<td>.048</td>
<td>5.377**</td>
</tr>
</tbody>
</table>

* *p<.01; *p<.05

Random Slopes

As previously stated, for all place of crime models, random slopes were investigated for the following level one variables: incident hour, victim age, victim race, and victim sex. Additionally, only those that were significant at the initial iteration were retained within the model. As can be observed in Table 52, all variables’ effects on the dependent variable within both groups of the dependent variable significantly varied across cities, with the exception of incident hour (which when initially added to the model did demonstrate significant variance across cities). Thus, one can conclude that the effects of victim age on place of robbery significantly varied across cities ($\sigma^2_{\mu.2(1)} = 0.008$, SE=.004; $\sigma^2_{\mu.2(2)} = 0.003$, SE=.002). Additionally, the effects of victim race on place of robbery significantly varied across cities for both public and outdoor groups ($\sigma^2_{\mu.3(1)} =$
0.036, SE=.014; $\sigma^2_{\mu 3(2)} = 0.020, SE=.008$), as did the effects of victim sex on place of robbery ($\sigma^2_{\mu 4(1)} = 0.049, SE=.015; \sigma^2_{\mu 1(2)} = 0.015, SE=.006$).

Table 52

*Robbery Significant Random Effects (Place of Incident)*

<table>
<thead>
<tr>
<th>Public</th>
<th>Estimate</th>
<th>SE</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>.206</td>
<td>.048</td>
<td>4.263**</td>
</tr>
<tr>
<td>Incident Hour</td>
<td>.003</td>
<td>.002</td>
<td>1.443</td>
</tr>
<tr>
<td>Victim Age</td>
<td>.008</td>
<td>.004</td>
<td>2.301*</td>
</tr>
<tr>
<td>Victim Race</td>
<td>.036</td>
<td>.014</td>
<td>2.540*</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>.049</td>
<td>.015</td>
<td>3.246**</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Outdoors</th>
<th>Estimate</th>
<th>SE</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>.238</td>
<td>.048</td>
<td>4.906**</td>
</tr>
<tr>
<td>Incident Hour</td>
<td>.000</td>
<td>.001</td>
<td>.225</td>
</tr>
<tr>
<td>Victim Age</td>
<td>.003</td>
<td>.002</td>
<td>1.865</td>
</tr>
<tr>
<td>Victim Race</td>
<td>.020</td>
<td>.008</td>
<td>2.591*</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>.015</td>
<td>.006</td>
<td>2.405*</td>
</tr>
</tbody>
</table>

**p<.01; *p<.05

Note. AIC=365559.368; BIC=365646.927

Effects of Place of Crime within Sexual Assault

*Preliminary Model*

Table 53 allows the analyst to examine the effects of all level one variables on the dependent variable, place of crime (sexual assault). The model explains approximately 11.2% of the variance in the place of crime (Nagelkerke R² = .112). The analyst can conclude that within the public category all predictors are significant with the exception of day of week ($b = .025$, Wald $\chi^2(1) = 3.310$, p>.05); victim sex ($b = -.034$, Wald $\chi^2(1) = .641$, p>.05); and offender sex ($b = .016$, Wald $\chi^2(1) = .047$, p>.05). Within the outdoor category, only day of week is nonsignificant ($b = .004$, Wald $\chi^2(1) = .064$, p>.05). To provide illustration of the significant effects, incident hour is significant for both categories, demonstrating that the odds of a sexual assault occurring in public rather than
the residence is 1.4 times greater for every 1 standard deviation increase in incident hour. Moreover, the odds of a sexual assault occurring in public rather than the residence is 3.0 times greater for male offenders than female offenders, and the odds of a sexual assault occurring outdoors rather than in the residence is 6.8 greater for male offenders than female offenders.

Table 53

*Sexual Assault Multinomial Logistic Regression (Place of Incident)*

<table>
<thead>
<tr>
<th>Place of Incident</th>
<th>B</th>
<th>SE(B)</th>
<th>Exp(B)</th>
<th>Wald</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-2.948</td>
<td>.143</td>
<td></td>
<td>427.336**</td>
</tr>
<tr>
<td>V-O Relationship</td>
<td>1.082</td>
<td>.037</td>
<td>2.950</td>
<td>865.913**</td>
</tr>
<tr>
<td>Temperature</td>
<td>-.078</td>
<td>.013</td>
<td>.925</td>
<td>34.568**</td>
</tr>
<tr>
<td>Day of Week</td>
<td>.025</td>
<td>.014</td>
<td>1.025</td>
<td>3.310</td>
</tr>
<tr>
<td>Incident Hour</td>
<td>.085</td>
<td>.014</td>
<td>1.089</td>
<td>37.852**</td>
</tr>
<tr>
<td>Victim Age</td>
<td>.312</td>
<td>.016</td>
<td>1.366</td>
<td>401.304**</td>
</tr>
<tr>
<td>Victim Race</td>
<td>.296</td>
<td>.039</td>
<td>1.344</td>
<td>57.591**</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>-.034</td>
<td>.042</td>
<td>.967</td>
<td>.641</td>
</tr>
<tr>
<td>Offender Age</td>
<td>-.189</td>
<td>.014</td>
<td>.828</td>
<td>186.597**</td>
</tr>
<tr>
<td>Offender Race</td>
<td>-.170</td>
<td>.034</td>
<td>.844</td>
<td>24.704**</td>
</tr>
<tr>
<td>Offender Sex</td>
<td>.016</td>
<td>.073</td>
<td>1.016</td>
<td>.047</td>
</tr>
<tr>
<td>Outdoors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-3.741</td>
<td>.194</td>
<td></td>
<td>370.038**</td>
</tr>
<tr>
<td>V-O Relationship</td>
<td>1.921</td>
<td>.037</td>
<td>6.830</td>
<td>2722.312**</td>
</tr>
<tr>
<td>Temperature</td>
<td>.046</td>
<td>.016</td>
<td>1.047</td>
<td>7.728**</td>
</tr>
<tr>
<td>Day of Week</td>
<td>.004</td>
<td>.017</td>
<td>1.004</td>
<td>.064</td>
</tr>
<tr>
<td>Incident Hour</td>
<td>.155</td>
<td>.017</td>
<td>1.168</td>
<td>87.647**</td>
</tr>
<tr>
<td>Victim Age</td>
<td>.290</td>
<td>.018</td>
<td>1.337</td>
<td>247.226**</td>
</tr>
<tr>
<td>Victim Race</td>
<td>.178</td>
<td>.045</td>
<td>1.195</td>
<td>16.046**</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>.119</td>
<td>.055</td>
<td>1.126</td>
<td>4.618*</td>
</tr>
<tr>
<td>Offender Age</td>
<td>-.158</td>
<td>.017</td>
<td>.854</td>
<td>89.086**</td>
</tr>
<tr>
<td>Offender Race</td>
<td>-.263</td>
<td>.039</td>
<td>.768</td>
<td>44.518**</td>
</tr>
<tr>
<td>Offender Sex</td>
<td>-.547</td>
<td>.120</td>
<td>.579</td>
<td>20.716**</td>
</tr>
</tbody>
</table>

**p<.01; *p<.05
Multinomial Nagelkerke $R^2 = .112$

Note: Reference Category= Residence.
**Level One Model**

As can be observed in Table 54, one notable difference in significance for the level one effects is that victim sex in the outdoor group is no longer significant within the outdoor category (OR=1.141, p>.05). Table 55 provides the estimates of the intercepts for both categories of the dependent variable. Both intercepts vary significantly across cities ($\sigma^2\mu_{4(1)} = 0.189$, SE=.034; $\sigma^2\mu_{1(2)} = 0.136$, SE=.024).

Table 54

**Sexual Assault Level One Model Fixed Effects (Place of Incident)**

<table>
<thead>
<tr>
<th>Place of Incident</th>
<th>Coefficient</th>
<th>SE(B)</th>
<th>Exp(Coefficient)</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-2.824</td>
<td>.1917</td>
<td>.059</td>
<td>-14.732**</td>
</tr>
<tr>
<td>V-O Relationship</td>
<td>1.058</td>
<td>.0589</td>
<td>2.881</td>
<td>17.956**</td>
</tr>
<tr>
<td>Temperature</td>
<td>-.088</td>
<td>.0130</td>
<td>.915</td>
<td>-6.800**</td>
</tr>
<tr>
<td>Day of Week</td>
<td>.023</td>
<td>.0145</td>
<td>1.023</td>
<td>1.571</td>
</tr>
<tr>
<td>Incident Hour</td>
<td>.090</td>
<td>.0168</td>
<td>1.095</td>
<td>5.386**</td>
</tr>
<tr>
<td>Victim Age</td>
<td>.305</td>
<td>.0282</td>
<td>1.357</td>
<td>10.822**</td>
</tr>
<tr>
<td>Victim Race</td>
<td>.248</td>
<td>.0519</td>
<td>1.281</td>
<td>4.770**</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>-.046</td>
<td>.0570</td>
<td>.955</td>
<td>-.801</td>
</tr>
<tr>
<td>Offender Age</td>
<td>-.181</td>
<td>.0226</td>
<td>.834</td>
<td>-8.016**</td>
</tr>
<tr>
<td>Offender Race</td>
<td>-.181</td>
<td>.0518</td>
<td>.835</td>
<td>-3.486**</td>
</tr>
<tr>
<td>Offender Sex</td>
<td>.009</td>
<td>.0876</td>
<td>1.009</td>
<td>.106</td>
</tr>
<tr>
<td>Outdoors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-4.068</td>
<td>.2180</td>
<td>.017</td>
<td>-18.659**</td>
</tr>
<tr>
<td>V-O Relationship</td>
<td>2.003</td>
<td>.0603</td>
<td>7.409</td>
<td>33.211**</td>
</tr>
<tr>
<td>Temperature</td>
<td>.064</td>
<td>.0232</td>
<td>1.066</td>
<td>2.737**</td>
</tr>
<tr>
<td>Day of Week</td>
<td>.006</td>
<td>.0187</td>
<td>1.006</td>
<td>.316</td>
</tr>
<tr>
<td>Incident Hour</td>
<td>.137</td>
<td>.0249</td>
<td>1.147</td>
<td>5.504**</td>
</tr>
<tr>
<td>Victim Age</td>
<td>.280</td>
<td>.0352</td>
<td>1.324</td>
<td>7.957**</td>
</tr>
<tr>
<td>Victim Race</td>
<td>.163</td>
<td>.0425</td>
<td>1.177</td>
<td>3.833**</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>.132</td>
<td>.0827</td>
<td>1.141</td>
<td>1.599</td>
</tr>
<tr>
<td>Offender Age</td>
<td>-.168</td>
<td>.0228</td>
<td>.845</td>
<td>-7.389**</td>
</tr>
<tr>
<td>Offender Race</td>
<td>-.203</td>
<td>.0426</td>
<td>.816</td>
<td>-4.776**</td>
</tr>
<tr>
<td>Offender Sex</td>
<td>-.535</td>
<td>.1162</td>
<td>.586</td>
<td>-4.605**</td>
</tr>
</tbody>
</table>

