Fall 12-1-2015

A Multi-Method Examination of Homicide Investigations on Case Outcomes

Shila René Hawk
Georgia State University

Abstract

A MULTI-METHOD EXAMINIATION OF HOMICIDE INVESTIONATIONS ON CASE OUTCOMES

By

SHILA RENÉ HAWK

December 1, 2015

Committee Chair: Dr. Dean Dabney

Major Department: Criminal Justice and Criminology

Approximately a third of homicide cases go unsolved each year. Research focused on understanding what affects homicide clearance rates is often methodologically underdeveloped and has produced mixed findings. These deficiencies compromise the ability of researchers to provide important guidance to police practitioners seeking to develop best practices. Under-specified modeling and limited access to accurate sources of homicide investigation data are two potential and interconnected reasons for the inconsistencies found in previous studies. The purpose of this study was to expand the literature on homicide case outcomes as follows: 1) to organize predictors into five substantive domains (involved subjects, event circumstances, case dynamics, ecological characteristics, and investigator factors) and operationalize multiple measures of each as viable predictors of clearance outcomes; 2) to explore the utility of using original and verified police data with a larger number of nuanced data points than previously documented in modeling efforts; and 3) to forward a unique multi-method account of the factors that predict homicide case outcomes that can be readily replicated in future studies. Data were collected from one Southern metropolitan police department's 2009 to

2011 homicide investigations (N = 252). Access to official homicide case files allowed for key subject, incident, and evidentiary information to be obtained. Critical investigation details and context were added to the case file data via interviews and survey administration efforts involving the lead detectives that worked the cases. The dataset was further supplemented with Census data. Subsequent analyses included examination of the data quality and multivariate logistic regressions. A comparison of the dataset after the first stage of data collection to the final product was conducted to understand the extent to which the dataset were improved. The multi-method process resulted in more precision to the data recorded from case files, significant reductions in missing data, and heightened detail on key variables. Consequently those data allowed for specification of a multivariate model that included multiple measures from all of the homicide investigation domains. Those results suggest the expanded data more accurately captured the factors that predict clearance outcomes as measures within all five domains were significant predictors of investigation closure.

A Multi-Method Examination of Homicide Investigations on Case Outcomes

By

Shila René Hawk

A Dissertation Submitted in Partial Fulfillment
of the Requirements for the Degree
of
Doctor of Philosophy
in the
Andrew Young School of Policy Studies
of
Georgia State University

Georgia State University
2015

Acceptance

This dissertation was prepared under the direction of the candidate's Dissertation Committee. It has been approved and accepted by all members of that committee, and it has been accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Criminal Justice and Criminology in the Andrew Young School of Policy Studies of Georgia State University.

Dissertation Chair:	Dr. Dean Dabney
Committee:	Dr. Brent Teasdale
	Dr. Mark Reed
	Dr. John Jarvis

Electronic Version Approved:

Mary Beth Walker, Dean
Andrew Young School of Policy Studies
Georgia State University
December, 2015

Acknowledgements

I would like to take this opportunity to express my appreciation for the numerous people who have provided invaluable contributions to this dissertation. It would not have been possible without the support and guidance of my mentors, professors, classmates, research participants, coworkers, family, and friends. My scholarship is a testament to their generosity.

I have been fortunate to learn from some truly amiable, thoughtful, and dedicated mentors. Foremost, I am grateful to my dissertation chair, major advisor, and coach—Dr. Dabney. Being Dr. Dabney's pupil has been extremely rewarding. I am indebted to him for all of his time and efforts to aid me in successfully navigating the various stages of graduate school, career development, and life over the last five years. He certainly surpassed mentoring expectations and provided ample opportunities for me to do research, network, publish, present, and reach my potential, all while being incredibly patient and accommodating. Dr. Dabney has never hesitated to promote me and my aspirations. This study was a direct result of his indefatigable philanthropy.

My dissertation committee also deserves my sincerest thanks. Dr. Teasdale, Dr. Reed, and Dr. Jarvis provided instrumental advice and encouragement prior to and during the dissertating process. Their insightful feedback increased the erudition and significance of my work. I could not imagine a better group of scholars to have consulted on the project. Additionally, I am appreciative of Dr. Teasdale for always being willing to help me whenever he could. He is one of the most convivial and brilliant people I know. My graduate experience would have been incomplete without his influence.

In fact, I am grateful for my graduate experience due to the entire faculty at the Georgia State University, Andrew Young School of Policy Studies, Department of Criminal Justice and Criminology. The faulty have worked unbelievably hard to create a respectable PhD program, better the students in it, and show them how to produce innovative research. I valued all of my classes and interactions with each faulty member as they are some of the most knowledgeable and supportive professors I have ever encountered.

I am further appreciative of the GSU professors who involved me in writing manuscripts – Dr. Dabney, Dr. Warner, Dr. Daigle, and Dr. Teasdale. I gained something unique from each project for which I am genuinely thankful. By co-authoring with me, they advanced my command of research and enhanced my career in more ways than I can list (or even yet comprehend). I cherished getting to know these interesting and accomplished individuals. I also enjoyed these opportunities because I got to collaborate with Dr. Copes (UAB), Dr. Tewksbury (ULOU), Dr. Swartz (ULOU), and Jane Daquin (GSU). Not only did I get to cultivate relationships with these scholars, but it was a pleasure to work with such creative people.

My relationships with the students at GSU are noteworthy too. The graduate students in my department have been an original, spunky, and passionate bunch. I expect amazing things from them as they inspired me regularly. My cohort was particularly important to my growth and helping me to grapple a myriad of issues. I extend many thanks to them and hope the years ahead offer more chances for us to team up. I want to specifically note that moving to Atlanta and being a PhD candidate was made easier by my colleagues Erin Marsh and Mindy Bernhardt. These women are so beautiful, strong,

and intellectually stimulating that being their friend is one of the best things I have ever done for my health and happiness. I appreciate them immensely for all of the reassurance, debates, laughs, and camaraderie they unconditionally bestowed.

Next, I would like to acknowledge all of the people who facilitated the data used in this dissertation. The police department that permitted this project to be conducted is due vast appreciation. It is rare that a police department authorizes outsiders to review their records and observe employees to the extent that we were allowed. I am honored to have been granted access and for their interest in the research. Moreover, this dissertation was dependent on the detectives that graciously spent countless hours explaining their job and specific cases to me. They were tremendously hospitable and accepting at every phase. By letting me tagalong with them during all aspects of their investigations and discussing their decision points with me, I gained a unique perspective on homicide clearances that shaped the study. These detectives incorporated me into the unit in a way that few scholars have experienced. I owe them my deepest gratitude and respect.

A thank you goes out to the students that aided in collection of the data as well. The project that this dissertation developed from took several years and a dozen assistants. I am grateful to Jane Daquin, Daniella Stuart, Don Hunt, Kayla Kane, Devin Carr, Danielle Gentile, Glen Ishoy, Kathleen Turner, Michelle Johnson, Christopher Anderson, and Asa Revels for all of the hours and consideration they devoted to that intelligence-gathering exercise.

My coworkers at Applied Research Services, Inc. (ARS) were also influential in my success. The ARS team is a truly skilled, articulate, and caring group of people. I have benefited from their experiences and altruism in many ways. The second stage of

data collection and the writing process required a lot of my attention at all hours of the day and night for a long time; the ARS team was continuously understanding and cooperative. What's more, Tammy Meredith talked me through many problems, especially related to coding the data. She is an exceptional teacher, talented researcher, generous boss, and fun person. I treasured having such wonderful role model cheering for me. I hope everyone at ARS knows how much I appreciate and admire them.

I never would have even made it to graduate school if not for Dr. Myrstol (UAA) and Dr. Bradley (UARK). These remarkable mentors have been committed to my maturation for over a decade. My interests in policing and policy issues are attributable to Dr. Myrstol's undergraduate course at the University of Arkansas and subsequent mentoring. Dr. Myrstol has been one of the most straightforward, honest, motivating, and supportive people in my life. He taught me to be analytical, was my first graduate advisor, and showed me how to publish early in my career. I am eternally grateful to him and for his friendship. As my thesis chair and master's program advisor at the University of Arkansas, Dr. Bradley counseled me on all aspects of becoming a researcher, oversaw my first original data collection project, and gave me confidence to pursue my goals. After she helped me get into the GSU program, Dr. Bradley co-authored my first, lead-authored journal article, regularly stayed in touch, and offered guidance whenever I needed her. I am appreciative of Dr. Bradley for really seeing me and what I was capable of, and then going out of her way to make sure I knew it and that others did too.

Lastly, I know there are many things, such as this dissertation, that I could not have accomplished without my family, friends, and spouse. I emulated their tenacity and

fortitude to tackle every challenge and had to lean on them frequently. I am lucky to know so many phenomenal individuals. I would be lost without their love and support.

Table of Contents

List of Tables

List of Figures

Chapter One: Introduction

Violence is costly to society's health. In 2013, there were 13,075 reported murders (or non-negligent manslaughters) nationwide, according to the Federal Bureau of Investigation's Uniform Crime Reports.[1] It is estimated that each of these homicides costs society about $17.25 million—a cost 38.5 to 417.9 times higher than the average expense of other serious crimes (DeLisi, Kosloski, Sween et al., 2010). This cost per homicide estimate excludes the incalculable detriment to families, communities, and public psychological health. While the occurrence of homicide has generally declined over the last few decades (Blumstein et al., 2000; Blumstein & Wallman, 2006; Cooper & Smith, 2011; Cronin, Murphy, Spahr, Toliver & Weger, 2007; Uniform Crime Report, 2012), corresponding clearance rates have also dropped substantially. Homicide clearance rates have decreased from 91 percent in 1965 (Xu, 2008) to 64 percent in 2013.[2]

The five-decade reduction in clearance rates is a problematic trend for a number of reasons. Foremost, when offenders are not arrested, they "are literally getting away with murder" (Carter, 2013, p.i; also see Witkin, Creighton & Guttman, 1994), which impacts the intended specific and general deterrence underlying criminal sanctions. Further, criminal history data suggests that offenders are not specialists and often amass many offenses over time (Alderden & Lavery, 2007; Braga, Kennedy, Waring, & Piehl, 2001; Braga, McDevitt, & Pierce, 2006; Kennedy, 1997); therefore, every murderer not apprehended stands to commit an array of subsequent violent and non-violent crimes

[1] This translates into a homicide every 37 minutes (https://www.fbi.gov/about-us/cjis/ucr/crime-in-the-u.s/2013/crime-in-the-u.s.-2013/offenses-known-to-law-enforcement/browse-by/national-data).
[2] https://www.fbi.gov/about-us/cjis/ucr/crime-in-the-u.s/2013/crime-in-the-u.s.-2013/tables/table-25/table_25_percent_of-offenses_cleared_by_arrest_by_population_group_2013.xls
http://www.fbi.gov/about-us/cjis/ucr/crime-in-the-u.s/2012/crime-in-the-u.s.-2012/offenses-known-to-law-enforcement/clearances

(Vaughn, DeLisi, Beaver, & Howard, 2009). In other words, not only do unsolved homicides reduce the celerity and certainty aspects of deterrence towards future crimes, these offenders are not incapacitated and thus are free to add to their lengthy criminal careers (Blumstein, Cohen, & Hsieh, 1982; Cronin et al., 2007).

More broadly, the ability to solve crimes is an indication of police effectiveness, especially since murder is arguably the most highly public and prioritized offense (Cordner, 1989; Klinger, 1997; Riedel, 1995, 2008; Simon, 1991; Waegel, 1981). Consequently, citizens and the media use such measures to judge police legitimacy, which in turn affects peoples' cooperation, compliance, and self-regulation (Hinds, 2009; Tyler, 2004; 2006; Tyler & Huo, 2002; Xu, 2008). This can manifest itself as residents being less likely to share pertinent information regarding crimes and increase the odds of more crime (Innes & Brookman, 2013; Riedel & Jarvis, 1998; Sunshine & Tyler, 2003; Warner, 2007). In addition, when the police believe they are effective and are criticized less, officers are more likely to be satisfied with their employment (Brough & Frame, 2004; O'Leary-Kelly & Griffin, 1995). Research shows that this has a reciprocal relationship with job performance (Judge, Thoresen, Bono, & Patton, 2001) and overall recruitment and retention (Shields & Ward, 2001) within police departments.

It is for all of these reasons that homicide case solvability is a pressing public health concern in need of enhanced research. Indeed, improvements in case outcomes would be significant in the function of the police overall. Unfortunately, while understanding clearance rates is instrumental, gaps remain in our understanding of the factors significant to solving homicide cases. Related to this point, Jarvis and Regoeczi (2009, p.174) noted that there has been a large volume of research on homicide incidents,

but "one issue has escaped significant attention: law enforcement's efforts to identify and arrest suspects for this criminal offense" (p.174). Similarly, Rydberg and Pizarro (2014) stressed that "many questions regarding correlates of homicide clearance remain unanswered," (p.2; also see Alderden & Lavery, 2007; Ousey & Lee, 2010; Puckett & Lundman, 2003; Riedel, 2008). Therefore, more homicide clearance studies would be valuable. However, given data limitations of previous clearance studies, those additional studies should strive to improve data and modeling quality to truly advance homicide clearance knowledge.

Statement of the Problem

The existing research on homicide clearance is characterized by mixed, incongruent, and even contradictory results. This uncertainty compromises the ability of researchers to provide much needed guidance to police practitioners seeking to develop best practices. This study explored two interconnected issues as potential sources of the inconsistencies found in previous research findings: 1) the use of under-specified models and 2) limited access to accurate sources of homicide investigation data.

The first major limitation of the existing research on homicide clearance rates is the use of under-specified models. A scan of the literature suggests predictors of homicide case outcomes fall into five general domains: involved subject, event circumstances, case dynamics, ecological characteristics, and investigator factors. However, no homicide case outcome study has included measures for all of the domains, and key variables are commonly missing in the predictive models of the domains that have been included. For example, subject-specific factors relate to the known characteristics of the persons involved in the incident and studies are often missing

information about one of the subjects in the homicide transaction ─ the suspect or the offender. This is a significant limitation, as offender demographic measures may be as important as the victim's characteristics in accounting for case outcomes. Moreover, too few clearance studies considered the role of a suspect's criminal history, even though research suggests a small number of repeat offenders are responsible for the majority of crimes committed (Braga et al., 2006; Kennedy, 1997; Wolfgang, Figlio & Sellin, 1972).

This is particularly true for hardcore street offenders who are more likely than other criminals to commit homicides, as they live in a subculture of violence wherein gaining and maintaining respect is seen as more important than living (Anderson, 1999). These offenders get caught up in the recursive and emergent nature of retaliatory violence, which spills over and draws others into the street culture, creating a contagion effect (Topalli, Wright, & Fornango, 2002; Wright, Topalli & Jacques, 2014). Homicide cases involving these types of offenders may have significantly different odds of closure than cases with less criminogenic offenders. It seems prudent for researchers to consider a full slate of measures pertaining to the involved subject domain when modeling case outcomes.

Measures of event circumstances have been the most commonly examined and significant predictors of homicide clearances. Nonetheless, the coding and inclusion of those measures have been inconsistent. For instance, a measure of the victim and offender's relationship has only been included in approximately half of the past studies. This is problematic given that research largely suggests that cases involving victims and offenders who are strangers to one another are more difficult to solve compared to cases with easily identifiable links between the involved subjects (Flewelling & Williams,

1999; Gilbert, 1983; Lattimore et al., 1997; Marche', 1994; Richardson & Kosa, 2001; Riedel, 1994, 2008; Robert & Lyons, 2009). Similarly, the presence or absence of various types of evidence (e.g., verbal & physical) have been reported to significantly contribute to arrest rates (McEwen, 2013; Schroeder & White, 2009; Riedel & Rinehart, 1996; Wellford & Cronin, 2000); yet, measures of evidence and other factors germane to the case dynamics domain have often been omitted from models that seek to predict homicide clearance rates.

Community characteristics and other factors that fall under the heading of the ecological domain have also been found to affect case outcomes (Listwin & Xu, 2007; Lundman & Myers, 2012; Puckett & Lundman, 2003; Regoeczi & Jarvis, 2013; Xu, 2008). Yet these predictors are not regularly included in clearance research (for examples, see Alderden & Laery, 2007; Jiao, 2007; McEwen, 2013; Schroeder & White, 2009; Rydberg & Pizarro, 2014).

Lastly, it makes sense that factors specific to the investigation, investigators, and department would have an impact on case outcome (Addington, 2006; Chaiken, Greenwood, & Petersilia, 1977; Keel, Jarvis, & Muirhead, 2009). Among the few homicide clearance studies that considered measures that fall under the investigator domain, some findings suggest detectives with more experience and lighter workloads are likely to clear cases at higher rates (Greenwood, Chaiken, & Petersilia, 1977; Marché, 1994). However, other studies reported no significant relationship (Ousey & Lee, 2010' Puckett & Lundman, 2003). While the divergences in the research results could be driven by sampling issues, data quality, or the use of proxy measures when operationalizing investigator factors that purportedly impact clearance rates, the absence of this and/or

other clearance domain measures in model specification is a pressing issue in need of deliberate consideration.

Overall, studies that excluded one or more of the five domains may suffer from and omitted variable bias, as research has documented the significance of each in predicting case outcomes. These modeling weaknesses are generally related to a lack of appropriate data to inform modeling. Homicide clearance research has mostly relied on stagnant archival data.

As a second interconnected line of inquiry, this study explores the possibility that access to timely and refined sources of data has the potential to significantly enhance empirical efforts to model homicide case outcomes. When relying on agency released data sources such as the Uniform Crime Reports or National Incident Reporting System, researchers are challenged by limited access to a predefined set of measures and issues of missing data. For example, researchers using the Supplemental Homicide Reports data have to create a proxy case status due to the fact that the dataset "lack[s] clearance information linked to particular murders" (Addington, 2006, p.142). As a result, researchers using these data are forced to proceed with imprecise measures or to omit factors that arguably shape case outcomes (Addington, 2006, 2007; Davies, 2007; Ousey & Lee, 2010; Regoeczi, Jarvis, & Riedel, 2008; Roberts, 2007). Problems of data integrity extend to even the more comprehensive archival datasets that homicide researchers have assembled directly from homicide case files. In these instances, researchers' access case files within one or more police departments to systematically record key data points on homicides occurring within the jurisdiction over a defined period of time.

One of the biggest issues facing the datasets of this kind is that they generally do not include all of the key information among open cases. These datasets are also primarily focused on details about the involved subjects and event circumstances in the homicide case. This means that data concerning the case characteristics and investigation specifics are largely absent. To further compound the issues faced in homicide clearance research, the majority of these datasets are outdated. For instance, the publically available data that Keppel and Weis assembled based upon Washington State homicide case files contains information that is nearly 30 years old (Keppel & Weis, 1994; Smith & Zahn, 1999). Even the thoroughly explored Block and Block (1998) Chicago dataset is roughly 20 years old. In fact, most researcher designed datasets are based on cases that occurred a decade or longer ago (Alderden & Lavery, 2007; Jiao, 2007; Litwin, 2004; Litwin & Xu, 2007; McEwen, 2013; Regoeczi & Jarvis, 2013; Xu, 2008). Considering that homicide clearance rates were higher in previous decades (Roberts & Lyons, 2009; Snyder, 2011), data collected during those eras could potentially not be comparable to current data. In the last decade alone, the employment of policing innovations has steadily increased (Lum et al., 2011; Weisburd & Braga, 2006; Weisburd & Telep, 2012) and the nature of homicides seems to have changed (Richardson & Kosa, 2001; Trussler, 2010; Xu, 2008). Analyses using more recent data may contribute more relevant and contemporarily generalizable results.

In an effort to overcome the above mention precision and timeliness problems, several researchers have sought to systematically assemble and analyze data derived from more contemporary homicide investigation case files. The validity of such data remains questionable given that they are coded from the original investigative case files. Research

suggests that the official records of a homicide investigation (commonly referred to as a homicide investigation files), are generally truncated and sterilized prosecution-oriented documents ─ not complete chronicles of the investigation process (Innes, 2003). Investigators often assemble these documents knowing that defense attorneys will be picking them apart and thus focus on only the most relevant facts needed to secure a conviction in line with the investigation outcome. Homicide investigators are known to make subjective interpretations of criminal motivations and events with great autonomy under chaotic circumstances and public scrutiny (Eck, 1992; Innes, 2003; Miletich, 2003; Sanders, 1977); yet, specificity of their decisions are beyond the reach of many previous datasets.

Purpose of the Current Study

The purpose of this study was to expand the literature on homicide case outcomes. The goal was to enlist the use of more accurate, contemporary, and relevant data in providing a holistic and improved assessment of the factors that predict homicide case outcomes by utilizing a more enhanced model than found in previous research. As part of the process, an analytic exercise was undertaken to examine differences in the quality of data collected from homicide case files compared to investigator interviews as a multi-stage development of enhanced data. In addition to designing a predictive model of homicide case clearance that includes direct measures of each of five substantive domains, the study also focused on adding a time lag with a more extensive follow-up to typical homicide case coding. The specific aims of the project were as follows: 1) to account for all five domains of a homicide case (i.e., involved subjects, event circumstances, case dynamics, ecological characteristics, and investigator factors) in a

predictive model of clearance outcomes; 2) to explore the utility of using original and verified police data with a larger number of nuanced data points than previously documented in modeling efforts; and 3) to forward a unique multi-method account of the factors that predict homicide case outcomes that can be readily replicated in future studies.

Subsequent chapters detail how these aims were addressed. In the second chapter, a thorough review of the literature outlines the current standing of homicide clearance research, suggesting areas where it might be improved. The third chapter specifies all of the methodological approaches to data collection and the analytical strategies used in the current study. The fourth chapter presents the study results. To conclude, the fifth chapter discusses the results, their implications, related limitations, and offer suggestions for future research.

Chapter Two: Literature Review

Many dimensions of the homicide phenomenon warrant empirical investigation. To date, most homicide researchers (and the general public) have been interested in understanding occurrences rather than responses. This has resulted in more knowledge about how and why homicides occur than about how society reacts. This chapter begins with a brief overview of what is known about homicide trends and continues with a more thorough review of homicide clearance research.

Homicide Occurrences

The U.S. experiences more violence than other westernized countries (Beeghley, 2003; Messner & Rosenfeld, 2012; Rosenfeld & Messner, 1991). Criminologists largely agree that the most reliable and well-documented barometer of violent crime is also the most egregious form ─ homicide (Chaiken et al., 1977; Fox & Zawitz, 2010; Smith & Zahn, 1999). Even though the overall rate of homicide occurrences has decreased in the last century (Pridemore, 2002), the U.S. is still a "murderous society" (Beeghley, 2003, p.79). This has captured the attention of scholars and law enforcement practitioners, who in turn have pursued numerous avenues of research regarding the occurrence of homicide. One line of research has focused on articulating the etiology of homicide.

Theories of homicide etiology. Numerous sociological theories have been used to account for the incidence of homicide. The commonly applied theories are grounded in the idea that someone's behavior is related to their interactions within an environment, which directly affects the likelihood of them becoming a victim and/or offender of homicide. For example, social disorganization theory suggests that people living in places with high rates of poverty, mobility, family disruption, dilapidation, and concentration of

racial/ethnic heterogeneity are less likely to believe they share the same norms and values as their neighbors, which in turn affects their willingness to engage in the types of social control necessary to reduce crime (Bursik & Grasmick, 1993; Sampson, Raudenbush & Earls, 1997; Shaw & McKay, 1942). It is posited that the risk of homicide is elevated in such environments. Alternatively, lifestyle/routine activities theory suggests people's habits can make them susceptible to homicide if their risk overlaps in time and place with would be perpetrators when protectors are absent (Cohen & Felson, 1979; Cohen et al., 1981; Hindelang et al., 1978; Messner & Tardiff, 1985). Subculture theories propose that homicides are concentrated in lower-class neighborhoods because violence is an adaptation to negative life events; therefore, it ends up being promoted as the appropriate way of managing problems, resolving conflicts, and gaining respect or honor (Anderson, 1999; Cloward & Ohlin, 1960; Davies, 2008; Ferracuti & Wolfgang, 1967; Miller, 1958; Nisbett & Cohen, 1996; Wilson, 1983). In general, it has been rare for researchers to model homicide trends through the strict adherence to a specific theoretical model. Instead, most scholars have pursued a more modest line of inquiry, seeking to model the social correlates of homicide occurrence. As a result, we have learned that homicides are predictably concentrated among identifiable people, events, and places (Kennedy, 1997; Braga, McDevitt & Pierce, 2006; McGarrell, Chermak & Carsaro, 2006; Wilson & Corsaro, 2006).

People. Demographically, research suggests that homicide offenders and victims are disproportionally African American (Davies, 2008; Hawkins, 1999; Laurikkala, 2011; Smith & Zahn, 1999). Cooper & Smith (2011) found African Americans were eight times more likely than their Caucasian counterparts to be a homicide offender. Moreover, the

extant research suggests that people are more often killed by someone of the same racial background (Browne & Flewelling, 1987; Palmer & Humphrey, 1980; Silverman & Kennedy, 1987; Smith & Zhan, 1999). In line with other studies, Fox & Zawitz (2010), reported males represented up to 90 percent of offenders (a rate 8 times higher than for females). Indeed, research suggests both men and women kill males at higher rates than they do females (Davies, 2008; Fox & Zawitz, 2010). It is also very common for victims and offenders to both be under the age of twenty-five (Centers for Disease Control and Prevention, 2006; Smith & Cooper, 2011).

It is the confluence of race, sex, and age where these patterns are most conspicuous (Dabney, 2013). Young, Black, males are at significant risk of being involved in a homicide (Bastian & Taylor, 1994; Fox & Zawitz, 2011; Smith & Cooper, 2013). According to the Center for Disease Control and Prevention, Non-Hispanic Black males between 10 and 24 years of age were killed at a rate five times that of young White males in 2010.[3] Moreover, Cooper and Smith (2011) reported that Black male young adults had the highest homicide-offending rate at 365 per 100,000 ─ making up over a quarter of all homicide offenders.

Events. Homicide events are comprised of four main components: precipitating circumstances, setting, motive, and victim-offender relationship (Cilbert, 1983; Davies, 2008; Fox & Zaswitz, 2010; Parker & Smith, 1979; Williams & Flewelling, 1988; Wolfgang, 1958; Zahn & McCall, 1999). Precipitating homicide circumstances include arguments, index crimes (i.e., rape, robbery, and burglary), drug-related, gang-related,

[3] http://www.cdc.gov/violenceprevention/youthviolence/stats_at-a_glance/hr_age-race.html

and unknown situations.[4] Of these precipitating circumstances, research has shown a disproportionate number of events to be preceded by drugs or alcohol use on the part of the combatants (Davie, 2008). In terms of setting, most homicides occur in private locations (Harris, 1997), during evening or early morning hours (Laurikkala, 2011) and on weekends and holidays (Wilson et al., 2004).

There are numerous kinds of motives and victim and offender relationships associated with homicide incidents. Motivations for murder have been categorized as aggression/frustration, retaliation/revenge/hate, jealousy, mental illness, money-related, gang-related, drug-related, property-related, escalation, disagreements, self-defense, and domestic argument and/or the breakdown of a relationship (Lee, 2005; Ousey & Lee, 2010; Puckett & Lundman, 2003). Attributed homicide relationship types have been coded as interpersonal, acquaintances, business, criminal (illegitimate dealings), felony (e.g., offender killed by a private citizen protecting themselves), subcultural-recreational-causal, other, and unknown (Smith & Zahn, 1999). Homicides are most likely to occur as the result of an argument[5] and involve people who know one another,[6] particularly if a firearm is present (Davies, 2008; Fox & Zawitz, 2010, 2011; Laurikkala, 2011; Parker & Smith, 1979; Williams & Flewelling, 1988; Wilson et al., 2004; Wolfgang, 1958; Zahn & McCall, 1999). People who associate with criminals and engage in illegal activities have the greatest chance of being involved in a homicide (Dobrin, 2001; Shaffer & Ruback, 2002). The term victim-offender overlap has emerged to depict the concomitant

[4] http://www.fbi.gov/about-us/cjis/ucr/crime-in-the-u.s/2010/crime-in-the-u.s.-2010/tables/10shrtbl12.xls
[5] There is some evidence that retaliatory violence, such as gang feuds (Skogan, Hartnett, Bump, & Dubois, 2008; Cronin et al., 2007), and felony escalations have increased in recent decades (Litwin, 2004; Mouzos & Muller, 2001; Riedel & Rinehart, 1996; Regoeczi et al., 2000; Wellford & Cronin, 1999).
[6] Homicides among strangers have become increasingly more frequent throughout the decades (Gilbert, 1983; Lattimore, Trudeau, Riley, Leiter & Edwards, 1997).

criminality observed among participants in the homicide transaction. When people attack and steal from others, they become increasingly vulnerable to confrontation with their victims or others with the same motives (Kurbin & Weitzer, 2003; Stewart, Schreck, & Simons, 2006; Wright, Topalli, & Jacques, 2014). Additionally, gun use is prevalent among criminals and increases the lethality of crimes, thus offender-on-offender victimization is more likely to result in incidents that end in homicide than those involving non-offenders (Decker, 1996; Jennings, Piquero, & Reingle, 2012; Pizarro, Zgoba & Jennings, 2011; Shaffer, 2003; Wolfgang, 1958).

Places. Violence is not evenly distributed across physical space. Instead, homicides are more likely to occur in some geographical enclaves compared to others (Leovy, 2015). Southern states typically have higher rates of homicide than the rest of the United States (Beeghley, 2003; FBI, 2011; Laurikkala, 2011; Parker & Pruitt, 2000). Homicide rates are observed to be higher in urban areas than in rural ones (Lee, Maume, & Ousey, 2003). Impoverished communities are at greater risk of experiencing homicides than middle and upper-class neighborhoods (Parker & Smith, 1979; Williams & Flewelling, 1988). Areas with higher rates of unemployment, racial segregation, family disruptions, and mobility have been shown to experience higher rates of homicide incidents (Laurikkala, 2011; Meithe & Meier, 1994; Ousey, 2000; Peterson & Krivo, 1993; Sampson, 1987; Shihadeh & Steffensmeier, 1994). The presence of group or gang activity (Cronin et al., 2007) in neighborhoods is also predictive of higher homicide rates (Laurikkala, 2011; Lee, 2011), as criminally inclined collectives are shown to foster a culture that uses violence to gain respect (Anderson, 1999).

Outcomes. After a homicide occurs, the police (aided by other officials) work to solve it. That work includes gathering information from anyone involved in, aware of, related to, affected by, or knowledgeable of the incident. It also includes weighing the event characteristics, viable evidence, and surrounding ecological conditions. Homicide cases are cleared by arrests (or exceptional circumstances wherein an arrest is not possible, such as a suicide). When an arrest is made, the case is closed, the clearance rate increases (Wellford & Cronin, 2000), and the case moves on to the courts for adjudication.

Research on the factors that contribute to homicide clearance rates started in the late 1950's, but only began to pick up in earnest in the 1990's. This heightened level of research corresponded with a precipitous national decline in case closure rates that were experienced during the final quarter of the twentieth century. Nonetheless, Riedel's (2008) observations remain true today, that "[w]hat is striking about the low arrest clearance rates for homicide in the United States is the relative lack of public and media attention to the issue. While there are heated discussions about the homicide rate in jurisdictions, there is relatively little attention paid to the extent to which offenders are taken out of circulation" (p.1159-1160; also see Puckett & Lundman's call for research on page 188).

Knowing what contributes to a homicide incident is central to prevention, but does not necessarily translate into understanding what contributes to offender apprehension; just as knowing what contributes to a successful homicide investigation outcome does not necessarily translate into understanding adjudication success. Each outcome within the criminal justice process is influenced by the characteristics or

conditions of the preceding stage. To understand the outcomes of a homicide case inquiry, researchers must consider the preceding characteristics of the homicide incident, as well as all facets of the investigation process. Incomplete predictive models will likely yield erroneous conclusions. Such conclusions can be dampening to the development of research consensus. Furthermore, the characteristics that contributed to the occurrence of homicide may work in various ways for or against criminal justice outcomes in the investigation and adjudication processes that follows. For example, a neighborhood with a low socioeconomic status may increase the odds of a homicide occurring and then decrease the odds of case closure (Regoeczi & Jarvis, 2013) due to a lack of witness cooperation. Thus, if homicide clearance rates are to improve, it is essential for police and researchers to consider what might impact outcomes based on incident and investigation factors, rather than focusing exclusively on the elements that predict homicide occurrences. Toward that end, homicide clearance research using a multifaceted approach to examine investigation outcome differences should enhance our overall understanding of the homicide phenomenon.

Homicide Clearance Research

Today, our knowledge about homicide investigation outcomes in the United States originates from two types of research: multi-site and single-site studies. Multisite studies consolidate homicide data from two or more police jurisdictions. This allows for cross-jurisdiction comparisons and increases the potential generalizability of findings. While there have been some interesting findings across cities, they require the researcher to make certain tenuous assumptions about the uniformity of practices, procedures, and data quality across the jurisdictions. The scope of the current study is a within-city (i.e.,

single-site) frame of reference. There are two main reasons why a single-site approach is appropriate for this study. First, the main goal of the current study is method and model refinement, not prediction. It is not as concerned with generalizability of findings as it is with exploring important issues surrounding model specification and data quality. A single-city design allows for the greatest degree of consistency and understanding of departmental practices, procedures, and data collection. Such stability is critical to the goals of the study. The within-city approach circumvents other issues as well. Multisite studies tend to use jurisdiction-wide measures of variables such as racial composition or socio-economic status. This practice is problematic as it is likely that the demographics of smaller geographic units, such as census tracts or neighborhoods, more strongly affect the chances a case will be solved. For instance, neighborhoods with a high percentage of minorities or populations well below the poverty line may be more difficult areas in which to solve cases, given their police-community relations tend to be strained (Innes, 2003; Innes & Brookman, 2013; Kane, 2002, 2005; Regoeczi & Jarvis, 2013; Reisig & Parks, 2000; Warner, 2007); yet this information is lost if a study uses aggregate measures such as citywide racial composition or median household income. A single-site design affords the researcher enhancements in data precision that are often elusive under a multisite format.

Given the current focus, the following literature review is limited to outlining the measures and data sources employed by scholars using a micro (single-site) approach to examining the question of "What factors predict homicide case outcomes?" and subsequent knowledge gaps. To conclude, a synopsis of the current project outlines a new approach to filling those gaps.

Theoretical perspectives on homicide clearance. As is the case with the body of research exploring the predictors of homicide occurrence, there have been limited efforts to theoretically frame homicide clearances studies. The majority of the theoretically driven, single-site studies of homicide clearance employ a discretionary and/or non-discretionary conceptual framework (Lee, 2005; Litwin, 2004; Litwin & Xu, 2007; Puckett & Lundman, 2003; Wolfgang, 1958). Research framed with the discretionary approach (also called victim preferencing) emphasizes the role of extralegal factors in predicting arrest outcomes (Black, 1976, 1980, 1995; Brown, 2005; Brown & Frank, 2006; Cureton, 2000; DeLisi & Regoli, 1999; Engel, Sobol, & Worden, 2000; Smith et al., 1984). This is based on Black's (1976) theory of law. Black posits that policing practices vary across people and places based on stratification, culture, organization, morphology, and control. Such variation results in more or less enforcement of the law and a corresponding change in clearance rates (for a thorough summary see Korosec, 2009). To describe the paradigm, Ousey and Lee (2010) explain that "after differences in the 'legal' characteristics of criminal cases are taken into account, there will continue to be evidence of race-, income-, gender-, or age-linked disparities in formal control processes because of bias in law enforcement," which manifests in the allocation of resources and prioritization of homicide cases (p. 143; also see Black, 1976, 1980, 1995; Paternoster, 1984; Peterson & Hagan 1984). This suggests that discretion shapes homicide investigations, thus affecting the likelihood of clearance.

On the other hand, the non-discretionary explanation of homicide clearance rates suggests that there is no room for discretion in arrests, particularly for serious crimes like homicide (Gottfredson & Hindelang, 1979; Puckett & Lundman, 2003; Wolfgang, 1958).

Klinger (1997) argues that the seriousness and frequency of a crime determines how the police respond to people and places. This school of thought asserts that homicide is a serious and public crime that is of the highest social concern thus compelling police to allocate equal resources and attention to each case (Blau, 1993; Entman & Rojecki, 2000; Weiss & Chermak, 1998). This explanation of case outcomes proposes that offense circumstances and case dynamics influence arrest outcomes. The differences between the characteristics of the individuals involved are said to be related to the type of case (Gottfredson & Hindelang, 1979; Regoeczi et al., 2008; Riedel, 2008). For example, it is argued that homicides involving strangers and anonymous killing methods (e.g., guns) will generally provide fewer leads or evidence to jumpstart an investigation (Ousey & Lee, 2010, p. 144) and thus hinder the likelihood of an arrest.

There have been important efforts in past research to test the theories reviewed above on homicide clearances. However, those results are mixed because there is still a need to move past correlational research and to give greater consideration to causation. To date, a barrier to achieving this shift of attention has been due to limited access to homicide investigations data and gaps in the modeling of key legal and extralegal variables. The main contribution of the current study is not to test any specific theories, but rather to explore factors hypothesized to be related to homicide clearances using more complete and comprehensive data than past studies. This is intended to help inform future research and contribute to improving the quality of data in studies in this area. In return, scholars may be able to better examine the causal processes behind homicide clearances, and thus return to theory-testing.

Five domains of a homicide case. Research findings suggest there are five domains that influence whether a case remains open or results in an arrest: 1) the involved subjects, 2) event circumstances, 3) case dynamics, 4) ecological characteristics, and 5) investigator factors. To date, most single-site homicide clearance research sought to account for case closure by focusing on the impact of the subjects involved and event circumstances. Only a handful of studies have included ecological characteristics and even fewer have considered case dynamics or investigator factors in their predictive models. To highlight these research trends, Table 1 displays the jurisdictions, types of data sources, years of the homicide cases examined, and variables modeled within each domain of the known single-site clearances studies.

There are many reasons why measures in each domain could influence homicide case outcomes. In the involved subjects domain, it could be that the type of victim changes how a detective works the case (Hawk & Dabney, 2014) or that certain people are more likely to be grouped within cases that go unsolved (Klinger, 1997). In the event circumstances domain, the relationship between primary parties may aid in identifying a suspect (Flewelling & Williams, 1999; Marché, 1994). With respect to the case dynamics domain, the amount or types of evidence at a crime scene perhaps dictates the presence or absence of significant investigative leads (Cronin et al., 2007; Geberth, 1996). In the ecological characteristics domain, the area where the murder occurred might influence the culture of cooperation among witnesses and other residents (Kane, 2005; Regoeczi & Jarvis, 2013; Warner, 2007; Witkin et al., 1994). As to the investigator factors domain, the skill set of the person who conducts the investigation and how they are managed

within an agency likely shapes the development of probable cause (Innes, 2002a, 2002b; Keel et al., 2009).

To date, these and other propositions germane to the five domains have not been consistently modeled nor simultaneously included in studies of homicide case outcomes. This situation may serve to significantly compromise the interpretability and authority of clearance research findings. In particular, failing to simultaneously include all of the domains and draw upon a robust sample of measures for each introduces an omitted variable bias that can undermine the accuracy of the results and lead to erroneous substantive conclusions. Capturing the complexity of how measures in all domains might co-occur is a prudent course of action for homicide clearance researchers that stands to enhance predictive efforts.

Involved subjects. It seems safe to assume that the types of people targeted by and committing homicides are likely to change the odds of them being solved. The personal difference in victims or offenders may be related to the manifestation of the violent episode. Since homicide rates are higher for African Americans, youths, males, and chronic serious offenders, it is conceivable that there is something fundamentally different about the cases with which they are associated that impacts the case outcome. Referring to information presented in the far right column of Table 1, note that nearly all single-site homicide clearance studies have included at least one of these demographic measures to account for the influence of involved subjects on homicide case outcomes. Common measures include victim and/or offenders' sex, race, age, and criminal history.[7]

[7] Additionally, one study considered victims' citizenship, but did not find legal status to significantly affect case outcomes (Lee, 2005).

Detailed below are the logic, operationalization, and findings associated with these various involved subject factors.

Sex. Victim's sex has been a commonly employed predictor of homicide case outcomes, as researchers reason that female victims may "draw a different level of attention from the police" than male victims (Jiao, 2007, p.7). The role of victim's sex has mostly been reported as non-significant to case outcome (Litwin 2004; Puckett & Lundman 2003; Regoeczi & Jarvis, 2013; Riedel & Rinehart, 1996; Rydberg & Pizarro, 2014; Wolfgang, 1958; Xu, 2008). There are, however, studies that suggest cases with female victims are more likely to be solved (Alderden & Lavery, 2007; Lee, 2005). In contrast, Jiao (2007) found that male victims are related to increased clearance rates (also see the 1986 to 1995 model in Litwin & Xu, 2007).

Notably absent from the extant research is the consistent inclusion of measures of suspect sex. Homicide cases with a female killer may be significantly different compared to males. Perhaps there are certain ways in which women are more likely to perform a murder or respond to interview techniques that affect case leads and contribute to producing useable evidence. Just like victims, the homicide occurrence research indicates that offenders are more likely to be male than female (Davies, 2008). If victim and offenders are both male in most homicide cases, maybe the atypical dyads contribute to case outcomes differently. Presumably due to missing data, single-site homicide clearance studies have not included a measure of both victim and offenders' sex, except Riedel and Boulahanis (2007).

Table 1. Single-site Clearance Study Measures

Research Publication / **Jurisdiction**	**Data Source(s)** / **Data Year(s)**	**Variables by Domain:** 1) IS = Involved Subject, 2) EvC = Event Circumstances, 3) CD = Case Dynamics, 4) EcC = Ecological Characteristics, 5) IF = Investigator Factors
Wolfgang, 1958 Philadelphia, PA	Case Files Observations 1948-52	1) IS: Victim Race, Victim Age, Victim Sex, Victim Prior Arrest 2) EvC: Motive/Circumstances, Weapon, Relationship, Time of Day, Day of Week, Alcohol Use 3) CD: Body/Crime Scene Location, Witnesses
Gilbert, 1983 San Diego, CA	Observations Incident Reports 1970 & 1980	1) IS: Victim & Offender Race, Victim & Suspect Age 2) EvC: Motive/Circumstances, Weapon, Relationship 3) CD: Crime Scene Location
Riedel & Rinehart, 1996 Chicago, IL	Agency Released 1987-91	1) IS: Victim Age, Victim Race, Victim Sex 2) EvC: Motive/Circumstances, Weapon
Puckett & Lundman, 2003 Columbus. OH	Agency Released Census 1984-92	1) IS: Victim Race by Sex, Victim Age 2) EvC: Weapon, Motive/circumstances 4) EcC: Income, Race 5) IF: Shift, Homicide Count
Litwin, 2004 Chicago, IL	Case Files - Secondary Census 1969-71 1979-81 1989-91	1) IS: Victim Sex, Victim Race, Victim Age, Victim Ever Arrested 2) EvC: Motive/Circumstances, Year, Weapon 3) CD: Body/Crime Scene Location 4) EcC: Income, Unemployment, Education, Home Ownership, Homicide Rate, Population
Lee, 2005 Los Angeles, CA	Police Reports Public Records 1990-94	1) IS: Victim Race, Victim Sex, Victim Age, Victim Legal Resident 2) EvC: Relationship, Motive/Circumstances 3) CD: Multiple Victims, Media Coverage
Alderden & Lavery, 2007 Chicago, IL	Agency Released 1991-02	1) IS: Victim Sex, Victim Race, Victim Age, Victim Ever Arrested 2) EvC: Weapon, Time of Day, Motive/Circumstances 3) CD: Body/Crime Scene Location

Table 1. Single-site Clearance Study Measures (continued)

Research Publication **Jurisdiction**	**Data Source(s)** **Data Year(s)**	**Variables by Domain:** 1) IS = Involved Subject, 2) EvC = Event Circumstances, 3) CD = Case Dynamics, 4) EcC = Ecological Characteristics, 5) IF = Investigator Factors
Litwin & Xu, 2007 Chicago, IL	Case Files - Secondary Census 1966-75 1976 - 85 1986- 95	1) IS: Victim Sex, Victim Race, Victim Age, Victim Ever Arrested 2) EvC: Motive/Circumstances, Weapon 3) CD: Body/Crime Scene Location 4) EcC: Economic Disadvantage (income, unemployment, poverty, female-headed households, vacancy, and owner-occupied units), Homicide Rate, Population, Race, Language
Jiao, 2007 Chicago, IL	Case Files - Secondary 1965 -95	1) IS: Victim Sex, Victim Race, Victim Age, Victim Ever Arrested 2) EvC: Motive/Circumstances, Substance Use, Relationship, Weapon, Victim Intervention 3) CD: Police Frequented Area, Decade, Body/Crime Scene Location
Riedel & Boulahanis, 2007 Chicago, IL	Case Files - Secondary 1987-91	1) IS: Intersex, Offender Race, Victim Race 2) EvC: Motive/Circumstances, Relationship, Weapon 3) CD: Body/Crime Scene Location
Xu, 2008 Chicago, IL	Case Files - Secondary 1966-95	1) IS: Victim Age, Victim Race, Victim Sex, Victim Prior Record 2) EvC: Relationship, Motive/Circumstances, Weapon 3) CD: Body/Crime Scene Location 4) EcC: Homicide Rate, Income, Race, Owner Occupied, Vacant Housing
Schroeder & White, 2009 New York, NY	Case Files 1996-03	1) IS: Victim Ever Arrested, Victim History with Drug Dealers/Users 2) EcC; Weapon, Substance Use 3) CD: Hospital Involved, Witness on Scene, Verbal & Physical Evidence 5) IF: Suspect Computer Checks, Witness Computer Checks, Victim Computer Checks, Interview Family, Interview Witnesses, Autopsy Attendance

Table 1. Single-site Clearance Study Measures (continued)

Research Publication / **Jurisdiction**	**Data Source(s)** / **Data Year(s)**	**Variables by Domain:** 1) IS = Involved Subject, 2) EvC = Event Circumstances, 3) CD = Case Dynamics, 4) EcC = Ecological Characteristics, 5) IF = Investigator Factors
Ludman & Myers, 2012 Columbus, OH	Agency Released Census 1984-92	1) IS: Victim Age, Victim Sex by Race 2) EvC: Weapon 3) CD: Prosecutor/Grand Jury Case 4) EcC: Race
McEwen, 2013 Phoenix, AZ	Police Records Incident Reports Court Records 2003-05	1) IS: Victim Sex, Victim Race & Ethnicity, Victim Age 2) EvC: Motive/Circumstances, Weapon, 3) CD: Victim Transported to Hospital, Body/Crime Scene Location, Number of People by Type on Scene, Physical Evidence
Regoeczi & Jarvis, 2013 Cleveland, OH	Case Files 1998-02	1) IS: Victim Sex, Victim Race, Victim Age, Victim Violent & Nonviolent Records Victim race & Area Type Interaction 2) EvC: Weapon, Motive/Circumstances, Motive & Area Type Interaction, Location 3) CD: Witnesses, Witnesses & Area Type Interaction 4) EcC: Concentrated Disadvantage (Female-headed Households with Children, Poverty, Unemployment) , Residential Instability (Mobility, Renter Occupied)
Rydberg & Pizarro, 2014 Newark, NY	Case Files Agency Released 1997-07	1) IS: Victim Race, Victim Age, Victim Sex, Victim Lifestyle 2) EvC: Relationship, Weapon, Mode/Proximity 3) CD: Media Coverage, Body/Crime Scene Location 5) IF: Open Cases, Time Since Case, Previous Case Open

Riedel and Boulahanis (2007) is one of the few studies to model the influence of suspect sex on homicide clearance outcomes. These scholars use inter- and intra-sex variables to capture the connection between the victim and offender's sex on case outcomes. While the reasoning for their coding choices was not published, the approach was likely shaped by the fact that the majority of homicide incidents are inter-gendered (Dabney, 2013; Fox & Zawitz, 2011). In other words, homicide cases involving people of the opposite sex represent departures from the norm, and thus may significantly change an investigation. Although Riedel and Boulahanis' (2007) analyses are limited to cases barred to prosecution[8] compared to those cleared by arrest (i.e., excluding open cases), they found that the suspect/victim sex dyad matters. Homicides involving male victims and offenders were more likely to take investigative effort to close. This could mean the null and contradictory findings of previous studies may have been a result of the absence of suspects' sex, but, more importantly, that homicides involving victims and offenders of the opposite sex could be statistically significant when examining open and closed cases. The research design of the current study not only allowed for robust data on suspects' sex, but also provided the opportunity to further explore the differences between inter-sex and intra-sex case outcomes toward possibly refining the effects.

Race. Most single-site homicide clearance studies have considered the race of at least one of the involved subjects. Generally, race has been modeled as a control variable or to test the idea that police devalue people of certain races. Similar to sex, suspects' race has not been included in most predictive models of case outcomes (see Table 1), again

[8] Riedel and Boulahanis (2007) explain that "Barred to prosecution is a specific exceptional clearance category that refers to the cases that have not resulted in the death of the offender (either as a homicide, suicide, or justifiable homicide), but for whatever reason(s), a lawful arrest has not been made, yet the case has been cleared" (p.153).

presumably because the data were missing (i.e., only offenders are entered, leaving suspect data unknown) from the case records. This methodological artifact notwithstanding, it makes sense that suspects' race could impact investigation outcomes similar to any other involved subject demographic trait (Gilbert, 1983). When Riedel and Boulahanis (2007) examined closed cases, they found homicides involving White offenders were more likely to result in an arrest pursuant to an investigation compared to Black offenders. This was the opposite result of their victims' race measure, which was only significant at the .10 level but had around 5 times the effect size as the offender measure. The race of the victim has been modeled in more studies than those accounting for the offender or both (Alderden & Lavery, 2007; Jiao, 2007; Lee, 2005; Litwin, 2004; Litwin & Xu, 2007; McEwen, 2013; Rydberg & Pizarro, 2014; Xu, 2008). Nonetheless, there is disagreement on its role in case outcomes (Riedel, 2008), thus it is not clear what is different about those investigations.

Research suggests that homicide arrest rates are higher for victims who are White (Alderden & Lavery, 2007; Litwin & Xu, 2007; Jiao, 2007; Xu, 2008), while others suggest that clearances are higher among those who are Nonwhite (Litwin, 2004; Wolfgang, 1958), or that race is not a factor (Puckett & Lundman, 2003; Riedel & Rinehart, 1996). It is worth noting that race has been coded in various ways ─ dichotomous and multiple dummy variables. For example, Litwin (2004) found Latino victims decreased case outcome using dummy variables for African American, Latino, and an "other" category, with Whites used as the reference category. Another study used a flag for African American victims compared to all other ethnicities and found no significant effect (Rydberg and Pizarro, 2014).

These contrary findings may be related to offenders' race missing in case outcome models. Some studies may have excluded this variable because homicides tend to be intraracial (Wolfgang, 1958), thus the measures may have suffered from multicollinearity. However, given that most homicide offenses involve victims and offenders of the same race, cases with interracial involved subjects may have significantly different clearance rates. Therefore, not only would it be interesting to consider how race might affect case outcomes by means of a dual measure (i.e., the pairing of victim and offenders' race to compare cases with interracial and intraracial combatants), but it also may be statistically necessary. No known homicide clearance research has done so; however, similar to sex, it stands to reason that that interracial homicide cases might be positively associated with case closure.