* p<.01; *p<.05

Note. Reference Category = Residence.
Note. AIC=454031.877; BIC=454049.564.
Table 55

*Sexual Assault Level One Model Random Intercept (Place of Incident)*

<table>
<thead>
<tr>
<th>Place of Incident</th>
<th>Estimate</th>
<th>SE</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public</td>
<td>.189</td>
<td>.034</td>
<td>5.591**</td>
</tr>
<tr>
<td>Outdoors</td>
<td>.136</td>
<td>.024</td>
<td>5.674**</td>
</tr>
</tbody>
</table>

**p<.01; *p<.05

**Level Two Model**

Table 56 reports the results of the level two model which has the addition of all social variables. There are no notable differences in the significance of level one fixed effects from the previous model to the present model. Within the public category, no second level variables are significant. Within the outdoor category RCI social is found to be a significant predictor of classifying sexual assaults as occurring either outdoors or in the residence (OR=.843, p<.01), meaning that the odds that a sexual assault occurred outdoors rather in the residence is .8 times less for every standard deviation increase in RCI social. This shows that the higher the social resilience, sexual assault occurred outdoors.

Table 56

*Sexual Assault Level Two Model Fixed Effects (Place of Incident)*

<table>
<thead>
<tr>
<th>Place of Incident</th>
<th>Coefficient</th>
<th>SE(B)</th>
<th>Exp(Coefficient)</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-2.799</td>
<td>.1855</td>
<td>.061</td>
<td>-15.092**</td>
</tr>
<tr>
<td>V-O Relationship</td>
<td>1.053</td>
<td>.0594</td>
<td>2.867</td>
<td>17.716**</td>
</tr>
<tr>
<td>Temperature</td>
<td>-.088</td>
<td>.0132</td>
<td>.916</td>
<td>-6.647**</td>
</tr>
<tr>
<td>Day of Week</td>
<td>.020</td>
<td>.0145</td>
<td>1.020</td>
<td>1.395</td>
</tr>
<tr>
<td>Incident Hour</td>
<td>.089</td>
<td>.0169</td>
<td>1.093</td>
<td>5.239**</td>
</tr>
<tr>
<td>Victim Age</td>
<td>.307</td>
<td>.0285</td>
<td>1.360</td>
<td>10.778**</td>
</tr>
<tr>
<td>Victim Race</td>
<td>.241</td>
<td>.0526</td>
<td>1.273</td>
<td>4.586**</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>-.056</td>
<td>.0568</td>
<td>.946</td>
<td>-.986</td>
</tr>
<tr>
<td>Offender Age</td>
<td>-.186</td>
<td>.0226</td>
<td>.830</td>
<td>-8.230**</td>
</tr>
</tbody>
</table>
Table 56 (continued).

<table>
<thead>
<tr>
<th>Place of Incident</th>
<th>Coefficient</th>
<th>SE(B)</th>
<th>Exp(Coefficient)</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offender Race</td>
<td>-.188</td>
<td>.0525</td>
<td>.829</td>
<td>-3.581**</td>
</tr>
<tr>
<td>Offender Sex</td>
<td>.015</td>
<td>.0875</td>
<td>1.015</td>
<td>.174</td>
</tr>
<tr>
<td>RCI Economic</td>
<td>.001</td>
<td>.0853</td>
<td>1.001</td>
<td>.013</td>
</tr>
<tr>
<td>RCI Social</td>
<td>-.024</td>
<td>.0815</td>
<td>.976</td>
<td>-2.293</td>
</tr>
<tr>
<td>Social Disorder</td>
<td>-.070</td>
<td>.0379</td>
<td>.933</td>
<td>-1.838</td>
</tr>
<tr>
<td>Resource Dependency</td>
<td>-.025</td>
<td>.0852</td>
<td>.975</td>
<td>-2.94</td>
</tr>
<tr>
<td>Population</td>
<td>.033</td>
<td>.0519</td>
<td>1.034</td>
<td>.635</td>
</tr>
<tr>
<td>Physical Disorder</td>
<td>.077</td>
<td>.0485</td>
<td>1.080</td>
<td>1.579</td>
</tr>
<tr>
<td>% under 25</td>
<td>-.069</td>
<td>.0536</td>
<td>.933</td>
<td>-1.288</td>
</tr>
<tr>
<td>% Nonwhite</td>
<td>-.066</td>
<td>.0891</td>
<td>.936</td>
<td>-7.38</td>
</tr>
<tr>
<td>% Female</td>
<td>-.062</td>
<td>.0630</td>
<td>.940</td>
<td>-9.81</td>
</tr>
<tr>
<td>Exposure</td>
<td>-.002</td>
<td>.0683</td>
<td>.998</td>
<td>-0.26</td>
</tr>
<tr>
<td>Outdoors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-4.080</td>
<td>.2208</td>
<td>.017</td>
<td>-18.477**</td>
</tr>
<tr>
<td>V-O Relationship</td>
<td>2.001</td>
<td>.0607</td>
<td>7.396</td>
<td>32.971**</td>
</tr>
<tr>
<td>Temperature</td>
<td>.065</td>
<td>.0232</td>
<td>1.067</td>
<td>2.779**</td>
</tr>
<tr>
<td>Day of Week</td>
<td>.005</td>
<td>.0187</td>
<td>1.005</td>
<td>.267</td>
</tr>
<tr>
<td>Incident Hour</td>
<td>.139</td>
<td>.0249</td>
<td>1.149</td>
<td>5.579**</td>
</tr>
<tr>
<td>Victim Age</td>
<td>.278</td>
<td>.0355</td>
<td>1.320</td>
<td>7.837**</td>
</tr>
<tr>
<td>Victim Race</td>
<td>.164</td>
<td>.0423</td>
<td>1.178</td>
<td>3.865**</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>.127</td>
<td>.0828</td>
<td>1.136</td>
<td>1.537</td>
</tr>
<tr>
<td>Offender Age</td>
<td>-.166</td>
<td>.0227</td>
<td>.847</td>
<td>-7.314**</td>
</tr>
<tr>
<td>Offender Race</td>
<td>-.203</td>
<td>.0440</td>
<td>.816</td>
<td>-4.604**</td>
</tr>
<tr>
<td>Offender Sex</td>
<td>-.541</td>
<td>.1176</td>
<td>.582</td>
<td>-4.601**</td>
</tr>
<tr>
<td>RCI Economic</td>
<td>-.051</td>
<td>.0542</td>
<td>.950</td>
<td>-.945</td>
</tr>
<tr>
<td>RCI Social</td>
<td>-.171</td>
<td>.0620</td>
<td>.843</td>
<td>-2.758**</td>
</tr>
<tr>
<td>Social Disorder</td>
<td>-.051</td>
<td>.0345</td>
<td>.951</td>
<td>-1.469</td>
</tr>
<tr>
<td>Resource Dependency</td>
<td>.007</td>
<td>.0660</td>
<td>1.007</td>
<td>.110</td>
</tr>
<tr>
<td>Population</td>
<td>.081</td>
<td>.0473</td>
<td>1.085</td>
<td>1.724</td>
</tr>
<tr>
<td>Physical Disorder</td>
<td>.042</td>
<td>.0340</td>
<td>1.043</td>
<td>1.242</td>
</tr>
<tr>
<td>% under 25</td>
<td>-.087</td>
<td>.0295</td>
<td>.916</td>
<td>-2.955**</td>
</tr>
<tr>
<td>% Nonwhite</td>
<td>-.045</td>
<td>.0697</td>
<td>.956</td>
<td>-6.48</td>
</tr>
<tr>
<td>% Female</td>
<td>-.033</td>
<td>.0364</td>
<td>.968</td>
<td>-8.99</td>
</tr>
<tr>
<td>Exposure</td>
<td>-.024</td>
<td>.0658</td>
<td>.976</td>
<td>-3.64</td>
</tr>
</tbody>
</table>

*p<.01; *p<.05
Note. Reference Category= Residence.
Note. AIC=449665.936; BIC=449683.600
In order to examine whether the intercept for both categories of the dependent variable remained significant across cities, the analyst can examine Table 57. Both intercepts remained significant ($\sigma^2\mu_1(1) = 0.189$, SE=.034; $\sigma^2\mu_1(2) = 0.136$, SE=.024).

Table 57

*Sexual Assault Level Two Model Random Intercept (Place of Incident)*

<table>
<thead>
<tr>
<th>Place of Incident</th>
<th>Estimate</th>
<th>SE</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public</td>
<td>.188</td>
<td>.037</td>
<td>5.123**</td>
</tr>
<tr>
<td>Outdoors</td>
<td>.139</td>
<td>.026</td>
<td>5.283**</td>
</tr>
</tbody>
</table>

**p<.01; *p<.05

Random Slopes

As previously stated, for all place of crime models, random slopes are investigated for the following level one variables: incident hour, victim age, victim race, and victim sex. Additionally, only those that are significant at the initial iteration are retained within the model. As can be observed in Table 58, the effects of victim age on the dependent variable significantly varied across cities (for both categories of the dependent variable). Thus, one can conclude that the effects of victim age on place of robbery varied significantly across cities ($\sigma^2\mu_2(1) = 0.024$, SE=.007; $\sigma^2\mu_2(2) = 0.024$, SE=.007). The lack of significant random slopes is likely due to the lack of variance in both victim sex and victim race, since the majority of victims are female and white (Heck et al., 2010).
Table 58

Sexual Assault Significant Random Effects (Place of Incident)

<table>
<thead>
<tr>
<th>Public</th>
<th>Estimate</th>
<th>SE</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>.132</td>
<td>.041</td>
<td>3.199*</td>
</tr>
<tr>
<td>Victim Age</td>
<td>.024</td>
<td>.007</td>
<td>3.273*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Outdoors</th>
<th>Estimate</th>
<th>SE</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>.114</td>
<td>.023</td>
<td>4.960</td>
</tr>
<tr>
<td>Victim Age</td>
<td>.024</td>
<td>.007</td>
<td>3.390*</td>
</tr>
</tbody>
</table>

*p<.01; *p<.05

Note. AIC=449938.279; BIC=449991.270

Comparing Significance of Fixed and Random Effects across Violent Crime

The primary purpose of this study was to examine the social, situational, and individual on victim-offender relationships and place of crime incident. For purposes of model parsimony, the primary analysis assessed these effects within each separate crime. As a result, the previously reported findings provide insight on the individual and social effects within each type of crime, yet fail to provide any comparison across all types of violent crimes. Thus, in an effort to provide simple comparison, level two models were compared by each individual and social effect within each group of the dependent variable. Additionally, all categories within both dependent variables (excluding the reference categories, stranger and residence) were collapsed to assess the frequency of the variables significant (p<.05). For purposes of this analysis, direction of the effect (positive or negative) was ignored; the only focus was on significant effects.