Age. The information provided in Table 1 shows that age is a commonly included factor in homicide clearance studies. Moreover, there is a general consensus among study findings that clearances are higher for younger victims compared to homicides involving older victims (Alderden & Lavery, 2007; Lee, 2005[9]; Litwin, 2004; Litwin & Xu, 2007; Puckett & Lundman, 2003; Regoeczi & Jarvis, 2013; Riedel & Rinehart, 1996; Wolfgang, 1958). Few explanations for this trend have been provided. However, some studies refer to the discretionary perspective to suggest that cases involving youths are more likely closed because the police bias those investigations. This reasoning seems to ignore the fact that cases among the elderly are solved less often than other ages and there is no research to support the notion that police value them less than middle-aged adults. On the other hand, it is difficult to substantively interpret those findings given the

[9] Age was not significant in the dichotomous dependent variable analyses only.

dissimilarities in variable coding. For example, Alderden and Lavery (2007) created flags for victims under 10, 10 to 25, and 25 or greater years old. Riedel and Rinehart (1996) used six categories (i.e., 0-10, 10-19, 20-29, 30-49, 50-64, and 65-97). Puckett and Lundman (2003) reported their dummy variables were 0 to 14, 15 to 64 and all else ages. Conversely, others have used continuous variables (Litwin, 2004) or the mean age of all victims (Xu, 2008).

Results generally suggest that cases involving younger people are cleared more often, although the impact levels have fluctuated. With the variety of different ways of coding age in prior studies, it is difficult to understand where the tipping point for age making a case more or less likely to be solved lies. It may be possible to shed more light on the relationship between a victim's age and case outcomes by exploring a cut-point predictor. This may apply to homicide suspects as well. Although homicide clearance scholars have noted trends that show more homicide offenders are in their early twenties or younger (Gilbert, 1983), the majority of single-site clearance studies have not been able to explore the role of suspects' age on case outcomes. This study considered this alternative approach to understanding victim and suspects' age in an attempt to add to clearance literature through this idea.

Criminal history. Prior criminal involvement is an important predictor of future criminal involvement. In the context of a homicide investigation, case development is likely aided when detectives are able to learn about victim or suspects' prior criminality by accessing records of their criminal justice contacts. Nevertheless, Table 1 suggests that there has been limited systematic inquiry into how victim or offenders' criminal history might predict arrest outcomes. Only about half of the single-site homicide clearance

studies have used a measure of prior arrests, and all of those focused exclusively on the criminal history of the victim. The resultant findings provide a convoluted answer to whether a victim's criminal history affects the likelihood of homicide case closure.

One study reported that cases involving victims with an arrest record did not have significantly different outcomes than cases with victims without arrest records (Litwin, 2004). Two other studies found similar results, except among select types of cases. Alderden and Lavery (2007) found the presence of a victim with a criminal history to be predictive of case status in instrumental[10] and gang-related cases. For instrumental homicides, cases were more likely solved when the victim had a record. Interestingly, the effect was stronger and in the opposite direction among the gang homicides. Gang homicide cases involving victims without an arrest record were more likely solved (Alderden & Lavery, 2007). Neither of these effects was robust in the full, "whodunit," and expressive cases models. Litwin and Xu (2007) also included a flag for cases where the victim had a criminal record, but it was not significant in the year-to-year findings subsequent to their 1966 to 1975 model. In a different study, the victims' prior criminal history was significantly associated with all of the homicide case outcomes. Jiao (2007) found that homicide cases involving victims whom had previously been arrested decreased the odds of closure.

The mixed findings associated with the criminal history variable may be driven by the fact that all of the above studies relied upon a dichotomous measure of past criminal involvement on the part of the victim (e.g., 0 = no prior arrests and 1 = one or more prior arrests). This approach does not allow for an assessment of how the type or frequency of

[10] Instrumental motives exist when the offender is driven by the pursuit of property or money (Alderden & Lavery, 2007).

prior criminal involvement might affect homicide clearance outcomes. A study by Regoeczi and Jarvis (2013) stands as the lone exception in this regard. These researchers were able to model the victim's type of criminal history using two measures ─ violent and nonviolent crime record flags (Regoeczi & Jarvis, 2013). After controlling for involved subjects, incident circumstances, and ecological characteristics measures, homicides of victims with a violent criminal history were nearly twice as likely to be closed compared to those cases where the victim was without a record for a violent offense. Since homicide victims are likely to have previously been criminal offenders (Broidy et al., 2006; Decker, 1996; Shaffer & Ruback 2002), it seems logical that their history could be helpful in case outcomes. Perhaps the homicide is related to an earlier crime so the investigator can use the documentation to connect the people, events, or areas.

Another reason the findings related to criminal histories have been limited could be that the focus has been exclusively on the victims (see Table 1); sans suspect data (reasons for this are discussed in later sections). A sizable proportion of homicide suspects are hardcore street offenders (Block, Christakos, Jacob, & Przybylski, 1996; Christako, Jacob, & Przybylski, 1996; Cook, Ludwig, & Braga, 2005; Thornberry, 1998), as evidenced by prior research showing that they "account for a disproportionate amount of crime, particularly serious and violent acts (Miller & Decker, 2001, p.116). Given that one's inner-city "street credibility" is often defined by how much respect others defer, vengeance and violence are a common dynamic that many homicide offenders navigate within their social worlds (Parker, 1989; Stewart et al., 2006; Wolfgang & Ferracuti, 1967). Commanding respect requires that criminally involved inner-city residents not back down from a fight and must challenge those that threaten their reputation

(Anderson, 1999). In other words, some criminality may have cyclical and emergent aspects that increase certain people's likelihood of committing a homicide. Indeed, the vast majority of homicide suspects are arrested more than once before they commit murder (Cook et al., 2005). Criminal histories may provide case leads for homicide detectives by narrowing the potential list of people to interrogate in route to making an arrest. This is likely why most homicide investigators run criminal history reports on all victims and suspects in a case (Block & Christakos, 1995).

Research suggests that homicide victims and suspects typically have at least one arrest to their credit (DeLisi & Conis, 2011; DeLisi et al., 2011; Patterson, 1974; Rydberg & Pizarro, 2014; Wolfgang, 1957). According to the Milwaukee Homicide Review Commission, 76 percent of victims and 90 percent of suspects in 2011, homicides had been arrested prior to their involvement in a homicide. Given such high percentages, it may be important to operationalize more refined criminal history variables that capture the severity and frequency of persons' prior criminal involvement as a predictive factor in homicide clearance outcomes. Chronic offending might be more informative to investigators in how to approach, interview, and understand people. Considering this logic, this study explores alternative measures of criminal history for both the victim and suspect.

In sum, it becomes apparent in reviewing the involved subject (IS) measures detailed in Table 1 that suspect variables have been largely absent from prior modeling efforts, presumably because such information is not available in the datasets. The subsequent chapter will detail a series of deliberate steps undertaken in the present study to allow for suspect specific factors to be considered alongside victim specific factors that

have traditionally dominated the measures comprising the involved subject domain. Further, it is evident that close consideration needs to be afforded to the manner in which involved subject variables are operationalized to best reflect the underlying logic of homicide events and investigation practices.

Event circumstances. Another recurrent substantive domain in the extant homicide clearance research incorporates measures that define the homicide event characteristics. Combinations of personal, spatiotemporal, and material circumstances change how people interact. This in turn complicates a homicide case and its odds of closure. Referring to Table 1, note that the event measures modeled in prior studies include the motive or social circumstances, victim/offender relationship, weapon used, time of day, and day of the week. Most single-site studies suggest that event circumstances are related to the probability of generating viable investigative leads and thus are predictive of case outcomes.

Victim/offender Relationship. Several single-site homicide clearance studies have considered how the type of relationship between a homicide victim and offender affects case outcomes. This measure was not included in all of the studies due to missing data. However, the victim/offender relationship has been found to be a key factor in homicide case outcomes (Jiao, 2007; Lee, 2005; Xu, 2008). To date, it is generally considered a predictor of homicide case outcomes (Flewelling & Williams, 1999; Gilbert, 1983; Lattimore et al., 1997; Marché, 1994; Richardson & Kosa, 2001; Riedel, 1994, 2008; Robert & Lyons, 2009).

In 1958, Wolfgang reported that many homicides occurred between people who had an existing relationship at the time of the crime, and that these relationships were

often familial (also see Rinehart, 1993, 1994). Later, Wellford and Cronin (1999) found that cases involving victims who knew their offender were cleared more often compared to cases involving strangers. They argued that it is easier for an investigator to identify an offender in homicides involving family members and friends than in stranger-on-stranger cases. Table 1 shows that several homicide clearance studies have included a measure of victim/offender relationship. Various coding strategies have been employed for this measure, producing somewhat varied results.

Jiao (2007) included a measure of whether the victim and offender were family, friends, strangers/unknown, or gang/business related. The results suggest that each type affected case outcomes, with the closest relationship types having the greatest odds of case closure. Similarly, Lee (2005) found that unknown and stranger relationships significantly decreased case closures (also see Xu, 2008), while partner relationships significantly increased the effect. However, Rydberg and Pizarro (2014) reported no statistically significant impacts from measures of intimate partners, family, and stranger relationships on case outcomes. If Wellford and Cronin (1999) are correct, it may not be important to categorize relationships into multiple groups as the key may be to capture whether the relationship was connectable enough to generate leads. Additionally, people's relationships are likely to fall into multiple categories making it hard to code just one type per case. Therefore, operationalizing the role of a victim/offender's relationship in a homicide investigation by the likelihood of leads may lend to more interpretable and consistent findings than examining numerous types.

Gilbert (1983) asserts, "[s]tranger homicide investigations are vastly more complex and inherently more difficult than the acquainted homicide investigation"

(p.154). In line with that logic, it is likely that what matters to the success of an investigation is if the relationship increases or decreases the complexity of a case. Cases involving easily connectable people may generate workable leads that increase the likelihood of a suspect being identified. A measure of legitimate relationships (e.g., family, coworkers, or friends) between victims and offenders may show they are easier to work than unknown, stranger, or illegitimate (e.g., gang-related, drug-related, or prostitution) relationships that are less traceable. The research design of the current study allowed for a nuanced consideration of how various types of victim and offenders' relationships might impact homicide case clearance outcomes.

Motive. It has been common for homicide clearance researchers to include a measure of the motive in their predictive models (see Table 1). Investigators routinely use case information to piece together theories of the motives underlying the homicide event and use their speculations to guide the manner in which they work a case[11] (Cronin et al., 2007; Simon, 2001; Wellford & Cronin, 1999). An investigator may be able to infer from the presence (or absence) of a street-crime motive how to interview people, use evidence, where to look for suspects, and supply more probable cause for a warrant.

Generally, study findings suggest unknown and instrumental or crime-related motives decrease the likelihood of case closure, while domestic/personal and expressive homicides increase the odds of an offender arrest (Jiao, 2007; Lee, 2005; Litwin, 2004; Riedel & Boulahanis, 2007; Wolfgang, 1958). Indeed, Riedel and Rinehart's (1996) work suggests "[t]he single most important variable to predict whether a murder will be cleared

[11] This is also true throughout the justice system, as cognitive processes can never be truly confirmed so cases are based on the evidence available; even with a confession, the suspect could be lying. Nonetheless, investigators work cases using the best information available ─ conducting interviews and interoperating evidence based on their theory of events (Innes, 2002a, 2002b, 2003).

was whether it involved a concomitant felony" (assumed to be an instrumental motive) as they are "substantially less likely to be cleared than murders involving arguments or brawls" (i.e., expressive motive) (p.97). As was the case with the nature of the victim/offender relationship, certain motives may be easier to link a suspect to than other types. Some motives may be less likely to produce leads or evidence and arise in places with fewer witnesses or ones less willing to help in an investigation.

In an attempt to further understand the role homicide motives play in case investigation outcomes, research has expanded motive categories in various ways, which seems to have created more ambiguity than clarity. For example, Alderden and Lavery (2007) separated rape/other and gang-related motives from the instrumental and expressive homicide motive categories. They found that compared to the expressive motives group, all of the other types of motives decreased the likelihood of case closure. Similarly, Litwin and Xu (2007) reported that domestic and sexual motives increased case closures, while concomitant crimes had a decreasing effect. However, they also found that some instrumental motives (i.e., gang- or drug- and money-related, or other types of motives) significantly increased case closures, and had among the largest odds ratios. Conversely, Xu (2008) reported domestic motives were unrelated to case outcomes (also see Gilbert, 1983). Puckett and Lundman (2003) found that domestic, fight/argument, and felony motives all increased the likelihood of case closure and drug motives had no causal effect. In a more recent study, Regoeczi and Jarvis (2013) established that felony-related, revenge/retaliation, and unknown circumstances significantly decreased homicide clearances compared to arguments. The divergence of these findings is seemingly proportional to the variations in the operationalization of

homicide motives in clearance studies. Additionally, there is likely more than one motive present in some homicides, which become increasingly difficult to account for as motives types are separated. There are also several interpretation issues associated with the overlaps in expressive and instrumental motive categories.

One possible reason why scholars began separating motives into more categories than instrumental or expressive was that some motives can fall into both (Miethe and Regoeczi, 2004). For example, there is likely overlap in domestic, sexual, and gang- or drug- and money-related motives, in that the offender was either fighting with the victim or trying to obtain something. However, studies that employ more groupings have not necessarily alleviated that concern. A homicide that was revenge/retaliation related could also include a felony, such as someone being killed when a drug dealer robbed a client for a debt not paid. Given these issues, using multiple categories to measure motives has not generally increased what is known about how homicide motives help or hinder subsequent investigations. In order to possibly refine how motives affect homicide investigations, this study considers alternative logic to modeling homicide motives. Indeed, perhaps there are alternative motive categorizations that reduce overlap and ease interpretation of results.

First, parsing motives into numerous categories may not be necessary. When all domains are included, there might not be enough predictability or variance within each type of motive among case arrests to accurately capture investigative changes. The modeled motives may all help in predicting homicide occurrences, but work more similarly in contribution to case closure. Second, as certain motives likely help point to a type of or specific suspect in which the investigator can pursue, maybe motive groupings

should be based on which ones are more or less likely to produce viable leads. For example, some research suggests homicides with a robbery-, gang-, or drug-related motive are less likely to be solved (Alderden & Lavery, 2007; Lee, 2005; Litwin, 2004). It makes sense that these street-crime motives might produce fewer leads, thus be harder to solve than other types of motives. For homicides related to street crimes, the motive would likely be impersonal and occur during the commission of illegal activities, which could make it harder to connect the victim and offender in time and space and/or involve people more likely to lie to an investigator (Chaiken et al. 1977; Greenwood et al. 1977; Innes & Brookman, 2013).

The current study benefits from enhanced information about offense motive derived from face-to-face interviews with the lead investigators. Clearly, there are many nuances associated with the precise measurement of event motives. It is unlikely that these distinctions are effectively captured by having researchers retrospectively code homicide case files or relying on the categories used in sources such as the Supplemental Homicide Reports. Direct contact with lead investigators seems like a more fruitful course of action for capturing the motive underlying the homicide event. These individuals have the benefit of assessing the totality of evidence and case development to best discern the motive. Research suggests that the foremost aspect of the detective's job is to interpret what information is available (Blair & Rossmo, 2010; Kuykendall, 1982; Rossmo, 2008; Sanders, 1977). As such, the present study called for having detectives review case file materials with the researcher with an eye toward reducing the measurement error associated with this key event characteristic.

Time of day and day of week. A large portion of serious crimes and potentially lethal violent crimes are committed during leisure hours (Block & Davis, 1996; Braga, Hureau, & Papachristos, 2010; Snyder & Sickmund, 2006; Tompson & Townsley, 2010). Not surprising then, the majority of homicides occur during evening hours (Laurikkala, 2011). Studies exploring this relationship are identified in Table 1. Some clearance research suggests this pattern is related to the odds of a successful investigation. For example, Wolfgang (1985) found that homicides occurring during late night and early morning hours are less likely to be solved. Since that seminal work, only one single-site study of homicide clearance outcomes has included a time-of-day measure. Alderden and Lavery (2007) found that the later in the day a homicide occurs, the lower the chances it will be solved, with killings occurring during late-night hours having the lowest odds of producing an arrest. There is sound logic to support these findings, as darkness makes nighttime crimes scenes harder to process for evidence (Chism & Turvey, 1999, Gardner, 2011). Additionally, late night homicides are often related to street-crime motives and happen when fewer people are out and about to serve as witnesses (Wolfgang, 1958). This confluence of investigative hurdles is captured well in the following quote from a detective in a study by Dabney and colleagues (2013):

> Umm, you know, between midnight and eight o'clock in the morning you're not going to get the case with, you know, the citizen on the corner standing and calling and being a good witness. I'm dealing with, you know, the only people that are out at three, four, five o'clock in the morning are cops and bad guys.

Certainly, it would be hard to follow-up with neighbors near the crime scene and canvas for witnesses when people are asleep during or after a homicide. It is also the case that

law enforcement agencies, especially large metropolitan departments, often base investigator shift assignments on seniority with seasoned investigators choosing daytime shift work (Puckett & Lundman, 2003; Walker, 1992). This could result in less experienced investigators responding to nighttime homicides, which could negatively affect case outcomes.

These factors may also change the odds of weekend homicide closures as fewer investigators, especially those with seniority, typically work those days. Wolfgang (1958) noted the difference in case outcomes between homicides occurring on the weekend compared to weekdays. His research suggests that homicides occurring during late night to early morning hours and on the weekends are more likely to go unsolved because more robberies go unsolved, and they "occur more often over the week-end and under the protective cloak of night hours" (p.294). Additionally, Wilson and Boland (1976) noted that "it is mostly fear of robbery that induces many citizens to stay home at night and avoid the streets, thereby demising the sense of community and increasing the freedoms with which crimes may be committed on the streets" (p.179). While research shows that homicides are more likely to occur on weekend days (Wilson et al., 2004), Wolfgang (1985) remains the only single-site homicide study to explore a weekend measure. This study explored the differences in case outcomes for homicides during late night and early morning hours and on weekends given that the data were readily available.

Weapon. Weapon use has been suggested to affect homicide case outcome due to the amount of evidence likely generated from one type compared to others ─ firearms (Addington, 2006; Alderden & Lavery, 2007; Puckett & Lundman, 2003; Litwin, 2004; Lundman & Myers, 2012; Riedel, 2008; Roberts, 2007; Rydberg & Pizarro, 2014).

Foremost, scholars argued that when someone is strangled, stabbed, drowned, or killed in some way that involves close contact and a struggle there is more evidence left behind (Geberth, 1996; Litwin, 2004; Litwin & Xu, 2007; Puckett & Lundman, 2003; Roberts, 2007). Summarizing the clearance literature, Riedel (2008) noted, "[t]he reason that weapons other than firearms are cleared more quickly is that forensic evidence is not available with firearms, especially handguns that kill at a distance and are widely available" (p.1157). Further, it has been hypothesized that guns are related to stranger homicides, while knife use is more personal, which increase the odds of leads (Wellford & Cronin, 1999). Indeed, some researchers hold both views, such as Ousey and Lee (2010) who hypothesized that "homicides that involve strangers or use more anonymous killing methods, such as firearms, frequently provide fewer initial leads or forensic evidence to jumpstart an investigation" (p. 144; also see Schroeder & White, 2009).

The summary information in Table 1 indicates that single-site studies have often sought to test these assertions. Despite employing a consistent operationalization of the concept, the findings provide somewhat mixed support on the predictability of case outcomes based on weapon involvement. The role of firearms in case outcome has been reported to increase, decrease, and not affect homicide case clearances. For example, a study by Litwin and Xu (2007) found the use of a firearm during a homicide reduced the likelihood of an arrest in their 1986 to 1995 data (also see Alderden & Lavery, 2007; Rydberg & Pizarro, 2014). Similarly, Schroeder and White (2009) reported cases that involved a knife or stabbing/cutting increased the odds of case clearance by 11 times[12]

[12] These findings should be considered cautiously due to study limitations, which were numerous. For example, a third of the case files were not released to the researchers. Similarly, Schroeder and White

(also see Wolfgang, 1958). On the contrary, Jiao (2007) reported gun use had a positive association with homicide outcome. However, Puckett and Lundman's (2003) analyses showed guns and knives *both* significantly increased the odds of an arrest outcome (also see Lundman & Myers, 2012); and Xu (2008) reported no consistent change in case status based on what weapon was used (also see Regoeczi & Jarvis, 2013; Riedel & Rinehart, 1996). Nonetheless, given the dominate explanation for why weapon use might affect case outcomes, the seemingly most telling study regarding this matter included measures of both evidence and weapons. McEwen (2013) found that controlling for biological, weapons,[13] trace, latent prints, impressions, and drug evidence, the use of firearms decreased the odds a case would be solved, regardless of the type of case.

Substance use. Drugs and alcohol have been linked to violent incidents in numerous studies (Brownstein et al,. 1992; Fendrich et al., 1995; Goldstein et al., 1989; Hanzlick & Gowitt, 1991; Pernanen, 1976, 1981, 1991; Spunt et al., 1994; Spunt et al., 1995; Taylor & Leonard, 1983). Indeed, Smith and Zahn (1999) summarized that "[s]tudies consistently report that approximately half of all homicide offenders are intoxicated on drugs and/or alcohol at the time of the crime; similar percentages of homicide victims test positive for alcohol or drugs as well" (p.182). Only two homicide clearance studies have considered whether substance use on the part of one or more of the combatants predicts case arrests (see Table 1). Wolfgang (1958) reported that more unsolved homicides involved alcohol use on the part of one or both involved subjects, while Schroeder and White (2009) found that victims with a history of drug use decrease

(2009) also note that there was a large amount of missing data that precluded them from including some significant clearance predictors (e.g., motive and victim and offender relationship measures).

[13] The weapons evidence measure included evidence that identified the type of weapon the suspect used and that linked s/he to it, such as gunshot reside.

the odds of case closure. It may be more difficult for homicide investigators to develop leads in cases where drug or alcohol use is involved as suspects, witnesses and third parties may be inebriated and thus not able to provide accurate details about the crime. Further, where homicides occur in connection with illegal drug markets, involved subjects may be less willing to cooperate out of fear of being implicated in drug-involved offenses or being subject to retaliation in the "no snitching" code that permeates these cultures (Dennis, 2009; Innes, 2003; Innes & Brookman, 2013; Natapoff, 2004; Rosenfeld, Jacobs, & Wright, 2003). Accordingly, this study considered the difference in case outcomes that involved substance use on the part of one or both combatants and those that did not.

Case dynamics. After the police become aware of a homicide, there are case dynamics that affect the development of the subsequent investigation. The information provided in Table 1 shows that case dynamics are modeled much less frequently than the previous two domains. Case-related measures include the availability of different types of evidence, police-frequented areas, location, multiple victims, and media coverage. The more of these dynamics a case bears, the more information investigators will be able to work. Evidence may identify the offender(s) or provide leads toward an arrest. Areas known to the police may well include informants, familiarity with the crime scene, or easier follow-up. Plus, more victims and media coverage might affect public involvement, availability of resources, and prioritization of homicides as there is typically more pressure to make an arrest in high profile cases. Indeed, public cooperation and the pressure to close high profile cases might be greater when more than one victim is

involved or the media highlights the homicide. Ultimately, the evolving dynamics of a case affect the odds of closure.

Evidence. For decades, studies have noted the role of evidence in homicide cases (Carter, 2013; Decker, 1995; Geberth & Bagerth, 1996; Greenwood et al., 1977; Innes, 2003; Riedel & Rinehart, 1994, 1996; Sanders, 1977; Wolfgang, 1958). Blair and Rossmo (2010) explained how the amount and type of viable evidence is fundamental to investigations, saying:

> More specifically, the investigator must decide what the available information tells him or her about the likelihood (or probability) that a particular suspect committed the crime in question. In other words, the detective might ask, given a particular set of facts, what is the likelihood that the suspect is guilty? This question is also undoubtedly linked to consideration of whether or not there is sufficient evidence to arrest and/or convict the suspect. Critical part of the investigative process, then, can be seen as evaluating what a given element of evidence tells the investigator about the likelihood that a suspect is guilty. (p.123-124)

Actionable evidence can be verbal or scientific. Verbal evidence includes witness, third party, and suspect statements and has long been quintessential to successful homicide investigations (Davies, 2008; Marché, 1994; Riedel, 2008; Riedel & Jarvis, 1998; Roberts, 2007). Scientific evidence, also commonly referred to as forensic evidence, involves the processing of physical material or technological information gathered at the crime scene. While witness statements remain more salient, the use of forensic evidence has not just increased in investigations; the public now expects it (Baskin & Sommers,

2010; Keel et al., 2009; Wellford & Cronin, 1999). However, only a few single-site clearance studies have considered the effect of one or both categories of evidence in examinations of homicide case outcomes (see Table 1). This trend is attributed to the constraints of available data (Rydberg & Pizarro, 2014).

Witnesses/third party statements. Homicide cases with viable witness or third party statements are generally considered easier investigations, as these people serve as key sources of verbal evidence (Cronin et al., 1977; Simon, 2006; Wellford & Cronin, 1999). Over fifty years ago, Wolfgang (1958) noted the presence of informants or witnesses as an important evidence source in homicide casework. Subsequent research suggests homicide investigations often hinge on the presence of useful verbal evidence (Greenwood et al., 1977; Litwin, 2004; Riedel & Rinehart, 1996). In 1971, Reiss reported the importance of witness statements in that the "capacity of the police to solve any crime is severely limited by citizens, due partly to the fact that most crimes cannot be solved without securing the cooperation of citizens to link a person to the crime" (p.30, also see p.105 and a similar argument in Reiss, 1972, p.150). Clearly, getting citizens to cooperate with the police is quintessential to all types of policing and is often harder to elicit from people with negative perceptions of the police or their community (Bayley & Mendelsohn, 1969; Hale, 2009; Hinds, 2009; Huang & Vaughn, 1996; Kane, 2005; Lewis & Salem, 1986; Stoutland, 2001; Sunshine & Tyler, 2003; Tyler, 2006; Warner, 2007; Wilson & Kelling, 1982), so it makes sense that homicide investigations would be impacted as well.