Level One Effects of Victim-Offender Relationships

Romantic relationships. Within category one (romantic relationships), the following fixed effects were significant across all crimes: place, temperature, victim race, victim sex, offender age, offender race, and offender sex. All other fixed effects (day of
week, incident hour, and victim age) were significant within two types of crime. More specifically, both day of the week and incident were significant in both simple and aggravated assaults, yet has no significant effect on sexual assault. Victim age; however, was significant in both sexual assault and simple assault, yet has no significant effect on aggravated assault.

*Family relationships.* Within category two (family relationships), the following fixed effects were significant across all crimes: place, temperature, victim age, victim race, victim sex, offender age, and offender race. Similar to the romantic relationship category, both day of the week and incident were significant in both simple and aggravated assaults, yet has no significant effect on sexual assault. Offender age was significant within both aggravated and sexual assaults, yet had no significant effect on simple assault.

*Acquaintance relationships.* Within category three (acquaintance relationships) the following fixed effects were significant across all crimes: place, temperature, victim age, victim race, victim sex, offender race, and offender sex. Similar to both previous categories, both incident hour and day of the week show significant effects within both simple and aggravated assault, yet no significant effect on sexual assault. Lastly, offender age has no significant effect on either aggravated or sexual assault, demonstrating only significant effects within simple assaults.

These observations generate several conclusions. Place, temperature, victim race, victim sex, and offender race remained consistently significant across all crimes and categories of victim-offender relationships. Both variables used to measure time (day of
week and incident hour) consistently had no significant effect within sexual assault,
demonstrating that time has no significant effect on victim-offender relationships within

Table 59

**Significant Level One Fixed Effects**

<table>
<thead>
<tr>
<th></th>
<th>Simple Assault (t)</th>
<th>Aggravated Assault (t)</th>
<th>Sexual Assault (t)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Romantic</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Place</td>
<td>59.193**</td>
<td>42.135**</td>
<td>33.980**</td>
</tr>
<tr>
<td>Temperature</td>
<td>-5.346**</td>
<td>-7.040**</td>
<td>-5.466**</td>
</tr>
<tr>
<td>Day of Week</td>
<td>-7.862**</td>
<td>-5.022**</td>
<td>-1.818</td>
</tr>
<tr>
<td>Incident Hour</td>
<td>3.572**</td>
<td>2.578*</td>
<td>1.070</td>
</tr>
<tr>
<td>Victim Age</td>
<td>-2.578*</td>
<td>-.915</td>
<td>7.432**</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>42.475**</td>
<td>32.566**</td>
<td>8.952**</td>
</tr>
<tr>
<td>Offender Age</td>
<td>5.093**</td>
<td>13.405**</td>
<td>-8.914**</td>
</tr>
<tr>
<td>Offender Race</td>
<td>17.069**</td>
<td>6.216**</td>
<td>10.630**</td>
</tr>
<tr>
<td>Offender Sex</td>
<td>-2.803**</td>
<td>15.657**</td>
<td>3.923**</td>
</tr>
</tbody>
</table>

| **Family**     |                    |                        |                    |
| Place          | 73.257**           | 50.237**               | 31.229**           |
| Temperature    | -6.498**           | -4.774**               | -8.180**           |
| Day of Week    | -8.345**           | -4.929**               | -1.136             |
| Incident Hour  | 17.334**           | 15.822**               | -1.645             |
| Victim Age     | 2.657**            | -1.981*                | -36.119**          |
| Victim Sex     | 30.546**           | 24.510**               | -3.560**           |
| Offender Age   | -10.218**          | .579                   | 14.612**           |
| Offender Race  | 26.039**           | 10.842**               | 11.750**           |
| Offender Sex   | 16.446             | 15.413**               | 8.791**            |

| **Acquaintance** |                   |                        |                    |
| Place            | 38.028**           | 34.383**               | 29.140**           |
| Temperature      | -5.522**           | .068                   | -6.342**           |
| Day of Week      | -6.632**           | -2.564**               | -.419              |
| Incident Hour    | 9.346**            | 11.276**               | .671               |
| Victim Age       | -7.500**           | -7.767**               | -17.335**          |
| Victim Race      | -21.534**          | -10.745**              | -5.847**           |
| Victim Sex       | 19.525**           | 13.462**               | -3.943**           |
| Offender Age     | -7.920**           | 1.620                  | .167               |
| Offender Race    | 9.411**            | 4.528**                | 5.566**            |
| Offender Sex     | 13.159**           | 15.366**               | 7.794**            |

**p<.01; *p<.05**
sexual assault. Moreover, victim age provides significant prediction of classification across all categories of the dependent variable and across all crimes with the exception of romantic relationships within aggravated assaults. These data (with the previously mentioned exception) target suitability (victim demographics) significantly affect victim-offender relationships across all crimes.

Second Level Effects of Victim-Offender Relationships

To compare the effects of level one variables within each category of the dependent variable, victim-offender relationship, all t values and their significance are reported in Table 60. While level one predictors predominantly had a significant effect on victim-offender relationships, the same conclusion cannot be made for second level effects. In fact, within categories of the dependent variable more level two predictors were nonsignificant than significant.

Romantic relationships. Within category one, romantic relationships, both RCI social was the only predictor that was significant across two crimes (simple assault and sexual assault). Social disorder had a significant effect within only aggravated assaults, percentage of the population under 25 years of age and percentage of the population that was female had a significant effect within only simple assaults. Lastly, percentage of the population that was nonwhite had a significant effect within sexual assaults, while percentage of the population that was female has a significant effect within simple assaults.

Family relationships. Within category two, family relationships, RCI economic has a significant effect within only simple assault, while social disorder was significant within both aggravated and sexual assault. Social disorder was significant within only
aggravated assaults, while population was significant within only sexual assaults. Percentage of the population under 25 years of age was significant within both simple and sexual assaults. Lastly, percentage of the population that was female was significant only within incidents of aggravated assaults.

*Acquaintance relationships.* Within category three, acquaintance, RCI social has a significant effect within incidents of sexual assaults, yet not in either simple or aggravated assaults. Percentage of the population under 25 years of age has a significant effect within simple assaults, yet not within either aggravated or sexual assaults. Percentage of the population that was female has a significant effect within only aggravated and simple assaults.

Essentially, this demonstrates that social resiliency (RCI social) was significant within at least one crime in each category, showing the most frequent significance across the model (along with percentage of the population that was female). Resource dependency, physical disorder, and exposure were consistently nonsignificant, thus demonstrating no significant effects on victim-offender relationships across all violent crime. The percentage of the population under 25 years of age was consistently significant within simple assault for all categories of victim-offender relationships, as well as for category two (family relationship) within sexual assaults. Also, the percentage of the population that was nonwhite was significant solely for romantic relationships within sexual assault.
Table 60

*Level Two Fixed Effects of Victim-Offender Relationships across All Crimes*

<table>
<thead>
<tr>
<th></th>
<th>Simple Assault (t)</th>
<th>Aggravated Assault (t)</th>
<th>Sexual Assault (t)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Romantic</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RCI economic</td>
<td>.952</td>
<td>1.184</td>
<td>.890</td>
</tr>
<tr>
<td>RCI social</td>
<td>2.071*</td>
<td>1.102</td>
<td>2.875**</td>
</tr>
<tr>
<td>Social disorder</td>
<td>.993</td>
<td>2.257*</td>
<td>1.154</td>
</tr>
<tr>
<td>Resource Dependency</td>
<td>.181</td>
<td>.394</td>
<td>.064</td>
</tr>
<tr>
<td>Population</td>
<td>-.810</td>
<td>-1.042</td>
<td>-1.039</td>
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<td>% under 25</td>
<td>2.396*</td>
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<tr>
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<td>-.633</td>
<td>-1.327</td>
<td>-2.122*</td>
</tr>
<tr>
<td>% Female</td>
<td>1.989*</td>
<td>2.676</td>
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<tr>
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<td><strong>Family</strong></td>
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<tr>
<td>RCI economic</td>
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<td>RCI social</td>
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<tr>
<td>Population</td>
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<tr>
<td>Physical Disorder</td>
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<td>.394</td>
</tr>
<tr>
<td>% under 25</td>
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<td>1.774</td>
<td>2.065</td>
</tr>
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<td>% Nonwhite</td>
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<td>% female</td>
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<td>3.183**</td>
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<td>Exposure</td>
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<td>1.370</td>
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**p<.01; *p<.05**
**Level One Effects of Place of Crime**

*Public.* Within category one (public) the following predictors demonstrate significant effects on place of crime across all types of violent crime: victim offender relationship, victim age, victim race, and offender age. Temperature was significant across all crimes with the exception of robbery. Day of the week and incident hour show nonsignificant effects within robbery, yet remain significant across all other types of violent crime. Victim sex show nonsignificant effects for sexual assault, yet remains significant for all other types of violent crime. Offender race was nonsignificant within aggravated assault, as was offender sex, which was also nonsignificant within robbery and sexual assault.

*Outdoors.* Within category two (outdoors), the following predictors demonstrate significant effects on place of crime across all types of violent crime: victim offender relationship, temperature, victim age, victim sex, and offender age. Day of the week shows nonsignificant effects within incidents of robbery and sexual assault, while incident hour shows nonsignificant effects only within robbery. Moreover, victim race was nonsignificant within both aggravated assault and robbery, while offender race was only nonsignificant within robbery. Lastly, offender sex was only nonsignificant within simple assault.