Only two known single-site clearance studies have modeled measures of homicide witnesses on case outcomes. Regoeczi and Jarvis (2013) found that the presence of third

parties or possible witnesses significantly increased case closure; however, areas with concentrated disadvantaged had a damping effect on those odds of an arrest. The authors contend that in areas with lower levels of collective efficacy, witnesses will be less likely to help in investigations and fear retaliation of being involved. Similarly, Schroeder and White (2009) identified four witness measures that were positively correlated with case closure: 1) the presence of witnesses at the crime scene, 2) witnesses providing a statement, 3) witnesses providing information about the death circumstances, and 4) the presence of witnesses who could identify the victim.[14] Additionally, they used a corresponding measure of witness influence based on whether the investigators follow up on the provided information produced viable leads in multivariate models. Schroeder and White (2009) found that leads from witness information (aka significant verbal evidence) were the strongest predictor of case closure in all of their models. Collectively, the above studies suggest that significant verbal evidence may be a key factor in investigations that should be included in future clearance research. Therefore, the effects of significant verbal evidence on case outcome were also considered in this study.

Scientific/forensic evidence. Advancements in the collection and processing of evidence have increased the role of forensic science in homicide investigations. Indeed, one study found that physical evidence was collected at nearly every homicide scene (97 percent) across five cities in 2003 (N = 400; Baskin & Sommers, 2010). Additionally, McEwen (2013) argues that "[t]he collection of forensic evidence and the application of forensic sciences have become essential to criminal investigations (p.16). It is suggested that forensic evidence is important for identifying and supporting the guilt of the

[14] These findings should be met with caution due to sampling bias, missing data, and focus on DNA evidence at the exclusion of other "potentially relevant variables" (Schroeder & White, 2009, p.326).

offender, as well as exonerating others (Baskin & Sommers, 2010; Fisher & Fisher, 2012). However, only two studies have accounted for direct measures of evidence in case clearance modeling (see Table 1).[15]

In the first study, Schroeder and White (2009) reported that case outcomes and measures of DNA, projectile, and fingerprint evidence had significant Chi-Square values, but did not perform as expected in their multivariate models. In their full logistic regression model, only the presence of fingerprints was a significant predictor of case closure. However, that relationship was not significant in their model seeking to predict time to clearance. Moreover, the availability of DNA evidence was only significant in the time to clearance model. Where significant, the effects of forensic evidence were shown to be negative on case clearance (Schroeder & White, 2009).

Second, McEwen (2013) included more types of forensic evidence and sought to assess how case difficulty was associated with evidentiary issues. They categorized forensic evidence into biological, weapons, trace, latent prints, impressions, and drug. No significant effects were observed for models of all homicide cases in their study. However, the null findings may have been related to the study not including ecological characteristics or investigator factors domains measures in the predictive models. Additionally, in multinomial analyses of closed cases by types (i.e., immediate arrest, quick action, and whodunit cases) compared to open cases, McEwen (2013) found that three categories of evidence were significantly related to case outcomes. Latent prints were significantly more likely to be present in cases that were open compared to an

[15] Several studies included measures of factors that were discussed as likely to affect case outcomes because of the evidence associated, such as victims being transported to a hospital and victim struggle/mode of death, but those were not measures of actual evidence collected or used in a case (Jiao, 2007; McEwen, 2013; Rydberg & Pizarro, 2014; Schroeder & White, 2009).

immediate arrest case. Additionally, open homicide investigations were less likely to have latent prints and weapons evidence than quick action cases. Lastly, biological evidence increased the odds of a closure for whodunit cases. Given that Schroeder and White (2009) and McEwen (2013) found somewhat contradictory results, more research is needed to clearly understand the current role of evidence in homicide investigations. Toward that end, this study included forensic evidence; however, other considerations might also be helpful.

One reason why prior findings are seemingly inconclusive may be that the measures were focused on evidence collected rather than those that were successfully processed for investigators to interpret. It is likely that the processing of evidence allows investigators to develop leads from evidence or for it to be of value to the investigation. In other words, just because evidence was collected does not necessarily mean it was useable. For instance, a study by Parker and Peterson (1972) found that evidence is available in 90 percent of crimes, yet only used in 1 percent of cases. If witnesses lie or cannot remember what happened, the statement is not likely to produce many leads. The mere collection of a witness statement does not determine if the information is used. For verbal evidence to be an influential element in an investigation, it has to be processed. Similarly, special conditions, protocols, and comparisons are required for many types of physical evidence to contribute to a case (Hails, 2009). For example, fingerprints and DNA must be matched to a sample in order to help the investigator identify someone. If a procedure is done incorrectly or there is no comparable sample, the evidence collected may not be useable.

Moreover, case outcomes may not be as dependent on the presence of a specific type of evidence as much as how many types are contributing to the investigation. Exploring each type of evidence may be important to understanding those more common among homicide incidents, but for case arrests, it is likely that collecting and processing more types of evidence increases the odds of closing the case. In other words, having a greater number of leads that arise from multiple pieces of available evidence in a single case may be more predictive of case outcomes than the presence or absence of any one specific type of evidence. To date, no known study has explored homicide case outcomes using this additive effect logic.

Police-frequented area. Another case dynamic that could influence investigation outcomes is how well the police know the area where the homicide occurred. Only one single-site clearance study has considered a police-frequented area measure. Jiao (2007) argued that a "[h]igher number of homicides in a location familiar to police presence may influence clearance rates due to both a constraining effect they may have on police resources and a desensitizing effect on police detectives" (p.8). However, it could also be argued that police resources are often meager, so any way to add information to a case is likely to help in solving the case.

Homicides occurring in areas known for high volumes of calls for service or established criminal markets might be easier to solve as they may present detectives with established sources of police intelligence on the habitually involved criminals and locations that they frequent. Familiarity with an area could provide information from knowing who to talk to and where to look for help. There is some support for these assumptions from research on community oriented policing and hot spots policing

(Weisburd & Braga, 2006). For example, community-oriented policing was developed and widely adopted based on the idea that increasing familiarity among officers and neighborhood residents would improve the function of the police (Giacomazzi & Brody, 2004; Giacomazzi, Riley & Merz, 2004; Goldstein, 1987; He, Zhao, & Lovrich, 2005; Vito, Walsh, & Kunselman, 2005; Weisburd, McElroy, & Hardyman, 1988; Zhao, Scheider, & Thurman, 2002, 2003). Varying by how it is implemented, community-oriented policing has been somewhat successful at meeting its goals of reducing crime, disorder, and fear of crime and increasing citizen cooperation and police legitimacy (Gill, Weisburd, Telep, Vitter & Bennett, 2014; Reisig & Parks, 2004; Skogan, 2006).

Additionally, investigators might set out with preconceived notions when dealing with homicides occurring in areas with a clear history of calls for service. Those notions may increase the odds of or speed up identifying witnesses and the suspect in a case. For instance, an investigator may be able to determine that a homicide is gang-related faster in areas known for gang activity. Once the investigator knows they are working a gang-related homicide case, they may have a better idea regarding whom the offender might be and how to interview him or her. Indeed, there are numerous reasons why homicides in an area frequented by police may have different odds of closure.

Research should continue to explore this logic but may want to consider using a slightly different conceptualization than Jiao (2007) used. Given the rarity of the crime, simply recording the number of homicides occurring in a particular area would not adequately tap all of the places frequented by or known to the police. However, areas associated with high levels of drug or gang activity or those that regularly request service for felony offenses, are considered hotspots of crime and better known by the police.

Using a police-frequented area measure that captures homicides occurring in crime hotspots would likely be more useful.

Crime scene location. Referring to Table 1, one notes that many single-site clearance studies have included a measure of the crime scene location (Alderden & Lavery, 2007; Gilbert, 1983; Jiao, 2007; Litwin, 2004; Litwin & Xu, 2007; Lundman & Myers, 2012; McEwen, 2013; Riedel & Boulahanis, 2007; Regoeczi & Jarvis, 2013; Riedel & Rinehart, 1996; Rydberg & Pizarro, 2014; Wolfgang, 1958; Xu, 2008). While few studies provide an explanation of how changes in outcomes may vary based on where the body was found, some suggest that the location dictates the probability of evidence (Jiao, 2007; Litwin, 2004; Litwin & Xu, 2007; Xu, 2008) being collected. The general finding is that homicides that occur in a home are more likely to be cleared than killings that occur elsewhere (Alderden & Lavery, 2007; Litwin, 2004; Litwin & Xu, 2007; McEwen, 2013; Riedel & Rinehart, 1996; Rydberg & Pizarro, 2014; Wolfgang, 1958). The specific findings are more convoluted as inconsistencies in the operationalizations of location types have varied.

Litwin (2004) compared general public place crime scenes (including vehicles) to taverns, homes, and low-visibility areas and found taverns and homes significantly affected case clearances over time. Homicide cases with residential crime scenes increased case closures, but taverns decreased them. Similarly, Rydberg and Pizarro's (2014) results suggested public streets and other public locations (including vehicles) significantly increased the time it took to clear a case compared to residential locations. Litwin and Xu, (2007) found that compared to low-visibility areas (e.g., alleys), homicide scenes in homes and public places were more likely cleared throughout all of the models,

but vehicles scenes were only significant in the 1976 to 1985 model and it had a negative effect. A study by Jiao (2007) examined the effect of crime scenes in home/other indoor and vehicle/public transportation locations compared to street/outdoor body discoveries. Both were significant, but had opposite effects; home or indoor scenes increased clearances, while vehicle/public transportation scenes decreased case clearances. Regoeczi and Jarvis (2013) found other indoor locations compared to residences significantly decreased case clearance, while outdoor locations were not significant in the full model. Finally, Alderden and Lavery (2007) and McEwen (2013) used a flag of indoor crime scene locations, and as expected indoor locations were significantly associated with an increase in solved cases. It stands to reason that indoor or contained crime scenes are easier to collect evidence from since there are fewer elements to compromise specimens. Also, indoor scenes may involve certain types of people or motives that are easier to solve, such as domestic violence cases. Consistent with past studies, this inquiry considered the effect of crime scene location on case closure.

Multiple victims and media coverage. There has been only one single-site homicide clearance study to test whether case outcomes are affected by a case having multiple victims (see Table 1). Lee (2005) argued that cases with more than one victim "may have suggested greater heinousness to the police and generated greater investigational effort" (p.253). Additionally, cases with multiple victims may produce more evidence and leads. It might also be easier to establish relationships to the assailant when there are multiple victims involved. Indeed, potentially all case aspects are subject to be multiplied by each victim. Case enhancements may also be more likely when the media becomes involve (Rydberg & Pizarro, 2014).

Another factor that may affect case solvability is the level of news coverage. The media do not equally report all homicides (Beeghley, 2003). When the media are attentive to a homicide, coverage may help solve cases by encouraging people with any relevant information to talk to the police. However, this is likely to depend on whether a department can control the information released in a way that generates any evidence or leads for the investigator. In departments where a standard operating procedure and professional relationship with local news outlets has been developed, detectives and reporters might be familiar with what information is sharable, whereas other department are less able to control the information released to the public (Carter, 2013). Homicide detectives who can use media coverage to help illicit information are likely to have better clearance rates. For example, in a study by Dabney et al. (2013) one investigator talked about the media as an external source, saying "situations where we need their help...they're the best outlet, to get out there to the most people." Unfortunately, most police departments do not have such a relationship with the media, thus there is little control over the announcements. The framing of a case by the media and need to withhold certain investigation details by the detective may be essential to interviewing subsequent witnesses and suspects. The two single-site homicide clearance studies to explore the media used a dichotomous indicator of local newspaper coverage on incidents and found when homicides were published the odds of an arrest increased (Rydberg & Pizarro, 2014). In light of Lee (2005) and Rydberg and Pizarro's (2014) findings, more research is needed to further understand how case enhancements such as multiple victims and media coverage possibly affect homicide investigations.

Ecological characteristics. The social context wherein a case is worked influences police effectiveness (Braga & Weisburd, 2010; Weisburd, Groff, & Yang, 2012). Indeed, mapping where crimes occur within a jurisdiction has been a useful police practice for decades (Braga, Papachristos, & Hureau, 2014; Eck, 2003; Eck & Weisburd, 1995; Silverman, 1999; Weisburd & Braga, 2006). Within every city, there are micro-level (e.g., neighborhood) differences in culture, resident demographics, collective efficacy, perceptions of the police, and crime dynamics (Anderson, 1999; Bursik & Grasmick, 1993; Sampson, 2012; Sampson & Grove, 1989; Shaw & McCay, 1942; Weisburd et al., 2012; Wilson, 1983). For instance, Warner, Swartz, and Hawk (2015) found that the racial composition of social ties within neighborhoods, and networks between neighborhoods, affected the likelihood of informal social control, which prior research reports is quintessential to crime reduction. These are different characteristics than would be represented in a citywide aggregation, as neighborhoods exhibit distinct socio-cultural features. Jurisdictional data describe the frequency of certain area features, not the breath. To illustrate, a city comprised mostly of low crime neighborhoods will usually be summarized as having a low crime rate, even though there will likely be micro-areas within the city limit that exhibit high crime rates. Similarly, the likelihood of clearing a case may vary across the neighborhoods of a city, as homicide detectives may be forced to adjust their investigative strategies in response to uncooperative residents or an established criminal element. This point is supported by research, which suggests there are variations in police-community relations that affect police effectiveness (Hinds, 2009; Sunshine & Tyler, 2003; Tyler & Fagan, 2008; Weitzer & Tuch, 2005; Weitzer, Tuch, & Skogan, 2005).

More specifically, data show that career criminals, such as violent repeat offenders, tend to operate in geographically concentrated pockets within cities (Braga et al., 2014; Sherman, Gartin, & Buerger, 1989; Weisburd & Mazerolle, 2000; Weisburd, Morris, & Groff, 2009), and those neighborhoods may pose unique challenges to homicide investigations (Litwin, 2004; Litwin & Xu, 2007; Lundman & Myers, 2012; Puckett & Lundman, 2003; Regoeczi & Jarvis, 2013; Xu, 2008). Four reasons are commonly forwarded in single-site clearance studies to account for these trends: 1) investigative commitment, 2) low levels of witness cooperation, 3) weak collective efficacy, and 4) problems associated with population density. These will be explained in turn.

First, areas with high crime, accumulations of people associated with crime, or high percentages of racial minorities may have a lower status than other areas. It is suggested that police may devalue cases in such areas, resulting in less commitment to their investigative efforts and thus fewer clearances (Black, 1976; Paternoser, 1984; Xu, 2008). Second, areas with higher percentages of criminals may not be welcoming or approving of the police (Anderson, 1999). Bystanders in these areas are often reluctant to assist police in the investigation process due to fear of reprisals from offenders and disbelief that the authorities will be able to protect them (Kane, 2005; Hale, 2013; Riedel & Jarvis, 1998; Stoutland, 2001; Warner, 2007; Wilson & Kelling, 1982). Similarity of life circumstances, ethnicity, culture, or familial ties may even encourage residents to protect offenders. Additionally, communities with high crime and more criminals tend to be generally less trusting of, confident in, and satisfied with the police (Bayley & Mendelsohn, 1969; Brown & Benedict, 2002; Carter, 1985; Decker, 1981; Huang &

Vaughn, 1996; Reisig & Parks, 2000; Tuch & Weitzer, 1997; Warner, 2007). Litwin (2004) and Puckett & Lundman (2003) suggest these poor police-community relations may reduce witness cooperation that an investigator could use to solve a case.

Third, neighborhoods facing socioeconomic challenges, such as concentrated disadvantage and residential instability, may have more crime than other communities because people exhibit higher levels of apathy and are less willing to spend their personal time helping the community or police (Browning, Feinberg, & Dietz, 2004; Keel et al., 2009; Mazerolle, Wickes, & McBroom, 2010; Morenoff, Sampson, & Raudenbush, 2001; Sampson et al., 1997; Warner, 2007). Where neighborhoods are characterized by low levels of collective efficacy, residents are less likely to feel connected to their community, which reduces shared resources, communication, socialization, and concern for neighbors (Alesina & LaFerrara, 2000; Beyerlein & Hipp, 2005; Costa & Kahn, 2001; Putnum, 2000, 2007; Sampson & Raudenbush, 1997; Twigg, Taylor, Mohan, 2010). In turn, homicide investigations in these types of neighborhoods would likely be less successful as the "same neighborhood conditions that allow criminal activity to flourish may also interfere with the identification, apprehension, and prosecution of suspect in these cases" (Regoeczi & Jarvis, 2013, p.984).

Lastly, area density has been argued to decrease case clearances because heightened levels of population density allow offenders to be more anonymous, thus escape detection (Litwin, 2004; Litwin & Xu, 2007; Wolfgang, 1985). It is for all of these reasons that ecological characteristics are likely to shape homicide investigation outcomes. Six single-site homicide clearance studies have examined ecological factors associated with homicide case outcomes (see Table 1). They all used census counts and

three studies examined the same neighborhoods.[16] The ecological measures explored can be grouped into three categories: area racial composition, area socioeconomic status, and area residency.[17]

Area racial composition. Of the clearance studies that have included ecological characteristics, the majority have modeled a measure of neighborhoods' racial composition (see Table 1). For example, Puckett & Lundman (2003) coded census tracts as primarily Black or African American, White, or racially integrated. They found that primarily Black or African American communities and racially integrated areas had a decreasing effect on case closures compared to primarily White census tracts. These results were the same in analyses of a subset of cases that did not include exceptional clearances and same-day closures. Lundman and Myers (2012) used the same data and ecological measures as Puckett and Lundman (2003); however, they found that only the mostly Black or African American tracts significantly reduced case closures.

Xu (2008) also included a measure of percent Black or African American residents in an area and added the percent Latino. Only the percent Black or African American residents variable significantly predicted homicide case closure. At the community-level, the effect was negative, while the percentage of Black or African American residents within the jurisdiction had a positive effect on case closure.[18] Using the same data as Xu (2008), Litwin & Xu (2007) did not find primarily Black or African

[16] Litwin (2004), Litwin & Xu (2007), and Xu (2008) used Chicago communities zoned into 77 areas (that overlap) within 25 police districts.
[17] Xu (2008), Litwin & Xu (2007), and Litwin (2004) also included the area's homicide rate, but it has not been a significant predictor of case outcomes in any of the models. Additionally, those data were across a decade or longer, thus provided more variation than would be available in this study. Therefore, this study did not include a similar measure.
[18] These results are supportive of the argument that research using citywide aggregated data may not produce the same understandings as within jurisdiction studies.

American communities to be predictive of homicide case outcomes. That study did report that increases in the percentage of Spanish speaking residents in an area produced a positive effect on homicide case outcomes though. Research should continue to explore if the racial composition of an area changes the likelihood of closure.

Area socioeconomic status. When modeling the ecological characteristics domain, researchers typically include at least one measure of socioeconomic status. That said, there is little consistency between the specific variables used and similar areas socioeconomic status (SES) measures have produced mixed findings. Puckett and Lundman (2003) examined the average income, below average income, and above average income of areas where homicides were investigated. They did not find income to significantly affect homicide case outcomes. Litwin (2004) explored measures of median income, percent unemployment, and percent college graduates in a model predicting homicide case clearances. None of the three socioeconomic status measures were found to be significantly related to clearance outcomes. Xu (2008), on the other hand, found that lower median household incomes in census tracts where homicides occurred significantly decreased the odds of case closure using the same data as Litwin (2004). The contradictory findings on median household income could be a result of using one year of census data to predict decades of homicide clearances or that Litwin (2004) used a logged income measure; nonetheless, it suggests more research should be conducted to test the relationship between income and clearances. Additionally, given that Litwin (2004) found unemployment and education to be correlated with case outcomes before multivariate modeling and that the study model did not include measures from all of the

five domains, clearance research should confirm their null findings before disregarding their possible impact on case outcomes.

Taking a different approach to modeling SES, Litwin and Xu (2007) created an economic disadvantage index using "median household income, unemployment rate, percentage of the population living in poverty, percentage of female-headed households, percentage of owner-occupied housing, and percentage of vacant housing" (p.101). That measure was only shown to be predictive of homicide clearance rates in their 1986 to 1995 analyses. Those results suggest that areas with higher economic disadvantage have lower likelihoods of clearances. Most recently, Regoeczi and Jarvis (2013) explored the concept of concentrated disadvantage with percent of female-headed households with children, percent of individuals below the poverty line, and the unemployment rate variables (p.997). While that homicide clearance study did not find that concentrated disadvantage directly affects case outcomes, it did produce a damping effect on the presence of third parties. This suggests that areas with more disadvantages may be less likely to include witness statements (Regoeczi & Jarvis, 2013). Given the array of ecological characteristics that have been considered as possibly affecting the success of homicide investigations, this study explored such likelihoods with all available SES measures.

Area residency. Four single-site studies examined area residency measures (see Table 1). Litwin (2004) found homeownership significantly changed the odds of an arrest, but the total census tract population did not. Homicides investigated in areas with higher percentages of people who lived in a home they owned had a greater likelihood of closure. It is likely the total population measure was not significant because it was a

count that did not adjust for the size of area. A density measure may be a better test of possible community size affects. Nonetheless, using the same data, Litwin and Xu (2007) found that increased area population decreased case closures in two of the three groups of case years. Those census tracts were also examined by Xu (2008), who considered area residency using different ecological measures ─ the percentage of owner-occupied and vacant housing in areas where a homicide occurred. In that study, as the percentage of owner-occupied households or vacancy within neighborhoods increased, the odds of case closure decreased. However, when Xu (2008) included time-series controls, the effects were no longer significant. In the most recent study to examine neighborhood-level effects, Regoeczi & Jarvis (2013) employed a residential instability construct using the percent of people aged five years and over who moved in the past five years and percent of renter-occupied housing units. Residential instability did not significantly change case outcomes; however, it did amplify the likelihood that cases with White victims would be solved. These findings suggest these measures may affect homicide cases and are worth further consideration.

In sum, numerous single-site homicide clearance studies have explored the impact that ecological factors have on homicide clearance outcomes. A wide array of measures has been employed in this regard. Given the variation in the modeling and findings regarding these measures, more research is needed to understand how community-level factors may impact investigation success. To accomplish this, the current project adds to the literature by examining the effects of area socioeconomic status and residency on homicide clearances.

Investigator factors. It stands to reason that the person who works the case likely influences the outcome. However, little is known about how investigators affect the likelihood of homicide case clearance. Few single-site studies have been able to include investigator factors domain measures (see Table 1). While the investigator factors domain has been excluded more than any other domain in clearance studies, there is a long history of homicide investigations research (Baden & Hennesse, 1990; Carter, 2013; Carter & Carter, 2013; Chaiken et al., 1977; Cloninger & Sartorious, 1979; Eliopulos, 2003; Gilbert, 1983; Hawk & Dabney, 2014; Innes, 2002a, 2003; Innes & Bookman, 2013; Keel et al., 2009; Miletich, 2003; Randall, 1997; Rossmo, 2008; Sanders, 1977; Wellford & Cronin, 1999). Like any other job, officers are promoted into and transferred from homicide (or major crimes) units based on their personal performance. It is well established that the homicide investigator position is a high profile assignment within police organizations (Cordner, 1989; Klinger, 1997; Riedel, 1995, 2008; Simon, 1991; Waegel, 1981). Devastated families and communities blame or credit detectives for case outcomes. The general public uses homicides as a barometer of safety and police effectiveness (Riedel & Rineheart, 1996; Riedel, 2008; Wellford & Cronin, 1999; Xu, 2008). Also, other homicide detectives judge their peers by closure rates (Hawk & Dabney, 2014). Therefore, it is not too much of a leap to suggest that the outcome of a homicide case may be impacted by individual-level factors related to the detective who is assigned the lead responsibility to investigate it.

With the easiest cases (i.e., self-solvers), aspects like workload, effort, experience and competency of an investigator may matter less as the job likely only requires them to record the story and assemble the requisite paperwork (Innes, 2002a, 2002b, 2003).

Among more complicated investigations (i.e., whodunits), detectives need to develop leads, interpret evidence, interview people, create an organized and comprehensive case file, and manage all of the people interested in the case, within and outside of the department (Cook & Tattersall, 2010). To this point, Sanders (1977) reported that "individual actions performed by officers collectively contribute to the construction of the 'facts' in different types of homicide investigations and consequently the meaning that are constructed for the individual incidents" (p.678). The ability of investigators to interpret facets of a homicide case is pivotal to the job (Kuykendall, 1982; Rossmo, 2004).

Cornin et al. (2007) argue that investigative work is the most challenging of all policing positions. Homicide investigations are complicated, especially when determining the validity of information as people often lie, misconstrue, manipulate, and exaggerate the truth (Chaiken et al. 1977; Greenwood et al. 1977; Innes, 2002a, 2002b, 2003; Innes & Brookman, 2013). Miletich (2003) suggests that information gathering and management are quintessential to approaching victims' families, canvassing, and conducting suspect interviews in a homicide investigation. Furthermore, evidence interpretation and motive speculation can dictate an investigation (Bayley, 1998; Eck, 1992; Greenwood & Petersilia, 1998; Reasons, Francis & Kim, 2010; Sanders, 1977). Investigative thinking at times requires creativity, experience, and unique and lateral lines of inquiry (Roycroft, 2007). Indeed, detectives are "calculating individuals who outwit their adversaries almost singlehandedly" (Cook & Tattersall, 2010, p.1). Table 1 reflects that several single-site clearance studies have considered some of these facets of the

homicide investigation job by exploring workload, investigative effort, and experience differences in homicide case outcomes.

Workload. A heavy workload can produce psychophysiological strain and fatigue that decreases productivity (Brookhuis & Waard, 2001; Robert & Hockey, 1997). This may be particularly true for people in jobs exposed to violence and without control over workload (Collins & Gibbs, 2003; Terkel, 1978). For homicide investigators, workload is among one of many possible sources of stress that could "not only inhibit effective investigations in the short-term, but would likely also contribute to ongoing stress and increases in frustration and physical, psychological, and emotional consequences (including burnout) for investigators" (Dabney et al., 2013, p.24). Nonetheless, simple math suggests that for every case an investigator is tasked with working, their available time to work other cases is reduced. Overly burdened investigators could miss case leads, lose interview opportunities, or misinterpret case components. Keel (2008) reported that homicide detectives are more effective at closing cases when they are assigned five or less cases a year. To test the role of workload on case outcomes, studies have used various different measures.

The first single-site study to analyze investigator factors was Puckett and Lundman in 2003.[19] These researchers explored workload using a count measure of homicide occurrences at the time of each new homicide. It is likely that the measure (as well as other undefined proxies included in noted analyses) was not significantly

[19] Unfortunately, they were denied direct access to the Columbus Ohio Police Department's case files and detectives so had to employ investigator factor proxies from the public dataset. They reported that the department told them "the data [they] were not allowed to access are confidential because they could compromise ongoing investigations" (Lundmand & Myers, 2012, p.27).This common problem (in which the current study overcomes) will be discussed more in future sections.

predictive of case outcomes, because variance for each investigator was not distinguished. To understand the possible effect of workload, it may be more important to explore an individual detective's caseload. A host of factors such as turnover and personal leave can result in an uneven distribution of case assignments within a police department. Inevitably, some homicide detectives end up shouldering a heavier workload than others and this may significantly change the odds of an arrest.

Considering this point, Rydberg and Pizarro (2014) included three measures of workload by detective: time elapsed since their last case (logged); total number of open cases, and recently opened cases. They encountered unexpected results; namely, the odds of case arrests were lower when detectives' time since their last case was higher. The authors argue this "may be indicative of a "getting rusty" effect, [or] it may also be that there is something qualitatively different about homicides incidents assigned to detectives who have not handled a case in some time" (Rydberg & Pizarro, 2014, p.17). It is difficult to interpret these findings beyond the reasons Rydberg & Pizarro (2014) provided as descriptive information regarding the minimum and maximum number of days the detectives in their sample went between assignments was not published. Additionally, the total number of cases each investigator worked and how many of those were unsolved are likely important to contextualizing the results. Table 1 illustrates that only these two single-site studies have examined the investigator's workload on the likelihood of case closure. Although there is sound logic underlying the inclusion of investigator-level factors, the data are rarely available to examine these measures. It is unfortunate that these two studies were able to test workload measures; yet, the findings

were contradictory. As a result, there is a need for further study of the possible effects of investigator workload on case outcomes.

Tenure/experience. Employees with longer tenure or experience are generally more productive or effective at their jobs (Gordon, Cofer, & McCullough, 1986; Gordon & Johnson, 1982; Hofmann, Griffin, & Gavin, 2000; McDaniel, Schmidt, & Hunter, 1988; Schmidt, Hunter, & Outerbridge, 1986). Developing expertise increases the ease of a task to a point where it can even become involuntary (Bloom, 1986; Shulman, 1987; Siedentop & Eldar, 1989). For detectives, experience could improve their expertise in recognizing potential leads and subsequently connecting the evidence or information between leads that subsequently establish the requisite probable cause for an arrest. Detectives with more experience could also be better at extracting information during interviews. Pauline & Terrill (2007) found that officers with more experience were less likely to use verbal and physical force or coercion on citizens (also see Bayley & Bittner, 1997) and Riksheim & Chermak (1993) contend that police effectiveness is best measured by the outcomes of citizen encounters.

Additionally, officers with longer tenure are often considered more skilled (Bayley & Garofalo, 1989). In a study of homicide detectives by Dabney et al. (2013), one investigator spoke directly to the relevance of a fellow officer's experience and skill, saying "[he] just appears to get there way before everybody else. I mean he's got a sharp mind…He's the most experienced person in this unit, so a lot of it's having been there and seen it." Maybe the aforementioned investigator produces more case clearances as a result. Accordingly, clearance research has explored if detective tenure associated with homicide case outcomes.

Puckett and Lundman (2003) examined shift assignments with the assumption that better shifts (day) are awarded by seniority. While that measure was not predictive of case clearances, Table 1 reveals that this is the only known single-site clearance study to include an experience measure. The present study explored tenure measures in an attempt to add to the literature regarding detectives' experience and case outcomes.

Investigative effort/thoroughness. Job performance or quality of work is a direct consequence of how much effort or thoroughness a person exudes, regardless of the industry (Blau, 1993; Brown & Leigh, 1996; Gardner et al., 1989; Hunt, 1996; Kidwell & Bennett, 1993; Viswesvaran & Ones, 2002). If some detectives are more thorough in their investigations than others are, they may produce better clearance rates. Feist and Newiss (unpublished paper) note that a homicide case can require between approximately 500 to 4,000 investigative actions. Carter (2013) found that investigative tactics (i.e., what and how tasks are performed) are related to positive case outcomes. Additionally, research suggests that homicide investigators face emotional obstacles as they try to work every case the same (Hawk & Dabney, 2014). Given these findings, and that a homicide investigation is "negotiated" work (Innes, 2002a, 2002b), it is likely that detectives' case outcomes vary by effort.

As shown in Table 1, Schroeder and White (2009) conducted the only single-site study to use investigator effort measures to explore case outcome differences. They modeled seven measures of investigation thoroughness: detective follow-up with witnesses, computer checks on victim, witnesses, or suspects, interviews with hospital personnel or victim's family, and presence at the postmortem exam. The results show investigations involving witness follow-ups, suspect computer checks, and detective

attendance at autopsy procedures were significantly more likely to be cleared. Each of these techniques is identified as best practices in a homicide investigation (Carter, 2013; Geberth & Bagerth, 1996; Innes, 2003; Keel et al., 2009; Snyder, 1967; Wellford & Cronin, 1999). Additionally studies are needed to better understand these and other investigative-effort measures, thus should be further explored in case outcome research.

Competency. There is a fourth dimension to investigator performance that has not been previously considered in homicide clearance research − detective competency. If all of the detectives in a unit had the same demographics, workload, tenure, and completed the same tasks for identical types of cases (i.e., involved subject, event characteristics, case dynamics, and ecological characteristics), there would likely still be variation in their clearance rates. There are personal traits that are unique to each person, such as being able to adapt to change, learn quickly, having communication and interpersonal proficiency, and other "softer skills" that significantly affect their work success (Boyatzis, 1982; Goleman, 1998; McClelland, 1973; Rodriguez et al., 2002; Schippmann et al., 2000). These personal traits translate into competency. Specifically, competency is having a "repertoire of capabilities, activities, processes and responses available that enables a range of work demands to be met more effectively by some people than by others" as it increases the "ability to generalize and transfer knowledge and skills from one job task or role to another" (Kurz & Bartram, 2002, p.230). For homicide investigators, their personalities, knowledge, intelligence, tenacity, and commitment are likely to shape their ability to close cases (Hogan & Kurtines, 1975; Hunter, 1983a, 1983b, 1984, 1986, 1996; Kirkcaldy, Cooper, Furnham, & Brown, 1993; O'Reilly, 1977; Ree & Earles, 1992; Schmidt & Hunter, 1993; Schmidt et al., 1986; Swider &

Zimmerman, 2010; Tett & Burnett, 2003). Some investigators may be better at interviewing people, know more about certain types of evidence, or be skilled at drawing crime scenes and writing up the case details. In other words, there are likely differences in job performance that are not captured by workload, tenure, and effort measures.

Moreover, if an investigator is burned out or less committed to the job than other detectives, this could negatively impact their ability to solve cases (Bakker & Heuven, 2006; Bhagat, Allie, & Ford, 1995; Burke, 1993; Lee & Ashforth, 1996; Parker & Kulik, 1995; Saunders, 1977; Wright & Cropanzano, 1998). To this end, McCreedy (1974) reported, "very critical skills that a police officer must demonstrate are affected deleteriously when the officer experience feelings of burnout and stress. They include the ability to assemble pieces of information and form a logical conclusion, the ability to make decisions quickly and accurately, the ability to observe, retain, and recall detailed information." Burnout may be more likely among homicide investigators given the job-specific stressors (Dabney et al., 2013) and scrutiny (Cordner, 1989; Klinger, 1997; Riedel, 2008; Waegel, 1981). Regardless of the reason why an investigator may be more or less competent at managing a homicide case, coworkers and administrators are generally aware of who are the better investigators in the unit. A measure of competency was included in the present study to explore this logic.

As only a handful of homicide clearance studies have included measures from the investigator factors domain and those findings are far from conclusive, more research is needed to understand the likelihood of case clearances among investigators. This will

require more studies to identify which investigator worked a specific case.[20] Particularly, exploring the impact of investigators' workloads, experiences, and efforts may provide interesting investigation insights about case outcome differences, especially among detectives who work cases that are more difficult or have higher caseloads (Geberth, 1996; Keel, 2008; Keel et al., 2009; Liska, Chamlin, & Reed, 1985; Puckett & Lundman, 2003; Wellford & Cronin, 1999). Additionally, it may be advantageous to consider how well one investigator is able to do the job compared to another on case outcomes. Generally, more homicide clearance studies should consider the possible effects the investigator working the homicide case has on the outcome. These gaps in the literature are in part due to previous scholars' use of archival data.

Data sources. When examining case outcomes, homicide-clearance scholars have largely relied on archival data, which are assembled and released to public researchers. Studies based on archival data are limited in what measures can be explored and thus how they can be causally interpreted (Alderden & Lavery, 2007; Lundman & Myers, 2012; Puckett & Lundman, 2003; Riedel & Rinehart, 1996). Most homicide clearance research has used secondary archival data.

Secondary archival data. Agency-released datasets are created with pre-defined measures, so as to limit the public's ability to identify or evaluate involved parties, particularly the police. While the use of agency-released data saves researchers time and resources when collecting original data, they also force scholars to exclude relevant variables or utilize proxies for measures not available. The second column of Table 1

[20] Most publically available data are de-identified to protect persons involved in a case, including the investigator and other case file datasets were only allowed to be assembled under an agreement that such information would not be collected (Puckett & Lundman, 2003; Schorder & White, 2009).

provides information on the data sources included in the known single-site homicide clearance studies. In this regard, it is noted that Puckett and Lundman (2003) and Lundman and Myers (2012) used the publically available Columbus Division of Police Homicide Squad Records dataset to analyze homicide case outcomes. Those data, entered and maintained by civilians, are limited to general information about the victim, incident circumstances, and ecological characteristics. Lundman and Myers (2012) noted that the electronic data were far less detailed than the "hard copy data that ranged in size from, for most homicides, a three-ring notebook to, for a few cases, the equivalent of three file cabinet drawers" (p.27). This dataset constrained Puckett and Lundman (2003) to examining the 1984 to 1992 cases utilizing homicide unit shifts as a proxy for detective experience, total homicide counts as a workload variable, and weapon types to be interpreted as evidence available in a case because those data were unavailable. Lundman and Myers (2012) used a similar approach, arguing that each type of weapon measured represented the various "amount[s] of physical contact required between violator and victim to accomplish the killing and the amount of evidence left behind" (p.29). Additionally, neither of these studies was able to explore any suspect details, which is a limitation as they might be as significant as victim predictors in impacting case outcome.

Similarly, Alderden and Lavery (2007) used an agency-released dataset from the Chicago Police Department Detective Division. They were able to specifically look at various types of motives, but could not include case dynamics, ecological characteristics, or investigator factors in the examination of Chicago's 1991 to 2002 case outcomes. That study also was unable to include offender information and described the weapons measure as an indicator of cases with more physical evidence. As most agency-released

data are similarly structured and restricted to protect ongoing cases, the absence of such variables that are likely key in understanding what predicts a homicide case arrest has been a pattern that has resulted in a considerable knowledge gap.

The most common secondary archival data used by homicide clearance researchers is a victim-level Chicago Homicide Database assembled from homicide case files (see Jiao, 2007; Litwin, 2004; Litwin & Xu, 2007; Riedel & Boulahanis, 2007; Riedel & Rinehart, 1996; Xu, 2008 in Table 1). These data were constructed by Block and Block (1998)[21] in partnership with the Illinois Criminal Justice Information Authority and Crime Analysis Unit of the Chicago Police Department using Chicago Police Department records. This dataset is considered superior to other publically available datasets, and includes approximately 115 variables coded across 23,817 homicides. Information from all 1965 to 1995 cases includes victim and offender demographics, previous offenses, relationship, cause of death, weapon, drug use, if and how an offender was identified, the event time, location, motive, and social circumstances, and several geographical variables, such as census tract. However, those data points only encompass three of the five substantive domains relevant to homicide investigations (i.e., subject involved, event circumstances, and ecological characteristics domains). Recognizing this limitation, Jiao (2007) notes:

> Due to the lack of information in the dataset regarding the actions of detectives, number of detectives assigned to homicide cases, and redeployment of other resources such as reinforcement of the narcotics

[21] The Chicago Homicide Dataset is accessible thorough the National Archive of Criminal Justice Data, Inter-university Consortium for Political and Social Research web page: http://www.icpsr.umich.edu/icpsrweb/ICPSR/studies/6399?q=chicago+homicide+data&searchSource=find-analyze-home&sortBy=

> unit based on consideration of the correlation between homicide and drugs (*Law Enforcement News*, 2000), this analysis does not address such variables and their potential effect on homicide clearance. (p.7)

Xu (2008) went further to note that this particular dataset was missing details and other explanatory data, such as internal documents, that are needed to fully understand all of the factors that contribute to homicide case outcomes.

Findings related to this popular Chicago-based dataset also have questionable generalizability in the current context due to including cases ranging from 20 to 50 years old. It is noteworthy that the national clearance rates dropped by around 30 percent over the timeframe of those cases, and technology and investigative practices have since advanced. For sure, there have been a significant number of changes within society and policing over the last several decades that imply analyses of contemporary homicide case data are likely necessary to make inferences about closures in the current climate. Nonetheless, it is not the secondary use of these data that is problematic but the archival nature that is concerning. When studies are designed based on measures available in existing datasets, research questions and models are shaped by the limits of the data. In an ideal situation, research questions and models should be designed based on theoretical or practical reasons and the best data possible would then be collected to test the propositions.

Original archival data. Table 1 reveals that numerous single-site clearance researchers have been afforded direct access to homicide case files and related official documents. These original archival data are also constrained by the availability to data and level of detail previously documented. As these data are collected directly from

public records and/or police reports, they are still heavily incident related, stripped of specificity, and missing the investigator influence. Valuable context is missing as a result. For example, Lee (2005) collected Los Angeles homicide case data from a plethora of sources (i.e., homicide reports, the state coroner's office, county courts, newspapers, and government records); yet, those data lacked ecological and investigation details, and only had information about homicides up to 1994.

In a more recent case outcomes evaluation, McEwen's (2013) data were derived from an electronic homicide case documents depository and Laboratory Information Management System. That research team coded supplemental investigation reports, evidence laboratory reports, and Superior Court records for one year (2003-2004) of Phoenix, AZ cases. Subsequently, the report focused on subject, event, and case domains. Although both of the studies collected original data, the data points were nonetheless predetermined, detailed the outcome rather than the process, and possibly asynchronous with current trends due to using over 10 to 20 year old cases.

In addition, it is likely there are issues with internal reliability of such data. Police reports/documents are conceived by and produced for justice officials, thus researchers trying to code the files may misinterpret portions or overlook valuable information. Most citizens are not trained to understand evidence tests, medical examiner reports, policing acronyms and lingo, or official procedures and policies. Therefore, they may not grasp what is being referenced nor code it correctly and consistently. Clarification, verification, and contextualization are needed to systematically capture homicide investigation dynamics. Indeed, it may be for these reasons that studies using archival data, even when collected directly from investigation case files, have produced mixed homicide clearance

findings. This is unfortunate as it is not an easy task to get admission to homicide units, much less collect data from their case files. Xu (2008) stated that it is a "well-known fact is that detailed and technical records on police criminal investigations and internal documents of law enforcement agencies are not in the public domain and are not easily available to researchers" (p.247).

Nonetheless, scholars recognize the need for coding verification. In a study by Rydberg and Pizarro (2014), 1997 to 2007 Newark homicide files were sourced to code whether the victim had a deviant lifestyle. They noted that since those data were only derived from the detectives' profiles of the victims, they probably did not have all of the information on victims' deviant and criminal behaviors when creating their dichotomous measures. It is not only likely that the detectives' views of the victims were at times speculative, but that the researchers would have had to make deductions as well. Case file information about victims is only as extensive as needed to describe the event and lead to a suspect (a point discussed more later). In another study, Schroeder and White (2009) experienced coding reliability and missing data problems when they reviewed 1996 to 2003 homicide cases occurring in the Manhattan borough of New York City. They were forced to omit three seemingly important measures. Confessions (AKA verbal evidence) were excluded because of validity concerns and the department thought, "such information would potentially violate the anonymity of the study" (Schroeder & White, 2009, p.326). Motive and victim-offender relationship were also not included because the information was missing from the file and they did not have permission to interview the detectives. Additionally, like other researchers, they were restricted from reviewing all of the files and discussing cases with the investigators who worked them.

Police departments have generally restricted researchers from accessing all of their case files by excluding some or all of the open cases. For example, Schroeder and White's (2009) data were narrowed to nearly half of the occurred homicide cases because the files could not be located, were in line to be prosecuted, or were said to not fit the study. Similarly, Gilbert's 1983 study of homicide investigations only reviewed San Diego's 1970 and 1980 homicides wherein a suspect was charged by the prosecutor's office. As a result, the study could only describe the characteristics of the victim, offender, and event patterns of all closed cases. Similarly, in the most recent review of case file data, Regoeczi and Jarvis (2013) reported a "lack of information in many of the narratives regarding the investigation of the case" (p.1011).

Even studies with open access to homicide files must contend with incomplete data. It is assumed that everything about an investigation would be included in a homicide case file, but that is not the purpose of the documentation. The organizational reality is that homicide case files are not investigation logs, rather they are written and managed by members of a formal law enforcement agency to justify arrest and foster prosecution. The official case file typically contains an incident report, lead narrative, assisting officers' supplemental reports, medical examination, ballistics log, crime scene photos, witness list, victim and offenders' (if identified) criminal histories, and any other evidence processed or useful to creating probable cause towards "beyond a reasonable doubt." Detectives do not spend extra time detailing aspects of a case that are speculative or not germane to the story, as they know it would only convolute closures and adjudication. Nor do they note personally influential attributes. The documents included in a homicide case file are more telling of the homicide incident than the investigation

and only include proven or factual information. These files are often clean, organized, standardized in form, and straightforward in their intent. Indeed, Innes (2002) noted that investigators rarely include all of the information about a case in the write-up because they are "story-tellers" whose job is to convince the judge signing the arrest warrant and other judicial participants of what they think occurred (also see Sanders, 1977). Similarly, Miletich (2003) reported that detectives do not disclose all of the case details to the public, so false confessions can be discounted, suspects do not know the extent of the investigation against them, and to preserve the process of prosecution. Conversely, the actual lived experience of the investigation is often convoluted, multifaceted, involves multiple decision points, and includes details about a wide array of people, places, events, or other crimes. That information is typically guarded by each detective in a "working file" (also called a "running file," "office file," or "street file"), but are needed for researchers to correctly understand and code case outcome factors.

Recognizing these practices and the need for investigation detail, homicide clearance researchers have unsuccessfully requested access to interview detectives (Puckett & Lundman, 2003; Xu, 2008). Others, such as defense attorneys and reporters have challenged the completeness of official case files. In the wake of a 1984 civil case (i.e., Palmer v. City of Chicago[22]), "requiring the Chicago Police Department and the Cook County State's Attorney's office to revamp their internal procedures for the recording, maintaining, and production of investigation files," CPD issued Detective Division Notice 82-2 (755 F.2d 560, *Nos. 83-1980, 83-1981*). It was an official Standard Operating Procedure (SOP) that the official homicide files be all encompassing.

[22] https://law.resource.org/pub/us/case/reporter/F2/755/755.F2d.560.83-1981.83-1980.html

However, it has since been revealed through litigation that detectives often disregarded the SOP and maintained "street files" containing a more complete record of the investigation than is found in the official record. As such, when case file information is being reviewed and coded, researchers are only really gain access to a sterilized version of the events that occurred. Thus future research needs to find ways to gain access to full case files and to interview detectives if we are to gain complete and accurate data on all the factors that go into clearing homicide cases. The present study takes important steps forward in this regard.

The last major point regarding limited data is that there is an under-representation of research on single-site homicide cases in the South. All of the single-site clearance studies have included cases from the West, Midwest, and Northeast (see Alderden & Lavery, 2007; Gilbert, 1983; Jiao, 2007; Lee, 2005; Litwin, 2004; Litwin & Xu, 2008; Lundman & Myers, 2012; McEwen, 2013; Puckett & Lundman, 2003; Riedel & Rinehart, 1996; Rydberg & Pizarro, 2014; Schroeder & White, 2009; Xu, 2008). Considering that, in 2012, the regional clearance rates ranged from 52 percent in the Midwest to 67 percent in the South,[23] it is conceivable that there are within city or region factors not being explored. Indeed, according to the Federal Bureau of Investigations, there are almost as many violent crimes committed in the Southern region of the U.S. as in the other three areas combined. The over-generalization of the current studies creates external validity concerns, thus more regionally heterogeneous research is needed. Specifically, only research in Southern states will provide a geographical representation

[23] http://www.fbi.gov/about-us/cjis/ucr/crime-in-the-u.s/2012/crime-in-the-u.s.-2012/tables/26tabledatadecoverviewpdfs/table_26_percent_of_offenses_cleared_by_arrest_or_exceptional_means_by_region_and_geographic_division_2012.xls

to what we know about homicide case outcomes. Just as laws vary by state,[24] cases and the investigators who work them may differ accordingly.

Current Study

In sum, little is definitively known about what contributes to homicide case closures. The extant literature is mixed, and thus it provides limited, ambiguous, or less applicable insight on what factors predict case outcomes. This condition is the result of three major flaws of previous studies. First, the reliance on archival data has resulted in gaps in the use of key measures, the use of proxies, and limited reliability. This situation has been exacerbated by researchers using varied coding strategies when creating measures from the data points made available to them. Second, data limitations have precluded many past studies from including the measures needed to fully model the five substantive domains that affect case outcomes. Previous research has included measures of each domain, but no study has tested them all concurrently. This is problematic as variables should only be trimmed based on informed decisions of what constitutes complete domain modeling, not a priori choices. Third, the single-site data are not geographically generalizable, contemporary, or easily interpretable.

No single-site homicide clearance study has used a multi-method design that included interviews with detectives about each case to verify and extend police record data. Indeed, heightened access to investigators not only allows for more thorough and comprehensive data, but also provides the opportunity to determine if the efforts significantly change clearance research findings. Xu (2008) proposed that, "a complete understanding of the dynamics of homicide clearance requires an inclusion of a wide

[24] For example, gun laws are more lax in the South.

range of explanatory sources. Because of data limitations, studies based on the other explanatory factors are scarce" (p.247). Additionally, several clearance studies have suggested that interviews with detectives would greatly improve the data and analyses on case outcomes.

The current project was designed to better inform the homicide clearance literature by modeling variables in all five domains and using enhanced data in examining case outcomes. It was the first to incorporate a complement of measures from the involved subject, event circumstances, case dynamics, ecological characteristics, and investigator factors domains. This builds knowledge toward providing a comprehensive model of factors that predict case clearance. The measures included in this study were coded based on prior research for interpretability. This study sought to overcome several of the problems associated with archival data by supplementing immutable homicide case file information with lead detective interviews and surveys that more directly access and accurately depict relevant case factors. Finally, the data considered here were contemporary and from a Southern state.

Chapter Three: Methodology

This study used a multi-method approach to explore homicide case clearances. Data were collected between 2011 and 2014 from homicide case files[25] and interviews of investigating officers pursuant to a related critical incident review of violent crime incidents. Data collection was accomplished by a team of researchers, over which I served as on-site project manager responsible for day-to-day operations. The design and procedures of that project were fully reviewed and approved by the Georgia State University Institutional Review Board. This chapter is organized into four descriptive sections: the study setting, data collection processes, measurement, and the analysis plan. While this study cannot provide definitive answers as to what affects case outcomes, it does provide an important first step in building a knowledge base better informed through the use of a multifaceted data collection effort. That effort included full access to homicide case files and interviews of lead detectives so that the analysis strategy could include all five domains of a homicide case investigation.

Study Setting

The jurisdiction. The data for this study were derived from research conducted in a single large metropolitan police department located the Southeastern United States. The jurisdiction under study spans a geographic area of about 150 square miles. According to the US Census Bureau (2012), it had a 2010 population of roughly half-a-million people, nestled inside a six million-person metropolitan area. Demographically, the jurisdiction was around 35 percent White, 55 percent Black or African American, 5 percent Hispanic

[25] The case files were only representative of homicides known to the police at the time the data were collected. There may have been more homicides that occurred within the jurisdiction during the study timeframe that were not treated as such by the police. The deaths had to be reported and determined to be homicides by the medical examiner to be included in this study.

or Latino, and 5 percent Asian or other ethnicity. Generally, the city was comprised of half males and half female, 10 percent foreign born, and three-fourths of its residents were between the ages of 18 and 65. About 90 percent of residents had graduated high school, half owned their home, and the median household income was just below 50 thousand a year (with a quarter below the poverty level).