The results of level one effects within place demonstrates the moderate consistent significance of victim demographics. Furthermore, with one exception temperature was consistently significant across all crimes and categories of the dependent variable. Time (incident hour and day of week) were consistently nonsignificant within incidents of robbery.
**p<.01; *p<.05

Second Level Effects of Place of Crime

Similar to the effects of victim-offender relationships, the second level effects were scarcely demonstrated significant effects across either category of the dependent variable (public or outdoors). The results of the second level effects are reported in Table 62.

Public. Within the public group, only two variables demonstrated significant relationships across any crime: social resiliency and the percentage of the population

<table>
<thead>
<tr>
<th>Public</th>
<th>VO Relationship</th>
<th>Temperature</th>
<th>Day of Week</th>
<th>Incident Hour</th>
<th>Victim Age</th>
<th>Victim Race</th>
<th>Victim Sex</th>
<th>Offender Age</th>
<th>Offender Race</th>
<th>Offender Sex</th>
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<tbody>
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<td>43.952**</td>
<td>34.533**</td>
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<td>17.716**</td>
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<td>14.887**</td>
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<table>
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<th>Incident Hour</th>
<th>Victim Age</th>
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</table>

**p<.01; *p<.05

Second Level Effects of Place of Crime

Similar to the effects of victim-offender relationships, the second level effects were scarcely demonstrated significant effects across either category of the dependent variable (public or outdoors). The results of the second level effects are reported in Table 62.

<table>
<thead>
<tr>
<th>Public</th>
<th>VO Relationship</th>
<th>Temperature</th>
<th>Day of Week</th>
<th>Incident Hour</th>
<th>Victim Age</th>
<th>Victim Race</th>
<th>Victim Sex</th>
<th>Offender Age</th>
<th>Offender Race</th>
<th>Offender Sex</th>
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<tbody>
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<td>17.716**</td>
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<td></td>
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<td>1.395</td>
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</table>

**p<.01; *p<.05

Second Level Effects of Place of Crime

Similar to the effects of victim-offender relationships, the second level effects were scarcely demonstrated significant effects across either category of the dependent variable (public or outdoors). The results of the second level effects are reported in Table 62.

Public. Within the public group, only two variables demonstrated significant relationships across any crime: social resiliency and the percentage of the population

<table>
<thead>
<tr>
<th>Public</th>
<th>VO Relationship</th>
<th>Temperature</th>
<th>Day of Week</th>
<th>Incident Hour</th>
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<td>-1.325</td>
<td>-6.647**</td>
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</tbody>
</table>

**p<.01; *p<.05

Second Level Effects of Place of Crime

Similar to the effects of victim-offender relationships, the second level effects were scarcely demonstrated significant effects across either category of the dependent variable (public or outdoors). The results of the second level effects are reported in Table 62.

Public. Within the public group, only two variables demonstrated significant relationships across any crime: social resiliency and the percentage of the population
under 25 years of age, which showed significant effects within incidents of robbery. No other second level variables were found to be significant across any other crime.

**Outdoors.** Within the outdoor category, social resilience (RCI social) was found to be significant across all types of crime except robbery. Conversely, social disorder had no significant effects within any crimes, with the exception of robbery. Resource dependency showed significant effects within both simple and aggravated assault. Lastly, the percentage of population under 25 years of age had significant effects within simple assaults and sexual assaults. RCI economic, population, physical disorder, percentage of the population that is nonwhite, percentage of the population that is female, and exposure showed no significant effects within any of the four crimes.

The second level effects within place vastly differed from those of victim-offender relationships. Furthermore, social resiliency appeared to have consistent significance across groups of both dependent variables, yet not within all crimes.

Table 62

*Fixed Level Two Effects of Place of Incident across All Crimes*

<table>
<thead>
<tr>
<th></th>
<th>Public</th>
<th>Simple Assault (t)</th>
<th>Aggravated Assault (t)</th>
<th>Robbery (t)</th>
<th>Sexual Assault (t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RCI Economic</td>
<td>.893</td>
<td>.231</td>
<td>-.076</td>
<td>.013</td>
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</tr>
<tr>
<td>RCI Social</td>
<td>-.349</td>
<td>.398</td>
<td>2.872**</td>
<td>-.293</td>
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</tr>
<tr>
<td>Social Disorder</td>
<td>-1.128</td>
<td>-1.938</td>
<td>-.312</td>
<td>-1.838</td>
<td></td>
</tr>
<tr>
<td>Resource Dependency</td>
<td>-.348</td>
<td>-.231</td>
<td>.978</td>
<td>-.294</td>
<td></td>
</tr>
<tr>
<td>Population</td>
<td>-.900</td>
<td>-1.925</td>
<td>-1.303</td>
<td>.635</td>
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</tr>
<tr>
<td>Physical Disorder</td>
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<td>1.759</td>
<td>.362</td>
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<tr>
<td>% under 25</td>
<td>-1.266</td>
<td>-.997</td>
<td>.304</td>
<td>-1.288</td>
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</tr>
<tr>
<td>% Nonwhite</td>
<td>-1.169</td>
<td>-1.092</td>
<td>-3.724**</td>
<td>-.738</td>
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<tr>
<td>% Female</td>
<td>-.847</td>
<td>.141</td>
<td>.128</td>
<td>-.981</td>
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<tr>
<td>Exposure</td>
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<td>-.259</td>
<td>-.945</td>
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</table>
To provide better summative meaning of the results, Table 63 was constructed. The purpose of this Table was to determine the number of times (frequency) that each variable had a significant effect on the dependent variable (victim-offender relationship and place of crime). As can be observed, individual fixed effects (level one effects) most often demonstrated significance, with the exception of day of the week, which was only significant 58.8% of the time. Moreover, incident hour was only significant 70.6% of the time, as was offender sex. Variables measuring target suitability (victim’s physical characteristics/demographics) were all significant over 80% of the time, as were offender’s physical characteristics. Temperature was found to be an important fixed effect, demonstrating significance 94.2% of the time within its respective models.

As previously stated, social fixed effects (second level effects) were scarcely significant across all models. That which showed the most frequent significance within its respective models was social resiliency (52.9%). Economic resilience, however, was only significant within one model. This demonstrates that social resilience generally had a greater impact on victim-offender convergence than economic resilience, thus verifying

**p<.01; *p<.05

Table 62 (continued).

<table>
<thead>
<tr>
<th>Public</th>
<th>Simple Assault (t)</th>
<th>Aggravated Assault (t)</th>
<th>Robbery (t)</th>
<th>Sexual Assault (t)</th>
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<td>-2.758**</td>
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<td>Social Disorder</td>
<td>-1.881</td>
<td>-.923</td>
<td>-2.803**</td>
<td>-1.469</td>
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<td>Resource Dependency</td>
<td>2.855**</td>
<td>2.213*</td>
<td>1.864</td>
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<tr>
<td>Population</td>
<td>1.257</td>
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<td>1.724</td>
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<td>Physical Disorder</td>
<td>.568</td>
<td>1.369</td>
<td>.349</td>
<td>1.242</td>
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<td>% under 25</td>
<td>-3.951**</td>
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<td>-.898</td>
<td>-2.955**</td>
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<td>-.497</td>
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<td>% Female</td>
<td>-.794</td>
<td>-.381</td>
<td>-.089</td>
<td>-.899</td>
</tr>
<tr>
<td>Exposure</td>
<td>1.540</td>
<td>1.707</td>
<td>.014</td>
<td>-.364</td>
</tr>
</tbody>
</table>
partitioning them into two factors. Demographics demonstrated some significant, specifically the percent of the population that was under 25 (35.3%), followed by the percentage of the population that was female (29.4%) of the time. Surprisingly, percentage of the population that was nonwhite was only significant 11.8% of the time. Also of note was the lack of significant contribution population, population race (percentage of the population that was nonwhite), physical disorder and exposure had on either dependent variables. Neither physical disorder nor exposure was significant within any of the models.

Table 63

*Frequency of Significance of Fixed Effects across all Dependent Groups and Crimes*

<table>
<thead>
<tr>
<th>Individual Fixed Effects</th>
<th>Maximum f</th>
<th>Observed f</th>
<th>% Significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Place</td>
<td>9</td>
<td>9</td>
<td>100.0</td>
</tr>
<tr>
<td>VO Relationship</td>
<td>8</td>
<td>8</td>
<td>100.0</td>
</tr>
<tr>
<td>Temperature</td>
<td>17</td>
<td>16</td>
<td>94.2</td>
</tr>
<tr>
<td>Day of Week</td>
<td>17</td>
<td>10</td>
<td>58.8</td>
</tr>
<tr>
<td>Incident Hour</td>
<td>17</td>
<td>12</td>
<td>70.6</td>
</tr>
<tr>
<td>Victim Age</td>
<td>17</td>
<td>14</td>
<td>82.4</td>
</tr>
<tr>
<td>Victim Race</td>
<td>17</td>
<td>15</td>
<td>88.2</td>
</tr>
<tr>
<td>Victim Sex</td>
<td>17</td>
<td>15</td>
<td>88.2</td>
</tr>
<tr>
<td>Offender Age</td>
<td>17</td>
<td>14</td>
<td>82.4</td>
</tr>
<tr>
<td>Offender Race</td>
<td>17</td>
<td>15</td>
<td>88.2</td>
</tr>
<tr>
<td>Offender Sex</td>
<td>17</td>
<td>12</td>
<td>70.6</td>
</tr>
<tr>
<td>Social Fixed Effects</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RCI economic</td>
<td>17</td>
<td>1</td>
<td>5.9</td>
</tr>
<tr>
<td>RCI social</td>
<td>17</td>
<td>9</td>
<td>52.9</td>
</tr>
<tr>
<td>Social disorder</td>
<td>17</td>
<td>3</td>
<td>17.6</td>
</tr>
<tr>
<td>Resource dependency</td>
<td>17</td>
<td>3</td>
<td>17.6</td>
</tr>
<tr>
<td>Population</td>
<td>17</td>
<td>1</td>
<td>5.9</td>
</tr>
<tr>
<td>Physical Disorder</td>
<td>17</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>% under 25</td>
<td>17</td>
<td>6</td>
<td>35.3</td>
</tr>
<tr>
<td>% Nonwhite</td>
<td>17</td>
<td>2</td>
<td>11.8</td>
</tr>
<tr>
<td>% Female</td>
<td>17</td>
<td>5</td>
<td>29.4</td>
</tr>
<tr>
<td>Exposure</td>
<td>17</td>
<td>0</td>
<td>0.0</td>
</tr>
</tbody>
</table>
Hypotheses Testing

The present study was designed with the intent of testing the aforementioned twelve hypotheses. Thus, using the results of the analysis, these hypotheses were tested.

H1: There is an effect of the Resilience Capacity Index on community rates of crime controlling for all other effects.

Within the preliminary analyses, an OLS regression was run to test this hypothesis (see Table 8). As previously discussed, due to the results of the factor analysis (see Chapter IV, Methodology) the Resilience Capacity Index was separated into two scales: social resilience (RCI social) and economic resilience (RCI economic). As can be observed within Table 8, both RCI economic and RCI social demonstrated significant effects on crime rates, controlling for all other effects. Thus, the analyst can conclude that there was support for this hypothesis, meaning that both RCI economic and RCI social are significantly related to crime rates.

H2: There is an effect of changes in the Resiliency Capacity Index on changes in community crime rates controlling for all other effects.

An Ordinary Least Squares regression was constructed to test this hypothesis. As can be observed in Table 9, RCI Economic was found to have a significant effect on mean rate of change for violent crime; however, RCI social showed no such significance. Thus, support for this hypothesis was partial, as relationship between economic resiliency (RCI economic) and rate of change for violent crime is real; however, no such conclusion was made for social resilience (RCI social).
H3: There is an effect of situational characteristics of crime (drug use, incident time, incident day, climate, and place) on the victim-offender relationship controlling for all other effects.

Due to missing data, drug use was not included within the model, thus was not tested within this hypothesis. One can observe the fixed effects within each victim-offender relationship model to determine that the results of the data show partial support for all situational effects (see Tables 20, 26, and 32). Specifically, place of crime had a significant impact on victim-offender relationships across all crimes, and temperature showed significant effects across all crimes (with the exception of aggravated assault within the acquaintance group). Day of the week showed significant effects on victim-offender relationships except within sexual assaults. Lastly, incident hour was shown to have some significant effect on victim-offender relationship, yet showed no significant effects for sexual assault across all groups.

H4: There is an effect of victim demographics on the victim-offender relationship controlling for all other effects

Within the multilevel models, victim age, race, and sex showed consistent significant results across all categories of victim-offender relationships, (see Table 20, 26, and 32) with the one exception being victim age in the romantic relationship group within aggravated assaults. Based on the results, this hypothesis was supported (with the one aforementioned exception) and thus the analyst can conclude that victim age, race, and sex affects the victim-offender relationship and this effect is due to neither chance nor sampling error.
H5: *There is an effect of resiliency on the victim-offender relationship controlling for all other effects*

As previously stated, resilience was separated into two factors: RCI economic and RCI social. Based on the results of the models (see Tables 20, 26, and 32) this hypothesis was partially supported. Economic resilience showed no significance with the exception of the family group model for simple assault. Social resilience, however, did demonstrate some significant effects across crimes, specifically within the romantic relationship group within sexual assault, the family group within both aggravated and sexual assault, and the acquaintance group within sexual assault.

H6: *The effects of target suitability (victim demographics) on victim-offender relationships vary across communities*

Within the primary analysis, the last step for each model was to assess whether the effects of target suitability (victim characteristics/demographics) on the type of victim-offender relationship varied significantly across communities (see Table 22, 28, and 34). The results from each crime model (simple assault, aggravated assault, and sexual assault) demonstrated that victim age, race, and sex significantly varied across communities. The one exception to this can be found within the sexual assault model (Table 34), where the effects of victim race on victim-offender relationships did not significantly vary across communities. Based on the overwhelming support (with the one aforementioned exception) the analyst can conclude that the effects of target suitability on victim-offender relationships vary across communities and this effect is due to neither chance nor sampling error.
H7: *The effects of situational variables (incident hour and incident place) on victim-offender relationships vary across communities*

In addition to victim demographics, both incident hour and incident place were examined to determine whether the slopes of both variables significantly varied across communities. By examining the random effects models, the analyst can conclude that there was partial support for this hypothesis (see Tables 22, 28, and 34). Specifically, the effects of place on victim-offender relationship significantly varied for all groups within the simple assault model, all groups within the aggravated assault model, yet only in the family group within the sexual assault model. The effects of incident hour on victim-offender relationships significantly differed across communities within all groups of the simple assault model, yet no groups within the aggravated assault model or the sexual assault model. Therefore, the analyst can conclude that the effects of situational variables (incident hour and incident place) on victim-offender relationships significantly vary across communities for simple assault offenses and this effect is due to neither chance nor sampling error. Moreover, the analyst could conclude that the effects of place on victim-offender relationships significantly vary across communities for simple assault. However, any other conclusions about effects could only be met with partial support.

H8: *There is an effect of situational characteristics of crime (drug use, incident time, incident day, climate, and victim-offender relationship) on the place of crime controlling for all other effects.*

One can observe through observation of the fixed effects within all place models that the victim-offender relationship significantly affected place of crime classification across all groups and all crimes (see Tables 38, 44, 50, and 56). Moreover, temperature
demonstrated significant effects on victim-offender relationships across all groups and categories with the exception of the public places category within the robbery model. Day of the week had some effect on the place of crime, demonstrating consistent significant effects across all groups for both simple assault and aggravated assault; however, showed no significant effect within either robbery or sexual assault. Lastly, incident hour had a significant effect on place of crime classification for all crimes except for incidents of robbery. Thus, from the results, the analyst can conclude there was partial support for this hypothesis, and more specifically conclude that situational variables affect the place of crime within both simple and aggravated assaults. Additionally, the analyst can conclude that the victim-offender relationship significantly affects the place of crime. Lastly, the analyst can conclude that the incident hour affects the place of sexual assault, and that this relationship is due to neither chance nor sampling error.

**H9: There is an effect of victim demographics on the place of crime controlling for all other effects**

Through examination of the level one fixed effects, there was partial support for this hypothesis (see Tables 38, 44, 50, and 56). Victim age and sex consistently had a significant effect on the place of crime for all groups within all crime models. Victim race, however, showed a significant effect across all crimes, but only in the public group, and only showed a significant effect for the outdoor groups within the simple assault and sexual assault model. Thus, the analyst can conclude that both victim age and victim sex have an effect on place of crime (with the exception of sexual assault). Furthermore, one can conclude that victim race has a significant consistent effect on place of crime for both simple and sexual assault.
H10: There is an effect of resiliency on the place of crime controlling for all other effects

Second level effect place models were examined to determine that there was only
partial support of this hypothesis (see Tables 38, 44, 50, and 56). Economic resilience
showed no significant effect across any groups or crime models. Social resilience,
however, was found to have a significant effect in the public group within incidents of
robbery, yet had no significant effect within the outdoor group on robbery. Furthermore,
social resilience had a significant effect on place classification within simple assault,
aggravated assault, and sexual assault within the outdoor group of the place model. Thus,
the analyst can only conclude that there was partial support for this hypothesis, as no
model of any crime demonstrated consistent significant effects across both groups of the
place model.

H11: The effects of target suitability (victim demographics) on place of crimes vary
across communities

Random effects across all place models were assessed to determine there was only
partial support of this hypothesis (see Tables 40, 46, 52, and 58). Specifically, the analyst
can conclude that the effects of victim demographics on place of crime do vary
significantly across communities for simple assault, aggravated assault, and robbery, and
these effects are due to neither chance nor sampling error. For sexual assault, the analyst
can only conclude that the effects of victim age on place vary across communities and
that these effects are neither due to chance nor sampling error.

H12: The effects of the incident hour on place of crimes vary across communities

Random effects across all place models were assessed to determine there was only
partial support of this hypothesis (see Tables 40, 46, 52, and 58). The effects of incident
hour on place of crime in the outdoor group for robbery did not significantly vary across communities. Additionally, the effects of incident hour on place did not vary across communities for either group within the sexual assault model. Thus, the analyst can conclude that the effects of incident hour on the place of crime do vary across communities for both aggravated assault and simple assault, yet cannot make such conclusions about sexual assault or robbery.

**Conclusion**

In order to examine the individual and social effects on victim-offender convergence, multilevel multinomial models were constructed. Specifically, the study assessed the individual and social effects on victim-offender relationships within three crimes: sexual assault, aggravated assault, and simple assault. Additionally, the study assessed the individual and social effects on victim-offender relationships within four crimes: sexual assault, aggravated assault, simple assault, and robbery. The models examined fixed individual and social effects of incidents of crime over a five year period (from 2005-2009) within 90 communities. Furthermore, the study assessed whether individual and situational effects on victim-offender convergence varied across communities. The results revealed that both social and individual variables have a significant effect on victim-offender convergence, and that individual and situation effects do vary across communities. Therefore, one can conclude that it was important that the analyst assessed the data under the assumption that incidents of crime and the victims and offenders involved within those crimes were nested within communities. Furthermore, the study demonstrated the significant contribution measures of resilience
made on explaining variations in both crime rates and changes in crime rates, as well as the prediction of classifying victim-offender relationship and the place of crime.
CHAPTER VI

DISCUSSION

Introduction

There has been a recent movement within criminology to assess crime through a contextual approach. In his 2012 presidential address to the American Society of Criminology, Robert Sampson (2013) purported that creating a model that only included individual level factors would lead to little more than 30% explained variance. Thus, he argued there was a need to integrate social-level factors to increase explanatory power of models; he referred to this as *contextual causality*.

The foremost conjuncture within environmental theories of crime is crime prevention through means beyond that of the targeted individual. Routine activities theory (Cohen & Felson, 1979) emphasized the importance of examining not only the mundane day-to-day bustle of the victim, but also of those whom surrounding the targeted victim. They argued that guardianship existed within the immediate social surroundings of the area. Felson (1995, 2000) continued to expand on guardianship, and eventually argued for macro-micro approaches to assess the effects of routine activities on crime. Other suppositions within criminology have grown on this original argument; Eck (1994) introduced another type of guardian, the *manager*, who is the protector of places. Felson (1994) examined this new guardian to further examine the relationship between guardianship and victim-offender relationships through socio-structural model approaches. Moreover, Clarke’s (1980; 1997) situational crime prevention, Newman’s (1976) defensible space, and Jeffery’s (1971) crime prevention through environmental design have all placed great importance on the place of crime and how the social and
geographic characteristics within the immediate surrounding area affect victim-offender convergence. The place in which a victim is being targeted by a motivated offender can act as either an effective guardian or may facilitate victimization.