The jurisdiction under study is located within a metropolitan area with one of the top homicide rates for jurisdictions with a population over 250,000.[26] The city has been listed among the ten most dangerous U.S. cities by Forbes Magazine.[27] In 2012, there were nearly 1,500 violent crimes per 100,000 residents.[28] Within the timeframe of this study, the jurisdiction experienced just under 100 homicides per year.

The police department. The police department has an authorized force of roughly 2,000 sworn officers who work in a Compstat-style management format with decentralized patrol and general investigation functions. Specialty tactical and investigative units are housed centrally. The department's homicide unit is part of the centralized major crimes section and is charged with investigating all reported homicides, deaths in custody, kidnappings, police-involved shootings, cold-case homicides, and suspicious death investigations.

The unit. The homicide unit under study deploys 25-30 investigators, overseen by 5-7 sergeants, a lieutenant, and a captain. Their office is organized as a contiguous bullpen-style workspace. During the project, the unit was staffed mostly (82 percent) by

[26] http://www.fbi.gov/about-us/cjis/ucr/crime-in-the-u.s/2012/crime-in-the-u.s.-2012/tables/6tabledatadecpdf
[27] http://www.forbes.com/sites/danielfisher/2012/10/18/detroit-tops-the-2012-list-of-americas-most-dangerous-cities/
[28] http://www.examiner.com/article/fbi-releases-top-25-most-dangerous-cities-america-list-for-2012

males, between the ages of 33 and 56, with mixed on-the-job experience and tenure. The majority (94 percent) of the unit members were either White or Black. Over two-thirds (67 percent) of them had a bachelor's degree, mostly (68 percent) in criminology or criminal justice. Additionally, roughly three-quarters of the unit members lived outside of the jurisdiction (76 percent) and worked in a law enforcement capacity at other establishments to supplement their income (73 percent).

The detectives are regularly recruited into the homicide unit from other specialty assignments, such as special victims, robbery, and fugitive units. All of the detectives who oversaw a case in this study reported having received training specific to being a homicide investigator, usually both in-house and at regional or national training academies. Many of the unit members simultaneously served the department in other capacities; they were deputized Marshals, FBI consultants, hostage negotiators, academy instructors, SWAT team liaisons, or on the field operations team. Others were known for their sharpshooting skills, gang knowledge, or handling of confidential informants.

Per departmental policy, homicide cases are assigned to an independently functioning lead detective as opposed to a collaborative team-based system. In 2008, the homicide unit transitioned from a shift-based to a unit-based case assignment rotation. Under the shift-based rotation, lead detectives were assigned cases by when the homicide occurred within each of the unit's three shifts: day watch, evening watch, and morning watch. Given that a disproportionate number of homicides were reported during the evening watch, the shift-based rotation was abandoned in favor of a unit-based rotation that consolidates lead detective case assignments across the shifts. Under the new unit-based rotation, detectives are ranked according to the length of time that has passed since

their last case assignment. The most recent detective assigned a homicide case has his/her name appear at the bottom of the list. When his/her name rotates to the top of the list, that detective "catches" the next case and is responsible for all communications and coordination of it from the initial report through the prosecution.

Investigations. It is a general practice for all members of a given shift to respond to each crime scene call out occurring while on duty to assist with the initial investigation. They are met by crime-scene technicians, the medical examiner, ranking officers, district or zone patrol officers, and usually the media. Per departmental policy, everyone on scene defers to the lead homicide detective. All crime scenes are cordoned off, measured, and sketched under the direction of the lead detective. Witnesses are interviewed, viable evidence is collected, and every person working is logged. When the lead detective releases the scene, the jurisdiction's Medical Examiner's Office takes custody of the victim's body. Subsequently, all documentation and reports are given to the lead detective.

Since few homicide scenes present sufficient information for an investigator to immediately arrest an offender (Greenwood et al., 1977; Innes, 2002b), standard practice dictates that the follow-up investigations begin with the lead detective developing a victim profile. This routinely begins with a focus on the victim. It is reasoned that by collecting details about the victim, the investigator is able to build backward in piecing together why that person may have been at the location, with the individual who killed them, and what transpired. The goal is always to learn as much as possible about who the victim was, their patterns of behavior, and the persons with whom they associate. This information helps the detective to find and interpret evidence, identify people to

interview, and construct the overall story. It is also standard protocol that computer checks are run on all victims and suspects, canvasses are conducted at the crime-scene location, and the media only given information when it might help the case.

Original investigative case files are created for every homicide. Those contain a plethora of data points not found in standardized datasets, such as the Supplementary Homicide Reports (SHR), National Incident-Based Reporting System (NIBRS), or Uniform Crime Reports (UCR). Specifically, original homicide case files in the study jurisdiction were inches-thick documentation of a homicide event and supporting investigation details. These files included narratives for all officers involved in a case, coroner's information, evidence reports, crime-scene documentation, and profiles and statements of suspects, involved parties, and witnesses. During the follow-up investigation stage, shift sergeants systematically review the case files on set intervals: at 7 days, 14 days, 21 days and then monthly for one year thereafter.

The above practices were verified through the direct observations of embedded researchers. Starting in 2008, members of the Georgia State University (GSU) Criminal Justice and Criminology faculty, as well as graduate research assistants, maintained a continuous and active presence in the police department's homicide unit. During that time, research efforts included interviewing detectives and partnering with the department on a systematic critical incident review of the department's gun-involved aggravated assaults and homicide files. The research relationship was built around our full and unfettered access to the original investigative case files for all homicides and the detectives who wrote them. While working on the critical incident review project, I spent four years integrating myself into the unit as an embedded researcher. I built familiarity

with the unit to generate their comfort with me and observed all aspects of homicide work. My broad-reaching fieldwork included direct observation, shadowing of unit members, and general relationship building. I was present at crime scenes, autopsies, brainstorming sessions, press releases, canvases, and other stages of cases. I observed a myriad of witness interviews and suspect interrogations, both within and outside of the department. I also learned about the jurisdiction and department by reading and coding data from hundreds of aggravated assault and homicide files, which helped me understand the idioms, acronyms, and other "shop talk" adeptness needed to converse with the detectives. Specifically, the countless hours of rapport developed with the investigators helped facilitate the data collection used in this study. The investigators became accustomed to my presence, seemed comfortable sharing information with me, and generally seemed to trust me. The vast majority of homicide clearance researchers have not been granted review of case files or been as embedded in a homicide unit as we were. This proved helpful at all stages of data collection, as I could easily ask investigators any questions about things that needed clarification, observe all aspects of the job, learn lingo and procedures, was privileged with active case details, and engaged in semi-interviews about investigative work regularly.

Data Collection

Data for this study were collected and electronically recorded from five information sources in a two-stage effort. The first stage of the data collection effort involved case file reviews and criminal history matching for all homicides that occurred in 2009 through 2011. These two sources provided for data on the involved subject, event circumstances, and case dynamics. In the second stage of the data collection effort, those

data were verified, updated, and extended through one-on-one interviews with the lead detective of each case. Afterwards, incident addresses were used to pull ecological data and investigator factors were captured with surveys. The following sections discuss the data collection efforts and information sources in detail.

Stage 1. The first stage of data collection was an intelligence-gathering exercise orchestrated by the faculty PI for a proposed focus deterrence gang intervention (for a summary, see Appendix I). That effort required that data be collected from two sources: homicide case files and criminal history records. There were several setup components that were instrumental to the initiation of that project which also aided the current study. The PI arranged for a team of researchers to have full access to nonlethal shooting and homicide official case files.[29] The team had a dedicated workspace complete with a computer terminal and file cabinets within the homicide unit, which could be used without restriction. This was done to keep the case files secure and allow the research team to follow up with a homicide-unit member regarding general questions about information in a case files.

During the design process, members of the research team reviewed the existing violence and investigations literature and consulted with various members of the command staff. The research team was trained on the use of departmental databases/electronic systems and briefed on the intricacies of a typical homicide case file. In early 2011, the Chief of Police signed a letter of support for us to begin data collection (see Appendix II).

[29] The present study focused on the homicide portion of that larger file review.

Case file reviews. The research team created a standardized data template, which was designed to systematically capture 207 data points (see Appendix III) from each original case file as the coders reviewed it. As project manager, I also constructed the corresponding electronic dataset, and then trained all of our coders in data collection and data entry. This included instruction on the operational definitions associated with all data points and direction on how to locate the relevant information within the case files and database materials. I worked alongside or was available via phone while teammates coded during the entire project. I looked over all of the templates for missing fields and incorrect coding after completion. Indeed, meticulous and consistent team support was a primary goal throughout the data collection process.

Subject and incident data were collected from 2009, 2010, and 2011 shootings (N=460) and homicide cases files (N=252[30]). For each subject named in a case file (i.e., victim, suspect, involved party, and/or witness), we recorded their demographic characteristics, details of their role in the event, criminal history, gang affiliation, identifying marks, and concurrent substance use (for a complete list see Appendix IV). At the incident level, the location type, victim/offender relationship, history of confrontation with other subjects, event initiation, social circumstances, and personal motives data were recorded (see Appendix V). For each case, evidence collected, processed, and of value included verbal statements, weapons related objects, biological samples, and technological records (see Appendix VI). Subsequent to reading a case file, we accessed department databases to conduct police record searches[31] on the specific address listed as

[30] For reasons unknown to the research team, one case file could not be located, thus was not reviewed.
[31] Using the department's primary records management system where officers document their activity.

the incident location. We did this to see how many times police had frequented the area for a felony call. Similar data cannot be found in other databases.

Next, we searched a departmental database for supplemental subject and evidence information not noted in the files. Toward the end of the file reviews, we began converting the templates into electronic format. At that point, bound codebooks were employed with quick tab references and extensive time spent practicing the electronic entry of hardcopy templates with each team member. Similar to my review of the all data templates, coding accuracy was checked throughout the data entry.

Criminal histories. Simultaneous to case file data entry, an electronic listing of every person in the gun-involved aggravated assault and homicide files was created. Among the homicide cases, a list of 2,199 profiles was reduced to 1,136 named adults[32] that were identified as a victim, suspect, or involved party in one of the 252 cases comprising the current sample. The resulting Excel file contained all recorded information about those individuals' demographic profiles.[33] State-level officials used those profiles to query criminal history databases for a potential State Identification Number (SID)[34] for each person. No SID was located in 142 queries (12.5 percent) because no recorded criminal history was associated with the individual's identifying information. After some back and forth between the research team and state-level officials for verification purposes, correct SID's were matched to the remaining profiles

[32] Any person under 17 years old was removed, as the state criminal record authority does not house those data. Additionally, the profile had to include a first and last name to be searchable.
[33] Profiles included each person's known name, date of birth, race, and sex. While these data will be discussed more in the limitations section, the profile searches rarely applied to the primary victim and suspect in a homicide as the SID used for their data extraction was copied from the case file.
[34] The first time a person is arrested in a state, they are assigned a SID. That number is used to track all of their criminal justice system contacts and those outcomes henceforth.

and criminal history data on 933 individuals (82 percent) were received. Those data included counts for arrest, conviction, and non-conviction cycles[35] within the state. Additionally, a total of how many involved gun, gang, violent, property, public order, probation/parole, drug, or other types of offences connected to each SID were provided.[36] All of the criminal history variables were then merged with each individual profile in the dataset described above. In order to capture the most comprehensive and accurate depiction of the investigation process; however, the next step was to review the collected data with the assigned investigators for each case to verify, update, and supplement the court-ready files.

Stage 2. When file reviews concluded and the data were entered, the research team met with department command staff to discuss the next stage of the Critical Incident Review Project. The second stage of the data collection effort required assembling information from three additional sources: interviews, surveys, and decennial census. Focusing on only the homicide cases,[37] a plan was formulated to conduct follow-up interviews with all of the 2009 to 2011 lead homicide detectives and ask each to complete a survey. The purpose of this extra data was to verify, update, and extend the file data. Given the suggested limitations of case-file data (see Chapter 2), checking incident data coding and adding the investigation context became a priority. Upon receiving approval for a project amendment from the Georgia State University Institutional Review Board (see Appendix VII), I emailed, called, or personally approached prospective participants

[35] Non-conviction cycles are counts of arrests that did not result in a conviction.
[36] Offense types were not linked to any specific arrest cycle, dated, or distinguished as a misdemeanor or felony.
[37] We did not work with or necessarily have access to the investigators who were assigned the shootings in the decentralized zone offices. As such, data for these cases were not included in any of the subsequent stages of the data collection and are excluded from all analyses presented in this study.

to solicit interest in participation.[38] Those contacts included information regarding the purpose, design, and timeline of the interviews and surveys. I made sure each detective knew that I would fully explain this next stage of the project and what I wanted from them when we met, at which time they could decide to provide their consent and their level of their commitment. I allowed them to pick the best shift for our meeting based on their working schedule, and provided my contact information should their availability change. I promised to send a reminder with a summary table of the cases we would go over, and asked them to have their working files handy in those sessions. The summary tables for each investigator listed all of the cases they oversaw in the three-year period[39] to help "jog their memory" before each meeting. Those tables included a count of the total number of cases we would review, unique case identifier, date, time, beat (jurisdiction area identification), address, victim and offender names, and incident highlights (see Appendix VIII). Based on their responses, I scheduled two to three meetings a week between June and November of 2014.

Investigator interviews. Interviewing detectives about each case they worked allowed for additional insight into investigations that could not be captured by file reviews, such as decision points, suspected offenders, evidence priority, and processes. It took 53 structured face-to-face follow-up interviews sessions to cover all of the 2009 to 2011 homicides (N = 252). Those meetings were completed with 29 current and former homicide unit members. Many of the investigators had been previously interviewed by

[38] Others were not aware of who, when, or how I was contacting any particular investigator. Solicitation approaches were dictated by convenience; therefore, there was a mix of tactics were employed for the initial contact, and more than one application used in subsequent communications.

[39] About a third of the investigators did not work cases in all three years. The investigators had an average caseload of five cases per year.

members of the research team in 2008-2009. Around a third of them had moved to other assignments outside of the homicide unit at the time these interviews were conducted in 2014. For those who were less familiar with the research team and/or project, active senior homicide unit members facilitated introductions.

When an investigator transitions out of the unit, their open cases were reassigned to someone else in the unit. It was standard procedure that the new lead was briefed, given the working file, and told to contact the previous detective or a case supervisor with questions. Several of the investigators were sergeants at the time or became sergeants during the study timeframe. Some cases were directly assigned to the sergeants, but they were also in close proximity to all of the homicide investigations assigned to the detectives they oversaw. It has been a longstanding department practice for each homicide watch supervisor to work closely with investigators, reviewing files on set intervals, discussing case developments, offering suggestions, conducting canvases, watching interviews, and helping whenever possible. For the few cases where meetings could not be scheduled with the original or the reassigned investigator, another detective or sergeant familiar with the case was utilized for purposes of the follow-up interview. Follow-up reviews were conducted with anyone who knew how the case was worked, thus some cases were discussed in multiple interviews.

Every effort was made to accommodate the needs and preferences of the investigators. The follow-up review sessions occurred during the officers' scheduled working hours at a place most comfortable for them. Their working hours fell within three 8-hour watches: day watch was 7am to 3pm, evening watch was 3pm to 11pm, and morning watch was from 11pm to 7am. The majority of the investigators chose to talk at

their office desk in the department. The nature of the work involves considerable downtime doing paperwork and information gathering (Eck, 1992; Innes, 2002a, 2002b; Miletich, 2003; Reasons et al., 2010); thus, there was plenty of time to talk with detectives when data collection would not interfere with their assigned duties**.**

Every follow-up session began with a review of the project informed consent (see Appendix IX). Officers were reminded of what transpired in stage one of data collection. The proposed interview and survey process was explained to each, they were apprised of their rights, and permission was sought to audio record the session. All 29 officers who were approached consented to participate.[40] Upon agreeing to participate, we both signed the form and I offered them a copy. I then turned on the recorder for the entirety of our conversations, except for when they had to take personal phone calls, go to the bathroom, or other such non-work related time. These recordings served as backup for entered data, and as a reference if clarifications were needed when updating the originally-coded data.[41] The same standardized data collection template used in the file reviews was used to shape these follow-up case reviews with investigators.

Each detective was given completed data templates (coded by research team members from their original investigation files) one at a time starting with their simplest case. I chose those by looking for cases with the least people involved, that had the most completed data fields, and seemed as though they would have been easier to close, such

[40] One administrator who had one case within the study timeframe, which was inherited and the victim had not been identified, referred me to interview another supervisor instead of themselves because the other had overseen the discovery and nothing had been done since the initial report. This administrator completed the survey only.

[41] If anyone had denied permission to record, I was prepared to take copious field notes. This proved unnecessary as all of the investigators agreed. The full cooperation was likely a product of the unit's familiarity with the embedded researchers, interview process, and extra efforts to accommodate, communicate, and be transparent with each member.

as a domestic-related compared to a robbery-related homicide. This allowed me to introduce the detectives to the questions I would be repeating. I explained what I meant by the question and what I wanted to know for each case file. With a red pen in hand, the detective and I talked through the investigation, marking the template for updates, clarifications, rankings, decision-making, and supplemental case-process information. The red-pen exercise was designed so that all data would be reviewed for accuracy, updated where missing, investigation details could be added, and those changes could be easily identified. For example, there were three sections of the data template where case evidence details were recorded: 1) specific verbal or physical evidence that were collected during the investigation; 2) identification of the collected evidence that were also processed; and, 3) those usable evidence that were of value to the case. For each section, the investigator told me about what, where, when, and how the evidence was worked so that I could cross out false positives, circle what was missing, and learn how it fit into the investigation. Next, they were prompted to identify the first, second, and third most important types of evidence available in the investigation. During the interviews, the detectives often consulted their working files ─ showing me documents and photos, providing details about people, and reconstructing timelines. Upon completing one case file follow-up, attention was shifted to a new and more complex case until the full slate of cases assigned to a detective were covered.

A full review of each homicide case took between 10 minutes to over an hour depending on the complexity of the investigation. Additional time was devoted to shadowing detectives in their current investigations or listening to them describe other cases beyond the temporal scope of this study so as to thoroughly understand the data.

Some detectives were asked to review fewer than 10 cases, while others were assigned 19 over the three-year study period. If a session could not be finished in one eight-hour shift, we scheduled a second meeting as closely to the initial meeting as possible before concluding. On average, it took two sessions to complete all of the investigations for each detective, with some taking up to four meetings. The same process was followed in each one-on-one session.

These interviews provided a unique dataset in that information on homicide offenders and suspects were included. In addition to improving what was known about the solved cases, detectives detailed their investigations over the three- to five-year period for unsolved cases, providing adamant and articulate reasoning behind the identification of a suspect who has not been arrested in many cases. For example, a detective may have an open case because a warrant is pending or the District Attorney's Office wants them to gather more evidence before arresting someone. Even when the detectives were unable to provide a suspect's name, they would often maintain that they knew what demographics they were looking for from surveillance videos, witnesses, informants, and/or other evidence. Following the interviews, the critical incident review dataset was verified, updated, and extended with any corrections or additions to the homicide data templates. The marked-up templates were also used to count the amount of edits required across cases and subjects.

The point of this effort was to understand how much of the data coded from the case files were changed as a result of the follow-up interviews. Alterations to the data template were captured with two tallies: one that represented accuracy or internal reliability improvements and one that represent advancements or robustness. Counts of

corrections to a template included how many times misinterpreted or inaccurate information was crossed out/deleted. For example, in one case the coder concluded that the motives were retaliation and gang-related. However, the detective specified that although the victim and suspect were both noted gang members, the incident was retaliation for other reasons. Subsequently, the gang-related motive coding was removed from the final database. The number of additions to a template included all updates and extensions of the data. These edits could be the result of investigation developments since the case files were reviewed, such as an arrest. Additions were also derived from data points that detectives did not typically put in the case file, such as suspect details. This account of the multi-method approach is of central importance to the contribution of the current study, as it allowed for examination of the degree to which the alleged weaknesses of prior datasets are accurate. Interviews were further supplemented by a survey administration effort.

Follow-up survey. The research team concluded that adding surveys to the project would allow for data related to our observations within the unit to be collected with minimum effort or intrusiveness as an addition to the interviews. Accordingly, a fifty-item mixed-format questionnaire was created (Appendix X) to query investigators about their work history, organizational practices, the fidelity of various investigative practices, and perceptions regarding the competencies of fellow officers. Questions were reviewed by the research team for biases and leading, long, or confusing wording (Babbie, 2007; Bateson, 1984).

The cover page of the survey provided a summary of the project ─ the title, purpose, procedures, and who to contact with questions. Referring to Appendix X, the

first series of questions focus on perfunctory job history issues, such as department and homicide unit tenure, other positions held within the department, shift assignment, and training history. The next series of questions tapped into officer job- or experience-related opinions, with procedural and other history inquires blended to reduce response fatigue. Indeed, in addition to designing the survey to reduce the possibility of fatigue, the effects of saliency, redundancy, and consistency are purposely considered (Ramirez & Straus, 2006). Questions were ordered to diminish the possibility of proceeding topics skewing responses (Rossi, Wright & Anderson, 1983). Similarly, topics were separated to the extent the respondent would not likely get bored or try to be consistent, yet did not read as disjointed (McFarland, 1981; Schuman & Presser, 1996; Sheatsley, 1983).

The detectives were surveyed about general procedures and their satisfactions, experiences, history and demographics. Questions included inquiries into how they conduct an investigation (e.g., information systems they use, perceptions of workload, who they share information with, how they conduct interviews). Opportunities for each respondent to identify the motives and factors they thought were salient to case closure were provided as well. The final section of the survey instrument explored competency among the investigators by asking them to rate their confidence in their coworkers and then room was provided for comments. None of the questions specifically identified the responding detective (Appendix X).

The research team decided the best time to give the surveys was when the investigator had just been reflective about their work. Therefore, each investigator was asked to take the self-administered follow-up questionnaire upon completion of their last case file interview session. In addition to the officers who participated in the follow-up

interviews, four homicide supervisors were asked to complete the survey. This was done after all of the interview data collection was completed. Since there were no refusals, a total of 33 informed consents and pencil-paper surveys were collected. Respondents were allowed to read each question and mark the appropriate answer themselves. Each was given privacy to record as much as they felt comfortable or confident to answer. I also made sure they knew I was nearby if they had questions and checked-in with them if it seemed to take longer than the estimated 20 minutes. The survey information was then entered into an electronic dataset designed to capture both the qualitative and quantitative data. That data file was matched with the case dataset when the sample was saturated. The last type of data collected during the critical incident review project was web-based 2010 US Census decennial data.

Census data. To capture the ecological characteristics of areas where homicide incidents occurred, publicly available census data were collected from the US Census Bureau webpage. Using the physical address to census tract tool, each incident location was keyed and converted. Although the addresses were recorded as they appeared on the case files, they did not always match the exact Census Bureau formatting. For those addresses, Google Maps was used to find the alternate or official spelling of odonyms[42] and quadrants. Using the census-tract codes, I pulled the relevant neighborhood characteristics. Those data included totals for tract population, children, elderly, housing units, occupied units, and owner-occupied units. Also recorded were percentages for those employed, race, and high school and college educated. Finally, the average income,

[42] Odonyms are the official and identifying names given to a specific postal address, normally coded by street segments.

family size, and citizenship were recorded as well. Those data were merged with the case file. The master dataset for the critical incident review study is an SPSS 22 file.

Ethical Considerations

There was no direct contact with offenders, victims, or eyewitnesses to criminal behavior. At no time were the case files removed from police headquarters. All interview/survey participants were public employees. Interaction with these individuals included verification of the critical incident review templates and administration of a follow-up survey on case-outcome factors. An informed consent form that clearly outlined the research aims and possible risks/benefits was reviewed with all of the homicide detectives prior to each session. By participating in the study, the officers had no more risks than they would in a normal day of life. They could decline to answer any question that made them uncomfortable. They could skip any question and stop participating at any time. Each investigator was also given the choice to reject being recorded. Signed consent forms are stored separate from other data in a locked file cabinet.

Officers' personal information was and will continue to be kept confidential and at no time will officer-level data be shared with department command staff. Their rights, interests, and identities were considered first and foremost. It is illegal for an officer to take money from a citizen while on the job so detectives were not given compensation for their time. Topics they seemed uncomfortable with were not pushed and it was made abundantly clear that every detective had the right to decline specific questions, lines of inquiry and/or the whole interview. The unit or departmental superiors did not assist beyond briefing the investigators of our presence and had no knowledge of the officer-

specific data. Participation was not reported to co-workers or supervisors. Additionally, cases were/are in various stages of investigation and prosecution, so privacy is a legal requirement. De-identified research findings are available to anyone upon request.

All information was collected, handled, and protected by a trained researcher. For each of the 252 homicide case files under consideration in the critical incident review, existing electronic data were updated using the information obtained from the interviews with lead detectives. The electronic recordings were referenced for additional information, if needed, when encoding the additional and/or changed data, not transcribed. Data from the investigator-level surveys were removed from the police department immediately upon receipt. All participants taking the survey were assigned a numeric identifier so that no names were attached to the data. That number was used instead of names or badge numbers. The surveys were then converted into electronic form, which removed any handwriting identification concerns.

Only the research team had access to the information the investigators provided. The information provided was stored in a locked filing cabinet. Participant names and other facts that might point to them will not appear when presenting or publishing the results of this study. All findings are summarized and reported aggregate form. All original and updated critical incident review case files, original voice recordings, and survey data were stored on a secure, double-password protected computer. The research team kept the data private, and will continue to do so to the extent allowed by law or as demanded by federal laws relative to IRB requirements.

Measurement

All of the measures used in previous single-site clearance studies that were available in the dataset were considered in this study. In total, thirty-five variables were identified and explored across the five domains. The following sections describe those measures.