Temporal and spatial convergence is the focus within routine activities theory; however, the theory failed to operationalize actual victim-offender convergence to examine its actual effects. Instead, it has been employed abstractly, or assumed to exist, simply because the crime took occurred, thus, the victim and offender inevitably had to converge within time and space. This assumption is similar to one of routine activities’ foremost criticisms: failing to measure or include offender motivation. It has oftentimes simply been assumed it was so because the crime occurred (Akers, 1999; Bernburg & Thorlindsson, 2001; Paulsen & Robinson, 2004; Schwartz et al., 2001). Thus, in order to examine victim-offender convergence, one must first define it. Some have assessed victim-offender convergence solely as the victim-offender relationship, while others have examined the effects of place on victim-offender relationships. Corresponding with contextual causality (Sampson, 2013), research has demonstrated that victimization odds are affected by individual lifestyles, as well as the surrounding social and structural (situational/place) characteristics (Miethe & McDowall, 1993; Rountree et al., 1994; Tewksbury & Mustaine, 2006).

Summary

The primary purpose of this study was to examine the environmental, situational, and individual effects on victim-offender convergence within violent incidents of crime. More specifically, this study employed the theory of resilience as a measure of social and/or environmental characteristics and their effects on victim-offender convergence
within violent crime. Using multiple data sources, this study examined incidents of simple assault, aggravated assault, sexual assault, and robbery. Within each incident of crime, individual (micro or first-level) and social (micro or second level) variables were assessed, including victim and offender demographics, the average temperature within the area during the day of crime, the day of the week the crime occurred, the hour in which the crime was committed, the place of crime\textsuperscript{14}, and victim-offender relationship\textsuperscript{15}. Moreover, social variables were included within each record, specifically the corresponding community’s level of social disorder, physical disorder, exposure, economic resilience, and social resilience, as well as city demographics (percentage of population under 25 years of age, percentage of population that was nonwhite, and percentage of population that was female). These measures were then employed into models in an effort to explain differences in the odds of victim-offender relationships (family, stranger, romantically involved, or acquaintance) or the place of the crime (public, outdoors, or residence). Thus, both place and victim-offender relationship are used as a theoretical definition of victim-offender convergence.

To keep with the contextual model, the individual effects of place and victim-offender relationship were first examined followed by inclusion of the social factors to assess both fixed effects and random effects of target suitability (victim demographics), as well as temporal (incident hour) and spatial characteristics (place of crime for victim-offender relationships models). These were included to test the hypotheses that the effects

\textsuperscript{14} Place of crime was dichotomized and employed as an independent level-one predictor in victim-offender relationship models.

\textsuperscript{15} Victim-offender relationship was dichotomized and employed as an independent level-one predictor in place of crime models.
of target suitability, space, and time on victim-offender convergence varied across communities.

Conclusions and Discussion

The results of this study revealed a number of important findings about the social, situational, and individual effects on victim-offender convergence. While some of the findings coincided smoothly with past research, other findings showed contradicting findings. Moreover, the goal of this study was to approach the examination of crime in a novel way by examining the social effects of crime traditionally (social and physical disorder), as well as a macro measure of target suitability (exposure). Most importantly, this study included the theory of resilience to determine its effects on victim-offender convergence and crime. While resilience has been used to explain phenomena within several disciplines, its effects on crime have yet to be explored.

Generally, the results of this study demonstrated a number of important findings. Thematically, the implication of the findings shows that victim-offender convergence is possibly preventable through community prevention. To clarify, those community effects which showed the most impact on victim-offender convergence were arguably dynamic characteristics (particularly social resilience), that can shift through changes in community building. Furthermore, the study’s results showed stronger support for a collective efficacy model (through social resilience) than a social disorganization foundation. Specifically, there was little significance found with population race or economic state of communities; the most significant findings were in social aspect of the community, particularly social resilience. Moreover, those demographics which were
significant may be indicative of collective efficacy efforts within the community (community age and community gender). Thus, this should be further explored.

Individual Effects

Traditional models of crime have assessed how individual characteristics affect the likelihood of crime or victimization. Contextual models have shown that situational and environmental variables oftentimes have an effect on individual variables, particularly when assessing victim and offender physical characteristics and routine activities. In particular, younger individuals will oftentimes frequent more dangerous places, especially at later hours of the day, while older victims were more likely to say within the home. Canter (1996) purported that an offender’s approach to a crime; meaning his or her method of targeting a victim, can provide ample information about the characteristics of both the victim and the offender. Thus, logically the victim and offender characteristics may provide explanation of the approach to the crime. Furthermore, females are oftentimes more cautious about their daily activities, yet may not account for actual risk in their assessment of danger (Franklin et al., 2012).

Additionally, the victim and offender demographic characteristics together can oftentimes affect their type of relationship. For instance, a juvenile victim and a much older offender are more likely to be related than a victim and offender who are of equal age. Thus, the researcher hypothesized that both victim and offender characteristics would have a significant effect on victim-offender relationships and the place of the crime.

Victim Demographics. As indicated by past research, the results demonstrated that victim demographics (age, race, and sex) did have an effect on crime, particularly victim-offender relationships and the place of crime. The results demonstrated that victim’s
gender consistently had an effect on the place of crime. Specifically, a woman is most susceptible to becoming a victim of assault or robbery in her home rather than in public or outdoors. Past literature has shown women oftentimes have escalated fear of crime, particularly of sexual assault (Valentine, 1989; Khan et al., 2005; Lane et al., 2009). This fear oftentimes limits women’s routine activities, especially if such activities would be committed alone (Valentine, 1989). This coincides with these findings that Kennedy & Forde (1999) found that young single men who regularly go to bars and night clubs were most susceptible to being victims of crime. These relate to the present findings that women are more likely to be victimized at the home (in either assaults or robberies).

Moreover, Finkelhor and Asdigian (1996) found that physical factors and age has a significant effect on victimization risk. The results of this study generally showed that a younger victim is more likely to be victimized outside their home rather than in public or outdoors. Although there were no individual measures of routine activities included in the model, younger individuals are oftentimes more prone to participating in activities outside of the home; thus, they are likely more vulnerable to crime taking place in public or outdoor areas, as their routine activities naturally put them in such places.

**Offender Demographics.** The results revealed that younger offenders were more likely commit a crime outside of the home rather than in public or outdoors. Additionally, the offender being older increased the likelihood that the victim and offender were romantically involved (in simple and aggravated assaults) or were family members (in aggravated or sexual assaults). Just as male offenders are more likely to commit crime in the homes, so too were older offenders. This finding may be explained in two different ways, dependent on the victim-offender relationship. First, if the victim and offender
know one another, they are more likely to cohabitate with age, thus, the two individuals were already present in the home prior to the commission of the crime. If the victim and offender were strangers, this demonstrates that older offenders were more likely to plan a crime rather than take an opportunity that presented itself.

Within all crimes, the offender being female decreased the odds that the crime occurred in the home. Meaning that male offenders were more likely to intrude into one’s home to commit the crime, regardless of whether it was robbery, sexual assault, aggravated or simple assault. Additionally, the offender being female increased the odds that the victim and offender knew one another romantically (in aggravated and sexual assaults), were family members (in aggravated and sexual assaults) or were acquainted (in aggravated or simple assaults). Violent crimes which occur in the home are due to the victim and offender both residing in the home, or the victim or offender having some previous relationship with the other party and inviting them into the home. However, when a violent crime occurs within the home and the victim and offender have no prior relationship, this may demonstrate greater planning on the offender’s part to target the victim. This could; however, be attributable to bonus crimes (Warr, 1988), where the offender originally planned on burglarizing the home and then came across the victim. Warr (1988) specifically referenced these bonus crimes to sexual assault. Moreover, it demonstrates that crimes which occur outside the home when the victim and offender are strangers are arguably more opportunistic.

Female offenders committing crime in public coincides with the aggression aspect of women and aggravated assault within Krienert and Vandiver’s (2009) study, in which they found that women who committed aggravated assault were usually younger than the
average male offender and were oftentimes more likely to use a weapon during the commission of the crime. They also had a greater tendency to victimize other women whom with they had a previous relationship.

Situational Effects

Examining situational effects has become more and more commonplace within criminological research. Particularly after the introduction of theories such as situational crime prevention (Clarke, 1983, 1997) and Eck’s (1994) emphasis on place within routine activities theory, research has consistently shown that place and guardianship of and within that place affect motivation of the offender and the likelihood of victimization. It is important to the relationship between the place of crime, and victims and offenders to understand the opportunity of crime (Clarke, 1993; Ekblom & Tilley, 2000). Kennedy and Forde (2009) argued that situational factors and their effects on individual characteristics of crime help explain violent crimes within a routine activities and opportunity context. Moreover, guardianship of a place is likely indicative of informal guardianship or social control of a community, and thus should be incorporated within a model of crime (Lee, 2000).

Place of crime (victim-offender relationship). Consistent with past literature, the results of this study demonstrated that when sexual, simple, or aggravated assault occurred within the home, they were more likely to be committed by intimate partners, family, or acquaintances than those who are strangers to the victim. Coinciding with domestic violence literature, this is seemingly sensible; those offenders and victims who cohabitate will most often converge within the home at a greater rate than victims and offenders who are strangers. Tita and Griffiths (2005) claim that examining the
relationship in context of place is important, as victim and offenders who know one another will create less mobility and likely be committed in an indoor area. As Messner and Tardiff (1985) contended, those potential victims whose life is focused around the home are those who were murdered in the home by known assailants. Muehlenhard and Linton (1987) found a strong relationship between place and victim-offender relationships, stating that the location of the date for victims and offenders affected the likelihood of sexual assault. The findings of this study showed that those who were acquainted and ended the date in the home were more likely to be victimized than an offender simply intruding into an unknown victim’s home.

The location of the crime has demonstrated great importance within the criminological literature. Smith et al. (2000) contributes these effects to mixed land use and activities within areas. While distance from the city decreased victimization within robbery, motels and hotels vastly increased it. Warr (1988) found a strong relationship between burglary and rape when controlling for the place of crime, finding rapes were often opportunistic *bonus crimes* in addition to an already planned burglary. Furthermore, the place of a crime is oftentimes indicative of the routine activities of the individuals populating that place. This is particularly true when examining communities’ alcohol outlet density, finding it to have a positive effect on assault (Hipp, 2007a; Pridemore & Grubesic, 2011; Zhang & Peterson, 2007). According to Armstrong et al. (2006), the likelihood of rape was affected by the place and the social characteristics of the place’s population.

*Time.* The findings of this study demonstrate that the later the hour of the crime, the greater the odds that simple assault, sexual assault, and aggravated assault were
occurring outdoors rather than in the residence. However, the results also indicated that the later the hour of the crime the greater the chance that a simple or sexual assault was committed by an assailant known to the victim. Furthermore, the data showed that simple, aggravated, and sexual assaults that occurred later in the week increased the likelihood that the crime was committed by a stranger, and increased the likelihood that the crime was committed outdoors or in a public area. This demonstrates that later hours on the weekend create the greatest timed chance of an individual being victimized outdoors. This somewhat contradicts the findings of Messner and Tardiff (1985), although they were examining incidents of homicide. Within their study, they found that homicide was more likely to be committed by strangers if they occur during the weekday, not the weekend. Furthermore, they found that the time of day in which the crime occurred had no bearing on homicide effects. This demonstrates that various crimes are diversely affected by temporal characteristics. This may be due to preventative measures of the potential target. Khan et al. (2005) found that time of the day had a significant association with fear of crime, thus, potential victims avoided nighttime activities, feeling particularly exposed as a suitable target during those times. Similarly, Mieczkowski and Beauregard (2010) examined the effects of situational effects on sexual assault having a lethal outcome. However, their findings indicated little effect of situational effects on lethal outcomes of sexual assault. Moreover, the routine activities likely differ regardless of self-protection mechanisms. Eckhardt (2008) found that time and season had significant effects on the likelihood of sober or drinking victims and offenders. Moreover, time of day may be particularly important when examining the offender’s intent – whether planned or opportunistic. Kocsis and Irwin (1997) found that the distance in
which an offender traveled was related to the time of the day in which the crime occurred. The effect of time within place should be of particular importance as they provide spatial and temporal measures of victim-offender convergence; however, time also affects the overall social control of a place. Who dominates an area is contingent upon the time of day. While a park may be dominated by children and their parents during the day, nighttime may cast juvenile delinquents in the domineering role (Valentine, 1989).

*Temperature.* The relationship between weather and crime has shown to consistently have an effect on crime, yet its theoretical foundation has been disputed. As expected, within the present study, the data showed that warmer temperatures increased stranger victimization within sexual, aggravated, and simple assaults. Furthermore, the findings generally showed that warmer weather increased the likelihood of a crime being commissioned outside rather than in the home. Unexpected; however, were the effects of temperature within crime when comparing incidents in public places versus the residence. Increases in temperature were shown to have a significant increase in the odds of a crime occurring in the home rather than a public area for sexual, aggravated, and simple assaults. The effects of temperature have typically been attributed to psychological rationales or routine activities. Baron and Ransberger (1978) found a curvilinear relationship between temperature and civil disorder, while Cohn and Rotton (2000) contended that routine activities provided a much stronger explanation of the relationship between weather and crime. The findings here coincide with routine activities, showing that warmer weather increases potential targets accomplishing their everyday, mundane
activities in outside areas, or perhaps traveling from one activity to another outside rather than in a vehicle or public transportation.

*Victim-offender relationship (place models).* The victim and offender being strangers increased the likelihood of the crime occurring outside the home for all crimes except robbery. When the victim/offender were strangers, robbery was more likely to occur in the home than in public or outdoors. Research has demonstrated the importance of the victim-offender relationship in explaining variation in violent crime (Bachman et al., 1992; Chamlin, 1989; Scott & Beaman, 2004). LeBeau (1987) found that serial criminals were more likely to victimize individuals whom they did not know, as they believed it would decrease their likelihood of arrest.

**Traditional Environmental Effects**

*Social Disorder.* The current study incorporated a ratio of social disorder offenses (prostitution, public drunkenness, loitering) to the population. The study revealed its effects on victim-offender relationships and places of crime incidents were minimal. Social disorder decreased the likelihood of a robbery occurring outdoors rather than in the home and increased the odds that aggravated assaults were committed by family members rather than strangers. While the minimal effects are somewhat consistent with the literature; for instance, Sampson and Raudenbush (1999) included measures of land use, which nullified the original effects of social disorder. Thus the inclusion of place of crime, as well as other environmental factors may negate the effects of social disorder. Moreover, social disorder events were only available if they resulted in an arrest, thus, the operationalized measure of social disorder may be a more valid measure of police efficacy rather than disorder within the area.
**Physical Disorder.** The present study included physical disorder an environmental measure of social disorganization. The results revealed that it had no significant effect on victim-offender relationships or place of crime. This lack of significant contribution to the model may be due to its operationalization (percentage of abandoned homes within the area), however, it may be that the relationship between physical disorder and the dependent variables are indirect. Shaw and Mckay (1942) purported that physical disorder was only one aspect that was indicative of social disorganization. Additionally, Woldoff (2006) found that physical disorder was related to fear of crime and social control; thus, the present models may already be accounting for any variance that can be explained by physical disorder. Conversely, other studies have emphasized the importance of the direct effects of physical structure and disorder on crime (Kelling & Coles, 1996; LaGrange et al., 1992; Ross & Jang, 2000; Sampson & Raudenbush, 2004; Stark, 1987; Wilson & Kelling, 1982).

**Resource Dependency.** Employed within both resilience and criminological literature, resource dependency was measured as the ratio of police officers to the population. The data revealed surprising effects: resource dependency increased the likelihood that simple and aggravated assaults would be committed outdoors rather than in the home. This may be attributable to an issue of temporal ordering; areas with higher crime may reactively supply more police officers, which may in turn have no significant effect on crime.

**Exposure.** Exposure has been employed within studies on routine activities, yet have examined exposure on the individual level (Franklin et al., 2012). Prior research on resilience has also assessed exposure, yet it is operationalized as the likelihood of risk to
enduring harm and/or risk within the community (Cumming, 2011; Luthar & Cicchetti, 2000; Miller et al., 2010). Within the current study, exposure was measured at a macro level to assess the access and visibility of the community. The present analyses revealed that exposure had no significant effects on victim-offender relationships or place of crime and should not be included in future research on victim-offender convergence.

Population Characteristics. Four population characteristics were employed within the models: the mean population from 2005-2009, percentage of the population that was female, under 25 years of age, and nonwhite. Most surprising was the negligible effect population and percentage of the population that was nonwhite had on either place of crime or victim-offender relationship. Specifically, higher populations increased the odds of stranger victimization rather than familial victimization within sexual assaults. Considering the fact that the foundation of social disorganization theory focuses on the effects of urban growth (Shaw & Mckay, 1942), these current results very much contradicted this original proposition. It may be that population affects crime rates, yet has little bearing on victim-offender convergence. Additionally, it may be that urban growth affects mixed land use, and thus incorporating the place of crime controls for its effects (Stucky & Ottensman, 2009).

Also surprising, in light of the fact that social disorganization theory places great emphasis on population heterogeneity and immigration (Paulsen & Robinson, 2004; Porter & Pursuer, 2010), were the insignificant effects of community race. Paternoster and Bachman (2001) argued that these measures were of importance because they demonstrated instability and differences, not because minorities were simply committing more crimes (Paternoster & Bachman, 2001). However, the current study’s findings are
aligned with those that have found the effects may be multifarious or indirect (Grattet, 2009; Warner & Pierce, 1993).

**Resiliency to Crime**

The secondary goal of this study was to employ measures of resiliency and examine its effects on crime. Social disorganization approaches to crime prevention call for the reform of places, not people (Sampson, 2003). The foundation of social disorganization was centered on understanding effects of demographics and mobility on communities. These factors are arguably unlikely to change regardless of reform. However, expansions of social disorganization theory, particularly collective efficacy (Sampson et al., 1997) and Broken Windows (Kelling & Coles, 1982), called for the need to create more social cohesion and efforts to clean up observable physical disorder to decrease crime. However, policy implementation and its effects have been diminutive. While Shaw (1929, 1931, 1938) established and ran the Chicago Area Project for 23 years, no data were ever recorded to assess how its focus on quality of life affected crime (Bernard et al., 2010). As Raghavan et al. (2006) purported, policy focused on these theories can only improve with valid assessment.

Similar to collective efficacy, resilience measures the positive effects of a community on crime. Resilience has typically been applied to create a risk-management model to determine how changes in a community or organism have affected their overall strength against harm or hazards, yet also how members of the community can change to increase that strength. Conversely, social vulnerability is resiliency’s antithesis, similar to the relationship of collective efficacy and social disorganization.
Measuring resilience can be tested from a number of approaches. Boos, Mobley, Boyd, and Wheaton (2009) purported that social vulnerability can be examined through a situational approach that examines “the nature of daily life, actual situations, how situations have changed, and how they are changing” (p.2). Regardless of the measure, there is a consistent emphasis on various typologies of capital, whether it be social, human, economic, natural, or human capital. Criminological literature that focuses on social effects of crime has shown the commonalities which exist between social capital and social control within collective efficacy, social disorganization, and routine activities theory. Thus, the goal of this study was to provide an all-encompassing measure of these that could be derived from secondary data sources. Foster’s (2010) Resilience Capacity Index was employed and an exploratory factor analysis revealed two theoretically justifiable factors: economic and social resiliency. The data were then tested to determine the effects of resiliency on rates of crime and changes in crime over a five-year period. The impact of social resilience and economic resilience on crime rates was stronger than any other social variable (physical disorder, social disorder, population and exposure), yet only economic resilience showed significant effects within the rate of change in crime rates model (yet still demonstrated the strongest impact on changes in crime rates). Thus, from the preliminary analysis it was clear that examining crime solely from a community level, both social and economic resilience are important measures to explain community crime rates.

The preliminary analyses also provided evidence of one of the main proponents of resiliency: buoyancy to harm and change, and ability to change to prevent future risk and harm. While social resiliency and economic resiliency were negatively related to crime,
economic resiliency and social resiliency (although nonsignificant) were positively related to changes in crime. Thus, the higher the resiliency, the less crime, the greater annual change in crime. Rate of change was measured in absolute values\(^{16}\), thus the direction of change is unknown; however it is likely that crime decreased over time.