Dependent variable. The dependent variable for this study is formal case resolution, thus open cases were coded as zero, and closed cases assigned the value of one. The open cases are the homicide incidents that were not cleared, while the closed cases resulted in apprehension of an offender or were exceptionally cleared.[43] This coding is consistent with the extant literature on homicide case outcomes (Jiao, 2007; Lee, 2005; Litwin, 2004; McEwen, 2013; Puckett & Lundman, 2003; Riedel & Rinehart, 1996; Rydberg & Pizarro, 2014), with a couple of important differences. First, many other clearance research findings are based on case statuses recorded one to two years after a homicide, whereas the case statuses in this study are inclusive of up to five years of an investigation.[44] Second, the dependent variable represents the cases that were being worked as open, while completed cases are coded as closed. This is an important substantive point, as a single arrest yields an official case closure but does not result in the case going dormant if the detective has evidence to suggest that additional perpetrators remain at large. The detectives identified the cases that were complete and those they were still investigating. This is different from other datasets as it accounts for

[43] Cases can be reported as cleared for several reasons other than an arrest, such as the offender committing suicide.

[44] Archival data are generally only retrospectively updated for a limited amount of time after the homicide, such as NIBRS, wherein the max amount of days information is known about an incident is 730 (Regoeczi et al., 2008).

the arrest of the actual murderer, while the Uniform Crime Reports data handbook notes that official reports of case clearances are based on the arrest of *any* person involved in the homicide (FBI, 1991). Other datasets reflect this official definition of case status, but the data in this study are more conservative regarding closed cases. Fourteen cases statuses were changed from either open to closed or closed to open after the interviews.

In addition to examining all of the homicides, this study also explored outcomes for a subsample of the cases that required significant follow up investigation. Research has generally deemed homicide cases as falling into two groups ─ those that require little more than the detective to "organiz[e] the mass of material they have collected into a coherent, explanatory account of the incident" and demanding investigations (Innes, 2002, p.672; also see Alderden & Lavery, 2007; Innes, 2002, 2003; Puckett & Lundman, 2003; Sanders, 1977; Schroeder & White, 2009). When cases are easily and quickly closed they are considered "walk-throughs" or "dunkers" (Sanders, 1977; Simon, 1991). Innes, (2002) defined these types of cases as "self-solvers" wherein there are enough witnesses and/or evidence to identify a suspect early in the case (p.672). Other cases that take more follow-up investigative effort are commonly called "whodunit" homicides (Sanders, 1977; Simon, 1991). Simon explained, "The distinction [is] between cases that require investigation and cases that require little more than paperwork" (p.41-42). "Whodunit" cases generally entail five investigation elements: preliminary response, information gathering, suspect identification, suspect targeting, and case construction (Innes, 2002, p.672).

While previous researchers have explored the difference between case outcomes within case types, rules for how to categorize them have not been well established

(Alderden & Lavery, 2007; McEwen, 2013; Puckett & Lundman, 2003; Schroeder & White, 2009). Nonetheless, it seems that homicide type has a bearing on homicide case closure (Riedel & Jarvis, 1998). Puckett and Lundman (2003) defined a "dunker" as a case that "required either no or very little work by detectives" and excluded homicides that were solved the first day accordingly. Schroeder and White (2009) removed cases solved within 48 hours to examine "whodunits." Alderden and Lavery (2007) filtered out those cleared the first week after the homicide incident was reported. Finally, McEwen (2013) used three categories: "self-solving," "quick action," and "whodunits." In that study, the first two categories were cases "in which a suspect is immediately identified at the homicide scene" and those that "investigators acted quickly to arrest a suspect (usually within a few days of the incident);" while the third group were the cases "that require[d] considerable effort on the part of the investigators to identify and arrest suspects" (p.3).

Using the conceptualization of Sanders (1977), Simon (1991), and Innes (2002a, 2002b, & 2003), this study explores "whodunit" cases using a new, but arguably more conceptually sound operationalization. The investigators were asked to identify how much investigative effort cases required. Indeed, Schroeder and White (2009) argued that "[t]he best way to capture whether a case was a whodunit or a dunker would be to simply ask the investigator" (p.340). Therefore, easier-to-work and exceptional cleared cases were flagged for deletion in "whodunit" analyses, so that difference in outcomes based on the level of case difficulty could be explored. That flag was created based on detective interview data wherein they assigned names to cases. Within the homicide unit under

study, easy to solve cases were called "bones," "ground balls," "baby cases,"[45] "domestics," and "murder/suicides." The "whodunit" cases were referred to as "shit sandwiches," "whodunits," "workable," "dumb ass cases," "bags o' shit," "pieces of crap," "needs help," "piles of shit," "challenging," and "little meat on a shit sandwich." This subset of cases comprises about two-thirds of the total number of cases (N=192) worked by the unit, which is consistent with previous studies (Alderden & Lavery, 2007; Chaiken et al., 1977; Puckett & Lundman, 2003). The dependent variable of case status as open (zero) or closed (one) will be used in the subsample as well.

Independent variables. The independent variables used in this study represented the five substantive clearance domains found in past studies. Those measures were included to either support or add to what is known about homicide investigation outcomes with a unique dataset.

Involved subjects. Previous research suggests that involved subjects' details are important to account for when predicting homicide case outcomes (Alderden & Lavery, 2007; Jiao, 2007; Lee, 2005; Litwin, 2004; Puckett & Lundman, 2003; Xu, 2008). Scholars have modeled the role of victims' and offenders' race, sex, age, and criminal history in case outcomes. As discussed in the previous chapter, the coding and/or inclusion of these measures has been as mixed as the findings of their influence in clearances. This study explores four involved subjects domain variables: 1) victim age 25 or older, 2) victim/suspect intersex, and 3) victim and 4) suspect chronic offending. The proposed measures of suspects' age and victim/suspect interracial could not be included.

[45] Investigators specifically told me that "baby cases" are "bones."

Descriptive information is provided for the suspects' age and interracial victim and offenders measure; however, those measures were not appropriate for multivariate analyses modeling. There were too many cases with missing data (about 19 percent of cases) on suspects' age and too little variation observed in the race types of people involved in the homicides. Indeed, there was a heavy representation of Black or African American victims and offenders among the homicides in the study jurisdiction.[46] Therefore, the interracial measure could not be used to predict case outcomes. Details on the coding of each study variable are provided after the following explanation of how victim and suspect details were pooled within the cases.

Since the critical incident review dataset is structured by homicide cases with up to 40 people listed within each row, the first step to coding involved subjects measures was to identify all of the victims and offenders across the cases. During homicide interviews, detectives explained who the primary victim and offenders (or suspects[47]) were in each file. Using that flag, a "loop" command was used to pick up all of the case specific subject numbers for those individuals. Syntax "if" statements were then written so that subsequent coding would only apply to those subject number related data.

Sex. Most single-site studies have modeled the impact that the sex of combatants has on the likelihood of homicide case closures (see Table 1). The most frequently included measure in this regard has been the sex of the victim. There are contradictory

[46] Only 9 percent of victims (N=22) and 4.5 percent of the known suspects (N=10) were White, Hispanic/Latino(a), Asian, or other races. This resulted in only 94 percent of homicides (where both races are known, N = 223) being intraracial (N = 210)

[47] In 31 percent of the cases (N=79), the offender had not been arrested. For 12 percent of the cases (N=31), the person who the detective specified they were certain was the primary offender (with convincing reasoning and explanation of why they had not been arrested) was marked as the suspected offender. The detectives were not confident that any or which of the people involved in the incident was the killer in about 19 percent of the cases (N=48). However, sex and race information was additionally coded based on other evidence (e.g., witnesses or video) in 12 percent and 7.5 percent of cases respectively (N=30 and 19).

reports on the impact that victim's sex has on case outcomes. Less is known about the impact that the offender's sex has on closure outcomes since missing data has generally precluded including this measure in the models (Alderden & Lavery, 2007; Jiao, 2007; Lee, 2005; Litwin, 2004; Puckett & Lundman, 2003; Xu, 2008).

Research focused on the patterns of homicide events suggests that there is an intra-gendered dimension to homicide (Miethe & Regoeczi, 2004; Silverman, Vega & Danner, 1993; Smith & Zahn, 1999). It stands to reason then that there may be something different about cases involving inter-gendered subjects that could impact case outcomes. For example, women are over twice as likely to be murdered by their partner than by anyone else (Zahn, 1989), and that partner is usually a male (Wilson, Johnson, & Daly, 1995). Conversely, research suggests that most male homicide victims will be killed by another male with whom they are not intimate (Campbell et al., 2002, 2003; Garcia, Soria, & Hurwitz, 2007). It makes sense that inter-gendered domestic homicides are easier to solve than the garden-variety intra-gendered murder. Indeed, the noted research suggests female-on-female homicides are rare and constitute only three cases within the current data.[48]

As previously discussed, one study looking at the difference between cases closed by arrest compared to exceptionally cleared considered this likelihood and found that male-on-male homicide cases were significantly less likely to be barred to prosecution (Riedel & Boulahanis, 2007). This suggests cases involving victims and offenders of the opposite sex are more likely to result in one type of case outcome compared to others.

[48] Suspect's sex was missing in 18 cases. Two of those cases were list-wise deleted in multivariate analyses.

Given that the current study had subject data, it potentially adds to the literature through this approach.

Following the logic of Riedel and Boulahanis (2007), this study also used a measure that pairs the victim and suspect of a homicide event according to each person's sex. That measure was coded zero if one subject was male and the other female and one if they were both male or both female.[49] Since some of data were missing for either the victim or suspects' sex, this measure could not be coded for seven percent of the cases. For those cases, SPSS was used to impute ten datasets that were later pooled for analysis. Given that homicides involving females are atypical (Miethe & Regoeczi, 2004), involve someone they know (Browne & Williams, 1989; Campbell, Glass, Sharps, Laughon, & Bloom, 2007), and are commonly inter-gendered (Davies, 2008; Fox & Zawitz, 2010), it is conceivable these cases would provide more clues as to what happened and who did it than intra-gendered cases. Therefore, it was expected that cases involving subjects of the opposite sex have increased odds of being solved.

Age. It has been well established that people's tendencies toward violence and frequency of associations other criminals dissipate as they age (Bonta, Law, & Hanson, 1998; Gendreau, Little, & Coggin, 1996; Hanson & Bussière, 1998; Hirschi & Gottfredson, 1983; Maruna, 2001; Matsueda & Anderson, 1998; Moffitt, 1993; Steffensmeier & Allan, 2000). For victims, age is the most commonly modeled significant measure of homicide case clearances (Jiao, 2007; Litwin & Xu, 2007; Lundman & Myers, 2012; Puckett & Lundman, 2003; Riedel & Rinehart, 1996; Rydberg & Pizarro, 2014). While we know that cases involving older victims are less likely to be

[49] Since some cases involved multiple victims and/or suspects, this measure was coded based on who the detective identified as the primary target and aggressor as discussed previously.

solved than those with younger victims, measures of the victims' ages have not been coded consistently (Alderden & Lavery, 2007; Lee, 2005; Litwin, 2004; Puckett & Lundman, 2003; Xu, 2008). This has left the substantive reasons for the relationship hard to translate. As such, it is unclear at what point the age of the victim shifts from being more likely to be involved in a closed case, to increased odds that a case not be solved. A tipping-point approach to examining the role of age may be useful for understanding how it relates to case outcomes.

Given that most homicide victims tend to be under the age of 24 (Smith & Cooper, 2011), models that contain a flag for cases involving victims 25 and older might be meaningful. Investigations involving cases where the victim is older than the average homicide victim may contribute to outcomes in a significantly different way compared to those who are younger. Perhaps investigations of older victims require a different orientation than is normally used to interview witnesses and interpret evidence. It also could be harder to trace older victim's histories and associates. Similarly, like victims, offenders are also more likely to be under 25 years old and to associate with other criminals (Barkan, 2006; Maruna, 2001; Matsueda & Anderson, 1998; Moffitt, 1993; Steffensmeier & Allan, 2000).

Research suggests teens and young adults commit more violent crimes than any other age group (Miethe & Regoeczi, 2004), and thus, are homicide offenders at higher rates than people over 25 years old (Blumstein, 1995; Cook & Laub, 1998; Fox, 1996). Since cases are more likely to involve younger offenders, detectives may be more experienced and knowledgeable about how to work those cases. Additionally, younger offenders are more common among certain types of easier to solve homicide cases as

well. For example, research suggests offenders of spousal homicide are more commonly between the ages of 18 to 24 year old compared to any other age group (Browne et al., 1999; McFarlane, Parker, & Soiken; 1995); and, that spousal homicides are associated with higher clearances rates (Jiao, 2007; Lee, 2005; Xu, 2008). Therefore, an over/under age 24 variable may help shed more light on how age affects case outcomes for both the victim and offender.

This study uses such an approach. That measure was coded in several steps. In every case, the data set allowed for a determination of the victim's age at the time of the murder. Those ages were recoded into a dichotomous 'victim 25 years or older' variable, where 0 equals 24 and younger and 1 equals 25 and older victims. It appears that this is the first single-site homicide clearance study to consider victims' age as an over or under predictor of the likelihood of at-risk youths involved. It was predicted that cases involving victims who are younger than 25 years old would have higher odds of being solved compared to those older than 25.

Criminal history. As previously discussed, the inclusion of indices of a victim's criminal history in homicide case clearance analyses has produced mixed findings (Alderden & Lavery, 2007; Jioa, 2007, Litwin & Xu, 2007; Schroeder & White, 2009). These results may be due to the fact that these researchers have operationalized any arrest history credited to the victim rather than whether or not that person was a chronic offender (see Table 1). Moreover, it might be that a suspect's criminal history is equally or more important in an investigation than the victim's because it may help an investigator identify, locate, and profile them to interview or arrest. Indeed, Cook and colleagues (2005) found that "[t]he prevalence of a serious criminal record among

homicide offenders is far higher than for the general population" (p.600). Yet, no study to date has included a measure of suspect criminal history in their models to predict homicide case clearance.

The present study provides a unique opportunity to create a nuanced measure of both the victim and suspect's criminal history due to the fact that we were able to gain access to official criminal history records on all persons named in the homicide files. According to the critical incident review criminal history records, the victims and suspects involved in the 2009 to 2011 homicide cases had been arrested between 0 and 47 and 57 times, respectively, with a median of 4. This is similar to national trends, as research indicates that roughly two-thirds of Americans are never arrested (discounting traffic stops),[50] and over three-fourths of the arrestee group are booked fewer than five times.[51] Therefore, people who are arrested more than five times are commonly labeled chronic offenders (Wolfgang, Figlio, & Sellin, 1972) and represent a very small percentage of the population. These types of people are likely more accustomed to dealing with the police or easier to connect to criminal events. Cases involving these types of people may easier to work and solve. Sanders (1977) reported that it is imperative to investigations that investigators know the styles, habits, and themes associated with various people. Maybe it is easier for investigators to profile these elements when they know someone's criminal history. Additionally, chronic offenders (and their associates) are more likely to be under criminal justice supervision, which could assist in finding them, compelling information, and corroborating their actions.

[50] http://www2.fbi.gov/ucr/cius2009/arrests/
[51] http://www.auditor.leg.state.mn.us/ped/pedrep/0105ch1.pdf

Following this logic, two chronic offending variables were created from victim and suspects' prior arrest counts.[52] It is a data benefit that this study was able to include this criminal history measure, especially for suspects. The criminal histories of all named victims and suspects were recoded as dichotomous flags for those whose chronic criminal backgrounds may be more likely to affect an investigation outcome.[53] In previous studies, suspect criminal histories have likely been omitted due to missing data. This study did not have that issue given the time passage between offense and data collection, as well as lengthy follow-up interviews with the lead detectives. In the victim and offender arrest history variables, zero represents persons investigators know have been arrested five times or less and one is equal to more than five arrests. These measures have not been previously used in homicide clearance research.[54] It was anticipated that cases with victims and/or offenders who have lengthy arrest histories would be associated with higher clearance rates.

Event circumstances. Previous research has found event circumstances to predict the odds of case closure. Relevant measures in this domain include the victim/offender relationship, motive, time of day and day of the week, weapons, and substance involvement measures. All of these measures were considered for inclusion in analyses, except a weapons measure. Firearms were present in 96 percent of the 2009 to 2011 homicides in the study jurisdiction; therefore, could not be included due to a lack of

[52] The data do not include details about the severity or specifics of charges.
[53] Three suspects were juveniles (i.e., 16 years old or younger), thus the state did not release their criminal history data. For those cases, the case files were consulted for a count of their arrests using the investigators' query. Only one of the three had been arrested more than 5 times.
[54] Cook et al. (2005) used a similar measure in a study about homicide offenders, but did not examine case status, and they set a violence criterion.

variance. The other measures were coded based on previous homicide clearance literature or the logic of case investigations and are discussed below.

Victim-offender relationship. Homicide clearance research has generally established that the victim and offender's relationship is associated with case outcomes (Gilbert, 1983; Jiao, 2007; Lee, 2005; Riedel & Boulahanis, 2007; Tydberg & Pizarro, 2014; Xu, 2008). However, the operationalization of the measures used to capture the effect have varied across studies and produced convoluted results. It is suggested that linking a victim and offender through legitimate relationships provides key leads as to what happened in a homicide and why (Wellford & Cronin, 1999). It is likely easier to identify and locate a suspect who has a legal relationship with the person they killed than someone that a detective cannot connect to the victim. As such, it is not surprising that clearance rates are high among the eleven percent of U.S. homicides that involve persons who are involved in an intimate relationship (FBI Uniform Crime Report Data, 2010; Litwin & Xu, 2007; Puckett & Lundman, 2003). When the relationship between the victim and offender is identifiable and verifiable, the case may be fundamentally more workable. This is most likely to be the situation within legal or legitimate relationships of all types. With that in mind, the relationship measure used in this study was designed based on how connectable the victim and offender were. Given that some datasets do not have such data, it is an advantage of this study to include this measure.

To create a legitimate relationship measure, eleven study variables that capture the victim and offender's affiliation were recoded. Victim and offender that were legitimately acquainted were coded as one, which included family, a close affiliation (e.g., roommate), neighbors, romantic partners, and legal business associations. A zero

was assigned if the relationship status was unknown, the victim and offender were strangers, or they were acquainted illegally (e.g., through the marketing of narcotics or prostitution). This legitimate relationship measure is an indicator of relationships that may have been more easily used to develop the case than other types of victim/offender relationships. It was expected that legitimate relationships would increase odds of case clearance.

Motive. The motive for a homicide has been measured by almost all of the single-site clearance studies (see Table 1). Generally, research suggests that homicide cases involving instrumental motives are less likely to be solved compared to expressive motives (Jiao, 2007; Lee, 2005; Litwin, 2004; Riedel & Rinehart, 1996; Wolfgang, 1958). However, a homicide can be driven by both instrumental and expressive motives. Recognizing this, scholars have explored alternative ways to measure homicide motives in effort to further understand how the reason behind a murder might change the likelihood of a case arrest. These efforts have produced conflicting findings. Indeed, an array of homicide motive measures have been used to predict case outcomes, but the study findings are more convoluted than consistent (Litwin & Xu, 2007; Puckett & Lundman, 2003; Regoeczi & Jarvis, 2013; Riedel & Boulahanis, 2007; Xu, 2008).

This problem may be related to the array of coding strategies used in past clearance research. While exploring all the types of motives associated with homicides may be valuable to understanding why people are killed, similar motives are likely to work the same in homicide investigations. For instance, there may not be much difference in possible case leads between robbery-, gang-, and drug-related motives. They are all likely to be impersonal, involve a firearm, be committed by someone with a

criminal record, during the commission of a felony, occur at night, and gratify reputation or revenge (Barkan, 2006; Block & Davis, 1996; Eck, 1983; Jacobs, Topalli, & Wright, 2000; Macdonald, 1975; Miller, 1998; Smith & Zahn, 1999; Snyder & Sickmund, 2006; Topalli et al., 2002; Zimbring & Zuehl, 1986). Research suggests these factors are all likely to produce fewer investigation leads, thus modeling them separately may not be necessary. Additionally, more than one of these motives is likely to be involved in a single homicide event. For example, in a study by Miethe and Regoeczi's (2004), one homicide was characterized as having "blended" motives:

> The 41-year-old victim was a Columbian who had arrived in Florida only one week before. The victim was involved in the drug traffic and was killed (shot) in a dispute over the selling of drugs. The offender was caught before he could take the drugs and money (which he stole in this killing/robbery) and flee. The offender was tied to the crime partly by teeth marks on the body. The victim was killed in a brutal fashion. (p.124)

An alternative approach to exploring the effects of motives on case closures could be to test motives that are less likely to produce leads or evidence compared to others. Given that robbery-, gang-, and drug-related motives are all generally less likely to be solved (Alderden & Lavery, 2007; Lee, 2005; Litwin, 2004) and the similarities of their circumstances, it is likely they have parallel effects on an investigation. This study was able to explore the postulated street-crime measure through more complete motive data given the prolonged time between incident occurrence and final data entry. It was coded as one if the case involved detectives having to work a homicide with drug-, gang-, or robbery-related motives. Non-street crimes were assigned a zero; those motives included

illicit sex, misunderstandings, retaliation, domestic violence, hate crimes, random killings, escalation, mistaken identities, and other felonies. In addition to the literature that suggests gang, drug, and robbery motives are the hardest cases to solve, homicide investigators surveyed in this study also reported they were the hardest motives to investigate. Therefore, it was predicted that cases with street-crime motives would have decreased odds of closure.

Time of day and day of the week. Homicides often occur after 9 pm and on weekends (Block & Davis, 1996; Laurikkala, 2011; Snyder & Sickmund, 2006; Tompson & Townsley, 2010; Wilson et al., 2004; Wolfgang, 1958). Unfortunately, these circumstances are likely to decrease case closures (Alderden & Lavery, 2007; Wolfgang, 1958). Homicide calls at night or on weekends could affect crime scene processing, witness canvassing, the types of people involved, and the assigned detective's experience or response time. Additionally, they are more likely to be related to other crimes, such as drugs and robbery (Block & Davis, 1996; Braga et al., 2010; Snyder & Sickmund, 2006; Tompson & Townsley, 2010; Wilson et al., 2004; Wolfgang, 1957). To explore the possible effects that time of day or day of week have on case outcomes, the current study used two measures.

The critical incident review data that served as the basis for the present dataset included the time (using the International Organization for Standardization format) that the incident occurred, as recorded by the homicide investigators. That measure was used to create a flag of evening and early morning homicides. Homicides that occurred between 2100 and 2400 hours and 0000 to 0859 were coded as 1. Homicide incidents that happened from 0900 to 2059 hours were assigned a 0. Those data were also employed to

code the incident day from the homicide date. It was expected that homicides occurring in the evening and early morning hours and on weekends would have a negative correlation with case outcome.

Substance involved. Studies suggest that substance use or involvement during a homicide may influence case clearances (Schroeder & White, 2009; Wolfgang, 1958). When people are inebriated at the time of a homicide incident, they may be less willing and/or able to cooperate with the police in an investigation. People may be unwilling because they do not want to be arrested for their substance dealing/use or they fear retaliation for "snitching" (Dennis, 2009; Innes & Brookman, 2013; Natapoff, 2004). They may not be able to cooperate because they cannot remember all of the details regarding what happened (Bechara & Martin, 2004). The withheld information could hinder the success of an investigation. To create a measure of substance-involved homicides, three variables were collapsed into one. If the social circumstances involved substance use or the victim or offender were identified as having or using drugs and/or alcohol at the time of the homicide the case was assigned a one. If drugs were not identified as being involved in the homicide, the case was coded as zero. It was expected that substance involvement would have a negative relationship to case closure.

Case dynamics. Research findings suggest case dynamics are significantly related to case outcome differences (Alderden & Lavery, 2007; Gilbert, 1983; Jiao, 2007; McEwen, 2013; Regoeczi & Jarvis, 2013; Rydbert & Pizarro, 2014; Schroeder & White, 2009). Measures in the case dynamics domain include evidence, police familiarity with the homicide-incident area, the type of location where the body was found, multiple

victims, and media coverage. This study was able to explore all of these measures except for multiple victims and media coverage.

Few studies have considered the effects of multiple homicide victims and media coverage in the case dynamics domain (see Table 1). As noted previously, cases involving multiple victims are rare (Jarvis & Regoeczi, 2009). The one study that modeled a flag of more than one victim did not include descriptive statistics on the frequency in that jurisdiction (Lee, 2005). Nonetheless, in the jurisdiction under study there were only eight cases (three percent) of the 2009-2011 data with multiple homicide victims.[55] Of those, half were open and no discernible themes that differentiated those cases were detected during the interviews. Therefore, this study did not include a measure of multiple victims. Additionally, no media measure was included in the dataset. However, the homicide unit in this study has standard practices and procedures in place regarding information released to the press and uses a well-publicized tip line that provides a monetary incentive for providing helpful case information. Hence, including a similar measure of coverage found in Rydberg and Pizarro (2014) and Lee's (2005) work is not likely to have much variance in this study. The case dynamics measures included in this study are discussed below.

Evidence. Although evidence measures have not regularly been included in homicide clearance studies, the breadth and depth of meaningful evidence available to investigators is likely to be of significant importance to case outcomes (McEwen, 2013; Puckett & Lundman, 2003; Riedel & Rinehart, 1996; Schroeder & White, 2009;

[55] For those eight cases, investigators identified who was the primary victim or target. For example, in a gang shooting case, two people were killed. The case data included in this study pivot on the target of that shooting, not the bystander, because the detective focused on investigating that victim to explain the event.

Wolfgang, 1958). Indeed, research suggests witness statements or significant verbal evidence to be a linchpin in successful homicide investigations (Davis, 2008; Marché, 1994; Reiss, 1971, 1972; Riedel, 2008; Riedel & Rinehart, 1996; Roberts, 2007). Nonetheless, few clearance studies have modeled the contribution of verbal evidence in investigations. Moreover, the availability of physical (i.e., forensic or scientific) evidence may help lead an investigator to understand the details of a homicide, order those details, and identify a suspect. Only two single-site studies have been able to test these assumptions (McEwen, 2013; Schroder & White, 2009). The mixed and inconclusive findings of those studies that have modeled measures of physical evidence suggest the need for more research to examine its role in homicide investigations. As few clearance studies have been able to test the role of evidence on case outcomes, this study adds to the literature by including both verbal and physical evidence measures in analyses.