Within the primary analyses models, social resilience was significant more often than any other social variable, including population demographics. Economic resilience was only significant within one model and was not as influential in explaining victim-offender convergence. Moreover, it consistently decreased the odds of stranger victimization and public or outdoor crime (with the exception of robbery). Thus, one can theorize that resiliency, as measured in this study, provides accurate measures of social control and supports findings from prior research that demonstrated that social control has a greater effect on crimes committed by strangers than victims who know their assailant (Lee, 2000). Additionally, high levels of social control are also indicative of guardianship at a community and place level (Clarke, 1997; Felson, 1986; 1994; 2000; Groof, 2008; Lee, 2000; Spano & Nagy, 2005).

The purpose of including measures of resilience was to determine whether it would provide a more parsimonious explanation of crime, particularly victim-offender convergence. These results give preliminary indication that resilience perhaps provides a better theoretical and statistical measure of crime. It incorporates measures of collective efficacy and social disorganization as well as measures of guardianship and routine activities theory. Furthermore, the theoretical utility of resilience has been established within the social sciences and has been attached to political movements of community

\(^{16}\) Rate of Change was measured as absolute value due to variability of crime rates increasing and decreasing over time.
improvement. Therefore, in addition to its possible statistical and theoretical authority within the present study, policy implementation has already begun to occur.

Examining Victimization Risk across Violent Crimes

While one of the foremost goals of any theory is parsimony, there has yet to be a theory that explains all crime in any simple manner. Past research on contextual causes of crime have examined crime within different models, therefore, this study followed that approach. Thus, in order to assess differences in factors influencing various crimes and suitable targets for particular crimes this analysis identified victim characteristics and situational characteristics that would create the greatest odds of the crime being committed by a stranger, as well as what characteristics would create the greatest odds of the crime being committed outdoors. Since stranger victimization and outdoor victimization are oftentimes most feared (Garfinkle, 2003; Wiles, Simmons, & Pease, 2003) these were used as the references to assess odds of victimization based on individual victim characteristics and situational effects.

Stranger victimization. Within aggravated assaults, those who are most likely to be assaulted by a stranger were young, white, females. They were most likely to be victimized in a public place or outdoors in warmer temperatures, during later parts of the week or the weekend, during earlier hours of the day. Within sexual assaults, those most likely to be victimized by a stranger are older, nonwhite, females. They were most likely to be assaulted in a public place, later in the day, yet earlier in the week during a time of warmer climate. Within simple assaults, those most likely to be victimized by a stranger were younger, nonwhite males, in a public place, later in the week, yet earlier in the day in warmer temperatures.
Thus, while some situational effects on stranger victimization remain relatively constant across crimes (warmer temperature and public place), time varies across crime (later in the week and earlier in the day for aggravated and simple assaults, while earlier in the week and later in the day for sexual assaults). Furthermore, target suitability by physical characteristics varies substantially across crimes. These findings demonstrate the importance of examining crimes separately, yet also provide essential information for crime prevention. Individual risk of stranger victimization can be assessed within context of the situation. This can be employed by both guardians within places, as well as potential victims themselves.

Outdoor Victimization. Within simple assaults, those most likely to be victimized outdoors are younger, nonwhite males, who do not know their attackers, later in the day and week, and in warmer temperatures. Within aggravated assaults, those who are most likely to be victimized outdoors are younger nonwhite males during warmer temperatures, later in the day and week, who do not know their attackers. Those who are most likely to be robbed outdoors are older, nonwhite, females, during the later days in the week and later in the day\textsuperscript{17}, who know their attacker. Those who are most likely to be sexually assaulted outdoors are older, nonwhite, within warmer temperatures, later in the week\textsuperscript{18}, and later in the day.

Likelihood of victimization outdoors demonstrates some variability. Aggravated assault and simple assault mirror one another in both individual and situational variables, and temporal measures (incident hour and day of the week) remain constant across all crimes. However, most likely victims to be sexually assaulted outdoors differ in age from

\textsuperscript{17} Neither day of week nor incident hour was significant for this model
\textsuperscript{18} Day of the week was not significant for this model
robbery, and gender from simple or aggravated assault. Again, this demonstrates that victimization risk varies across crimes in context of the situation. Therefore, this should be further researched and made known to the public for purposes of crime prevention.

Limitations

This study is not without its limitations. First, the study employed a number of secondary data sources, which bring rise to a number of issues. Second, the researcher operated under the assumption that data were imputed accurately by all whom entered the data. This is likely inaccurate, as mistakes by imputation are inevitable. Furthermore, while data were collected based on their unit of analysis being the corresponding community or the incident, there is likely some variation in the unit of analysis across data sources. Additionally, the primary data source, NIBRS, encourages those who impute the data to use some subjective interpretations rather than leaving information blank. Therefore, ones interpretation of victim-offender relationship may differ from another’s, or from the researcher’s interpretation of the data. Therefore, caution should be taken when interpreting these results.

Furthermore, while the intent of this study was to provide national generalizable results, the base data (NIBRS), is in no way nationally representative, as agencies are not required to participate in data submission, thus limiting the overall accessibility of incident records across the United States. Therefore, while the data remains the most comprehensive source of detailed crime information, it is still vastly limited in its generalizability. Moreover, data were only employed within the present analysis for communities with greater than 65,000 to 500,000 people, thus, can only be generalized to cities with mid-size populations.
While the goal of this study was to examine victim-offender convergence within space and time, this analysis is somewhat limited. Ideally, geographic coordinates of victim and offender residences, as well as the incident would be included within the data to assess distance from both the victim and offenders home. Moreover, the geographic coordinates would be employed to better understand the place of crime. However, due to limitations of the presently available data, this was not feasible.

Within this present study, social variables were measured at the community level. This limits variation that likely exists within census blocks or tracts of the community. Again, due to limitations of the data, the smallest social unit of analysis available was the corresponding community of the agency, and thus, was used for purposes of the social/environmental variables.

Lastly, while multilevel models provide context to individual data, their detail are still lacking. Thus, future research should employ mixed-methods approaches to better understand victim-offender convergence and its individual, situational, and social effects. Moreover, this sort of approach would provide increased data on offender motivation, victim’s fear of crime, and the effects of the community and place on both offender motivation and target suitability.

Policy Recommendations

The results of this study demonstrated that place and time play an important role on victimization and victim-offender relationships. Thus, keeping with Sampson’s (2013) emphasis on reform of places, not people, places should be designed to protect high-risk victims and monitor high-risk victim-offender relationships. For instance, outdoor areas should be well-lighted and monitored throughout both the day and night to provide better
formal and informal guardianship. Moreover, the importance of place in context of crime should be examined specifically within communities and their land use. Stucky and Ottensmann (2009) purported that in a community where nonresidential land use (hotels, motels, tourist attractions) is excessive, more crime may occur at a hospital, because it converges victims and offenders who are strangers. Therefore, community prevention programs should examine hot spots of crime (Sherman et al., 1989) in an effort to determine why they have elevated rates of crime, as well as how the community contributes to those increased rates of crime.

Furthermore, communities should better educate their members on victimization risk, and extinguish irrational fears of crime by providing better understanding of victimization risk within one’s community. Moreover, such programs would bring people together and would likely increase social cohesion, which in turn, would increase informal social control and/or guardianship.

Arguably, the most important finding of this study was the importance of resilience within each model, particularly that of social resilience. While financial capital and community demographics are somewhat inflexible within reform, social capital and cohesion can be improved through government and community efforts. This is already observable with the Resilience Alliance, a “research organization comprised of scientists and practitioners from many disciplines who collaborate to explore the dynamics of social-ecological systems” (Resilience Alliance, http://www.resalliance.org/index.php/about_ra) that works to better understand the effects of resilience, and implement its framework to build better communities.
In addition to the pre-existing movement of policy implementation through a resilience framework, resilience has demonstrated community improvement within other forms of capital and risk-management. Thus, using resilience to better develop communities accomplishes a number of goals in addition to the possible decrease in crime. Therefore, from a cost-benefit approach, its efforts are likely financially sound in relation to its benefits. Furthermore, examining the effects of resilience movements within communities should require little extra implementation than what is already surfacing; one simply needs to examine the effects on crime in addition to overall community improvement.

Future Research

The aim of this study was to provide a preliminary analysis of the contextual effects on victim-offender convergence within communities. Moreover, its secondary aim was to implement and test the effects of resilience on community crime.

In order to determine the utility of resilience in explaining crime, future research should incorporate existing measures of resilience to determine its effects on crime and victim-offender convergence. Moreover, future studies should aim to test the theory against other social theories of crime (like social disorganization and collective efficacy) with accurately operationalized measures of each concept. Resilience should be examined at a lower level to determine its social effects (at either a block or tract level) to better understanding the variability of the relationship between resilience and crime across cities. While research on resilience within the social sciences is prevalent, its effects on crime remain unknown, thus ethnographic research within communities to determine their resilience would be an important contribution to the literature.
Future research should also focus more on the relationships between victim-offender relationship and the place of crime, as well as target suitability and the place of crime. Keeping with the effort to reform places, not people (Sampson, 2005), examining more comprehensive contextual models of crime within cities would provide a more implicit approach to preventing crime through place design.

The results from this analysis suggest planners and policymakers need to rethink their approach to crime control and community development. Strategies such as community reinvestment (Clear, 2011) build individual, community, and corporate resilience and need to become an integral part of our dialog on crime prevention. These findings, the first to introduce resiliency as a measure of crime, suggest a new way of thinking about crime prevention and a theoretical framework for making policy changes that are grounded not only in an intuition about what works, but also in empirical evidence.
APPENDIX A

INSTITUTIONAL REVIEW BOARD APPROVAL

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NOTICE OF COMMITTEE ACTION

The project has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 21, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the “Adverse Effect Report Form”.
- If approved, the maximum period of approval is limited to twelve months.

Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: 13051601
PROJECT TITLE: An Examination of Cities’ Resilience to Violent Crime: A Contextual Analysis of Victim-Offender Convergence
PROJECT TYPE: Dissertation
RESEARCHER(S): Vanessa Woodward
COLLEGE/DIVISION: College of Science and Technology
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IRB COMMITTEE ACTION: Expedited Review Approval
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Lawrence A. Hosman, Ph.D.
Institutional Review Board


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