Additionally, modeling the mere collection of evidence might not be as telling as capturing whether it was processed for use in a case. Large quantities of evidence are collected in almost all homicide cases (Parker & Peterson, 1972); however, it is if it is usable that likely matters. For example, a fingerprint may be lifted at a crime scene but if no one ever processes it for matching, it will have no way of contributing to the case outcome. This study was able to account for the possible contributions of evidence by measuring its collection as well as its usability. Given that evidence data were recorded to account for what evidence were collected and what were processed in each case (see Appendix III), a coding criterion was set to require both. The evidence variable in this study was a measure of case strength based on inclusion of multiple types of evidence

collected and processed in an investigation. This was the first study to examine evidence this way and it took several stages to create the measure.

First, four dichotomous recodes were created from 19 variables contained in the original dataset. The weapons (or ballistics) evidence variable was a dichotomous flag of cases that collected and processed gunshot residue, projectiles, shell casings, or bullets. The technological evidence flag included phone records, crime scene or other videos, financial records, and electronics. The biological evidence flag included blood, bodily fluids, DNA, impressions, fingerprints, clothing, and hair specimens. Since there was verbal evidence recorded in 95 percent of the cases, the fourth flag was based on the collected and processed statements that the lead detectives specified as significant. These were captured using "do repeat" commands across the evidence each investigator identified as important. As a result, the variable is a flag of citizen's cooperation in providing useful verbal evidence in the investigation. The sum of the four evidence flags was used to construct an ordinal evidence types scale. This measure represents how many types of evidence the case contained. It was expected that cases with more types of evidence would have higher odds of clearance.

Police-frequented area. Case leads may be impacted by police familiarity with an area. Areas that are hot spots for crime could significantly change case outcome dynamics compared to less troubled districts. Only one homicide clearance study has considered the effect of areas frequented by the police on case outcomes (Jiao, 2007). In that study, it was surmised that areas frequented by the police yielded reduced clearance rates because detectives are more desensitized to it and police resources are spread thinner (Jiao, 2007).

The present study considered alternative explanations. Perhaps police being familiar with the physical and cultural landscape of an area helps them to identify possible suspects, storylines, and evidence. Areas with increased police activity may see or be seen by police in ways that result in different investigation interactions or developments. When the police are more familiar with an area, they may have to do less information gathering and speculating on a case to figure out what happened and who did it. The police may be able to "double dip" by using the existing police intelligence and resources in a frequented area in homicide investigations. For example, instead of canvassing for information, the police may know who to talk to in an area police regularly visited.

This study used a measure of police familiarity with (or knowledge about) the homicide areas, that was created based on the frequency of calls for service and police perceptions. Three variables from the dataset were consolidated in this regard: the criminal incidents hits, known drug locale, and known gang locale. The incident hits variable was an interval-level indicator of how many times the police had been to the crime scene location for an offense call based on the exact incident address over the course of the previous two years. This information was gathered by entering the address into the department's electronic records system and checking offense-related boxes for a search count. The results were filtered to January 1, 2009 through December 31, 2011. No other known homicide clearance dataset has data like these as access to search internal data systems is heavily guarded. The drug- or gang-location variables were

dichotomously coded from case files and detectives' perceptions of the area's crime problem.[56]

The incident hits distribution in these cases' addresses was reviewed toward grouping the number of calls for service that represented greater police familiarity with an area. About two-thirds of the homicide locations received fewer than fifteen calls over the three-year timeframe. The research team used this information to determine the addresses which were not known for drugs or gangs but that were likely known for high call volumes/other crimes. If there were less than fifteen 2009-2011 calls for an offense and the area was not identified as a gang or drug locale, the police-frequented areas variable was coded as zero. If there were fifteen or more incident location hits and detectives indicated the area was known as a drug and/or gang locale, it was coded as one. It was predicted that the cases in areas known to the police were cleared more often.

Crime scene location. A measure of the homicide crime scene location type has been included in the majority of single-site clearance studies (Alderden & Lavery, 2007; Gilbert, 1983; Jiao, 2007; Litwin, 2004; Litwin & Xu, 2007; Lundman & Myers, 2012; McEwen, 2013; Regoeczi & Jarvis, 2013; Riedel & Boulahanis, 2007; Riedel & Rinehart, 1996; Rydberg & Pizarro, 2014; Wolfgang, 1958; Xu, 2008). Indoor crime scenes have been suggested to contain more evidence (Xu, 2008) and thus found to increase homicide clearance rates (Alderden & Lavery, 2007; McEwen, 2013; Rydberg & Pizarro, 2014). Homicide location variables have typically been measures of the physical space in which a homicide occurred. While they are likely the same as the homicide scene in many cases, body relocations occur and previous studies have not accounted for both. This study

[56] Although the police were asked about addresses, there was no way to control for perceptions based on neighboring units or houses. This is noted as a limitation in Chapter 5.

followed suit by using the call location in the official police reports and case reference. For example, if someone is shot in a moving car, and then that car is left at a park, or someone shoots from a moving car into an apartment, the park and apartment are the recorded addresses. Location types were coded based on the physical address, case file narrative, and investigators' description during the case review interviews. Discussing the location coding provided for clearer and more concise data than were collected from case files alone (see Chapter 4). Similar to previous clearance studies, a dichotomous indoor flag was created. This measure was recoded from eighteen location types. If a crime was inside of a residence, bar, hospital, school, other building, or hotel was coded as one. All other locations (e.g., secluded area, park, street, parking lot, cemetery, or outside of someone's residence) including vehicles were coded as zero. It was hypothesized that indoor locations would have higher clearances.

Ecological characteristics. Previous research has included ecological measures under four assumptions regarding conditions that could reduce homicide case closures. One, some communities may be devalued by police (Black, 1976; Paternoser, 1984; Xu, 2008). Two, some areas may have reduced likelihood of witness cooperation (Bayley & Mendelsohn, 1969; Brown & Benedict, 2002; Carter, 1985; Cooney, 1994; Decker, 1981; Huang & Vaughn, 1996; Kane, 2005; Reisig & Parks, 2000; Riedel & Jarvis, 1998; Smith, 2005; Stoutland, 2001; Tuch & Weitzer, 1997; Warner, 2007; Wilson & Kelling, 1982). Three, areas with more social disorganization will have reduced collective efficacy (Browning et al., 2004; Keel et al., 2009; Mazerolle et al., 2010; Morenoff et al., 2001; Sampson et al., 1997; Warner, 2007). Lastly, areas with more people may serve as a protective factor buffering offenders from identification (Litwin, 2004; Litwin & Xu,

2007; Wolfgang, 1985). As discussed in the preceding chapter, these assumptions have been examined using an array of measures.

Where possible, the present study explored those ecological measures found in other clearances studies. However, some measures were not appropriate for this analysis. For example, there was a skewed representation Black or African American residents within the homicide incident location census tracts,[57] so diversity and community composition measures could not be included in this study. Nonetheless, many available ecological characteristics related area socioeconomic status and residency were considered and some improvements in operationalizations were offered. As this domain has not been modeled by many single-site homicide clearance studies, this study had the advantage of including such measures.

Area socioeconomic status. Clearance research suggests the socioeconomic status (SES) of the area where a homicide occurred is related to the success of investigations (Litwin, 2004; Puckett & Lundman, 2003; Regoeczi & Jarvis, 2013; Xu, 2008). Measures of SES have primarily been monetary. The effect of area median income on case outcomes has been tested with mixed results (Litwin, 2004; Puckett & Lundman, 2003; Xu, 2008). The median income variable in this study was measured as a total median dollar amount for each census tract. Two studies also included area poverty in disadvantage constructs (Litwin & Xu, 2007; Regoeczi & Jarvis, 2013). For this study, an area poverty flag was created using two variables in the dataset: median family income and average family size. The flag was coded as one if the area median income was lower than the national poverty level dollar amount assigned to the corresponding family size.

[57] The census tracts where homicides occurred between 2009 and 2011 in the jurisdiction under study was 87% Black or African American, 8% White, and 5% other races.

The case was coded with a zero if the tract income for the family size was above the matched poverty level. Given the logic of possible issues investigators may face in socially disadvantaged neighborhoods and the findings of Xu (2008), these income measures were anticipated to significantly decrease the odds of case closures. Both indicators were explored toward building the best multivariate model; however, univariate and bivariate examinations were used to exclude one from multivariate modeling.

Additional socioeconomic status measures modeled in previous homicide clearance studies included data on the percent of college graduates and employment in an area (Litwin, 2004; Litwin & Xu, 2007; Regoeczi & Jarvis, 2013). Similarly, the present study considered two education measures and an unemployment one. Following prior research, one education measure was operationalized as the percentage of census tract residents whom had a college degree. Since Litwin (2004) did not find that education significantly affected case outcomes using this measure, data on a more common attainment level were also included. The percentage of residents with a high school (or General Education Development, GED) diploma in an area was also considered. Adopting the hypothesis of Litwin (2004), it was expected that cases in communities with more education (i.e., higher percentages of people with a high school (or GED) diploma would have increased odds of closure. The employment variable used was the percentage of residents in each census tract who were in the workforce. Again, the logic of prior studies suggested areas with higher unemployment would have lower odds of case closures.

Area residency. Several ecological characteristics related to area residency have been explored by clearance research. Area density (also referred to as community size) has been included in more single-site clearance studies than any other area residency measure. This study considered two measures of density. Following the example of previous research, the total population for each homicide case census tract was represented as the raw count of residents (Litwin, 2004; Litwin & Xu, 2007). Additionally, a measure created to control for the census tract size was coded using two variables: tract population and area square miles. This is more of a community size measure than the population count variable, as it adjusted for the fact that some census tracts were only .15 square miles, while other were up to 13.27 square miles. This computed measure was created by calculating the proportion of people per square mile. Then the natural log was used to transform the values into a continuous variable with a more normalized the distribution. Given that Litwin and Xu (2007) found area population decreased case clearances, a similar result is anticipated in the current study.

Prior research has explored the area residency measures of owner-occupied housing units and vacancy as predictors of homicide clearance rates (Litwin, 2004; Litwin & Xu, 2007; Xu, 2008). This study also examined these measures. The owner-occupied unit variable was recorded as the percentage in each census tract. The proportion of vacancy measure was derived by taking the total number of housing units within the tract and dividing it by the total number of occupied housing units. Similar to Xu's (2008) hypothesis, it is expected that when homes are owner-occupied, the odds of case clearances will be higher. Vacancy levels were expected to be inversely related to homicide clearance levels.

Investigator factors. The logic behind investigator domain is that the detective who leads an investigation influences case outcomes (Carter, 2013; Greenwood et al., 1977; Innes, 2002a, 2002b, 2003; Keel et al., 2009; Ousey & Lee, 2010; Sanders, 1977; Schroeder & White, 2009). Indeed, interclass correlation results suggest that 13 percent of the variation in case outcomes in the current study were attributable to investigators. Figures 1a (and 1b for "whodunit" cases) illustrates that there were different distributions of closed cases among investigators. There are several possible reasons why the investigators personal clearance rates varied above or below the department average.

Figure 1a. Percentage of All Cases Cleared by Detective

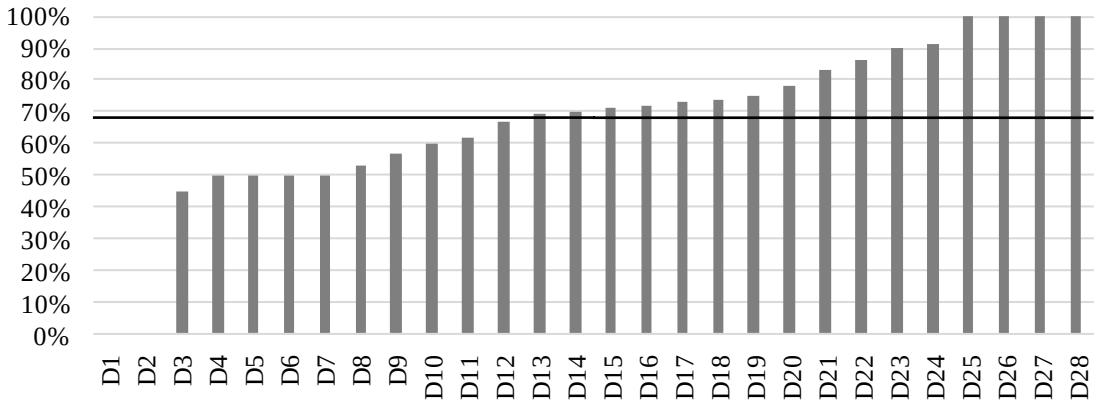
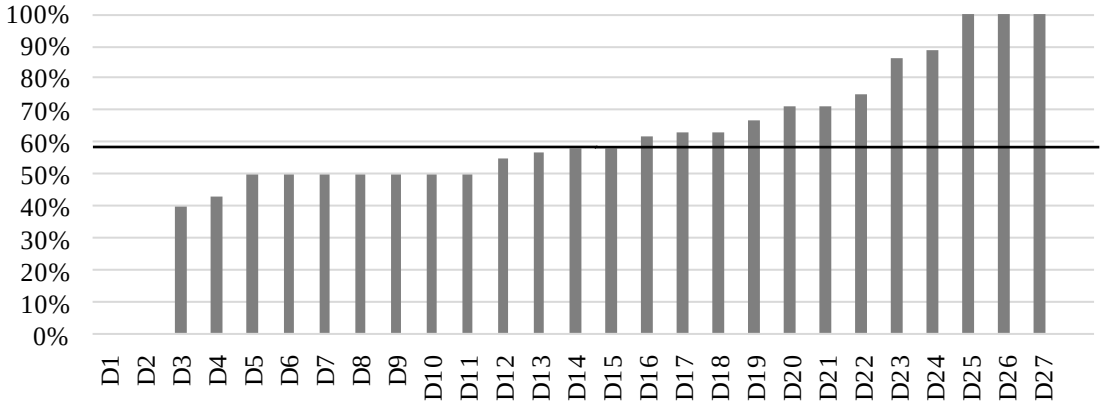


Figure 1b. Percentage of "Whodunit" Cases Cleared by Detective



Research examining homicide investigators' jobs suggests a heavy workload can strain productivity (Marché, 1994; Rydberg & Pizarro, 2014). It is also proposed that increased experience translates into better work (Cronin et al., 2000; Greenwood et al., 1997; Innes, 2002a, 2002b, 2003; Wellford & Cronin, 1999). Lastly, it makes sense that there is some variation in the aptitude among investigators, which could affect their case outcomes. This study considered measures related to each line of reasoning. This is an advantage the current research has over many other clearance studies, as it is one of few studies able to test all five clearance domains. Specifically, investigator factors have been largely unexamined. Additionally, many homicide clearance datasets are missing information regarding the specific investigator who worked the case, thus proxies have been used. Every investigator measure in this study corresponded to the lead detective.

Workload. The most common investigator factor measure has been workload. In this study, four measures were created to explore the effects of investigators' workload on case outcomes. First, following the lead of Rydberg and Pizarro (2014), the frequency of case assignments was calculated by lagging the date each detective was assigned a particular homicide from the last and then summing the days between them. This allowed for time between each new case in the investigators' workload to be considered as it relates to the likelihood that a case is solved. More days between cases was expected to reduce the odds of case closure because it allowed the prior case more investigation time.

Second, the amount of days between each case may be beside the point if the detective closes them. The length of time between cases likely only affects case outcomes when detectives are actively investigating more than one homicide. As such, another workload measure was created to account for how many cases each investigator had not

been able to close and thus was likely still working. The open cases measure was the total number of open investigations each detective had within each year. Given that having open cases may have changed the attention they could give their overall caseload, it was predicted that this measure would have a negative relationship with case outcomes.

A third workload measure captured the number of homicides a specific detective had been assigned at the time they "caught a fresh body." This variable was coded the same as Puckett and Lundmans' (2003) workload measure, except the counts are by investigator rather than for the unit as a whole. The variable was created by summing all of the cases for the detectives prior to the date of each new incident. The logic behind this measure was that the fewer cases an investigator has to work when they are assigned a new case, the more time and attention they can devote to solving that current case. Thus, it was anticipated that this measure would have a negative effect on case status.

Lastly, an average workload variable was created to explore if an investigator's overall caseload affected their output. This measure is based on Keel's (1999) argument that investigators workload should be held to five cases or less a year to improve investigation outcomes. Two variables from the original dataset were employed to code this measure: the total number of cases each detective worked in the three years and the total number of years they were assigned to homicide between 2009 and 2011. Those numbers were divided for an average workload measure. Greater investigator caseloads were expected to reduce case closures due to the investigator having been more burdened with work.

Experience. A tenure measure was included in an effort to capture the effect of detective experience on case outcomes. Only one single-site homicide clearance study

has included an experience measure. Puckett and Lundman (2003) did not have investigator specific data so they used a measure of unit shift to represent investigator seniority. This study, however, collected data regarding when the detective who worked each case became a homicide detective. Therefore, a more direct approach to exploring the differences in investigators' tenure on case closures was employed in the current study. The investigator's experience was captured by the length of time each detective had been assigned to the unit when they caught each new case. This measure was coded using the date each detective was transferred to the homicide unit and the date of each incident for which they were the lead detective. Most detectives only self-reported the month and year they became a homicide investigator, thus the duration of their experience per case was calculated in months. Since increased experience among investigators has been suggested to increase case closures, it was expected that more months in the unit would increase the odds of an arrest.

Competency. The last investigator factors domain measure was competency, which has not been previously modeled in previous clearance studies. While job specific conditions such as caseload and experience are likely to affect job performance (Brookhuis & Waard, 2001; Hockey, 1997; McDaniel et al., 1988; Paoline & Terrill, 2007; Rydberg & Pizarro, 2014; Schmidt et al., 1986), research suggests personal abilities may also be important (Hogan & Kurtines, 1975; Hunter, 1983, 1986, 1994; Kirkcaldy, Cooper, Furnham, & Brown, 1993; O'Reilly, 1977; Ree & Earles, 1992; Schmidt & Hunter, 1993; Schmidt et al., 1986; Swider & Zimmerman, 2010; Tett & Burnett, 2003). In other words, the competency of an investigator may be as influential in case outcomes as the homicide investigator's experience or burden of assignment. Some

investigators may be better suited for the job, and thus be more effective than others. Additionally, the prolonged exposure to highly stressful work environments may be more likely to result in "burn out" (Harrison, 1980) of those less suited to detective work. A single survey item was tapped to operationalize this competency measure. Since self-reported evaluations in work settings have been found to contain biases that threaten the validity of research results (Donaldson & Grant-Vallone, 2002), investigators were asked to evaluate their co-workers' competency rather than to score their own.

Detectives were given a list of all of the investigators in the sample and asked the following: For each of the detectives listed below, indicate the level of confidence you would have in them to clear a “who-done-it” case involving the death of a close friend or loved one (wherein you are not a suspect)? Please circle the appropriate rank (*excluding those you have not worked with and yourself)* between 1 = extremely low confidence and 5 = extremely high confidence. There was considerable missing data observed for this item for two reasons. One, the question was skipped by six detectives. Two, some of the detectives left and others started in the unit during the study timeframe. Therefore, not all of the detectives had worked with each other. There were between zero and nine scores missing for the 28 detectives who were lead on homicide case in this study. The amount of missing data was proportional to the total number of years in the unit and cases they were assigned in the three years. This makes sense given that investigators with fewer years and cases in the sample would have been less likely to be known by other investigators. The average number of missing scores was 3.5 (12.5 percent). Regardless, the data were aggregated across the detectives to generate a mean competency score for

each. Those final rankings were then matched to the cases the detective oversaw. It was predicted that higher competency scores would be related to greater odds of case closure.

Analytic Strategy

First and foremost, this study is guided by the following research question: What factors predict homicide case closures? To investigate this question, analyses for this study were conducted in four stages. First, given the above outlined weaknesses of prior clearance research data and gaps in modeled measures, it seemed important to understand the extent to which the data were suited to answer the research question. Thus, an analytic exercise was conducted to assess how much data were verified, updated, and extended after reviewing the cases during interviews with lead investigators. Second, univarate analyses were conducted using SPSS software to provide a descriptive portrait of the data. The third stage involved bivariate analyses, in which variables were checked for appropriateness for inclusion in predictive models and trimmed accordingly. The fourth stage involved multivariate logistic regression analyses using measures from all five domains and controlling for the clustering of census tracts and investigators among cases. Each step was repeated on a subset of the data that excluded the cases identified as self-solvers, to test whether predictors of closure changed when looking only at "whodunit" cases. This is not intended to be a paramount study that fills all of the gaps in the single-site homicide clearance literature, but rather to explore homicide case outcomes using a different approach and provide guidance for future studies.

Chapter Four: Results

Data Quality Enhancement

The first analysis included in this study was based on two assumptions regarding the data used in prior clearance research: 1) homicide case files represent sterilized versions of the facts of a homicide rather than a complete catalog of the evidence and investigation process; and 2) there is an increased likelihood of coding error when data are derived from archival sources rather than an investigator. Consequently, an analytic exercise was conducted to determine the degree to which having lead detectives systematically review the data templates (derived from homicide case files) resulted in modifications to the dataset. Such an analysis serves to enhance the precision of the data used in the present study; but more importantly, the outcome of this exercise provides insight to future homicide clearance researchers seeking to design efficient and effective data collection protocols.

Conducting follow-up interviews with lead detectives produced two types of substantive changes to the data that were populated on to the standardized templates: corrections and additions. *Data corrections* were made when the detective advised that the information that research team members recorded on template constituted a misinterpretation of what was included in the case file. *Data additions* represented new case developments or details that were known to the detective but not readily discernible from the original case files. Counts were conducted on the number of times fields on the original data templates were altered and whether those constituted a correction or addition. This exercise focused first on the changes that occurred to all case files, and

then on a subset of cases that were deemed inactive at both stages of data collection.[58] The subset of inactive cases provided insight as to the data developments among homicides that were not subject to ongoing investigative efforts by detectives, thus the case file was not likely to have changed since being reviewed by the research team.

Table 2. Pre to Post Interview Homicide Case Data Comparison

	Corrections to Cases	Additions to Cases	Inactive Case Changes
Involved Subjects	N = 2,199	N = 2,256	N = 1,343
Involvement Type	9%	11%	4%
Subject Age	2%	14%	17%
Subject Race	2%	19%	13%
Subject Sex	3%	4%	2%
Event Circumstances	N = 252	N = 252	N = 159
Location	1%	26%	16%
V/S Relationship	29%	54%	54%
V/S History Confrontation	38%	43%	40%
V/S Prior History as Contributor	33%	36%	36%
Who Initiated Incident	37%	46%	60%
Social Circumstances	11%	42%	42%
Motive	18%	41%	40%
Case Dynamics	N = 252	N = 252	N = 159
Evidence Collected	5%	44%	45%
Evidence Processed	3%	46%	55%
Evidence of Value	4%	54%	56%
Drug Locale	40%	42%	41%
Gang Locale	10%	69%	62%

Examining the percentage of alterations that occurred in key fields in the data template suggests the follow-up interviews with the lead detectives did in fact improve

[58] Cases were considered inactive when the lead detective advised that the homicide was formally cleared and they were no longer investigating the homicide. Oftentimes, a case will be cleared when an offender is arrested but the detective will continue to work the case on the basis of evidence indicating there were co-offenders, who remain at large. In this situation, cases are deemed cleared but not technically closed as they are still subject to active investigation. For this subset analysis, only cases cleared and closed before the study began were examined.

the accuracy of the data. Table 2 summarizes the frequency with which corrections and additions were made to various involved subjects, event circumstances, and case dynamics data elements.[59] The first column of Table 2 presents the percentage of validity changes (i.e., corrections) made to the coding of case-file data as a result of reviewing the case file information with the lead detective. The second column lists the percentages of the updates or supplements (i.e., additions) that resulted from these one-on-one case file follow-ups. The last column reflects the overall changes (either corrections or additions) that occurred in the subset of cases that were deemed fully resolved or inactive by the lead detectives. Each of these columns is summarized within sections/domains below.

As shown in the first section of Table 2, comparisons of the involved subjects domain data were focused on personal involvement type[60] and demographic details. There were 2,199 people named in the 252 homicide case files that were reviewed by the research team. Upon reviewing involved subjects information with the lead detective in each case, it was determined that data coding were inaccurate among two to nine percent of those people depending on the data field. It was most common for corrections to be made to the field designating the person's type of involvement (i.e., victim, suspect, involved party, or witness), where detectives deemed nine percent of the designations to be inaccurate. For example, some subjects were coded as witnesses by the research team but conversations with the lead detective revealed that an involved party designation was more fitting given those persons were active participants in the events that led up to the

[59] The majority of ecological and investigator data elements were not collected from case file reviews so examples of data modifications were focused on the domains most affected, which are also the most used in prior research.

[60] The research team was trained to review case file information and assign one of the following labels to each person named in the formal record of the investigation: victim, suspect, involved party, or witness.

homicide. The data further indicate that detectives deemed the research team's coding of age, race, and sex variables incorrect between two and three percent of the time. Throughout the course of the interviews, the detectives also advised there were 57 additional people identified as being connected a homicide in this study. Those people were either not named in the official record of the investigation (N=2,256), or came to the attention of investigators between the initial data collection and the follow-up interview. Referring to the second column of Table 2, note that the follow up interviews yielded additional data for 4 to 19 percent of subject-specific fields that were considered. Most notably, the age of a subject was added to 14 percent and racial information to 19 percent of the profiles. Further analysis revealed that alterations were not concentrated among open cases. Referring to the far right column of Table 2, note that involved subjects information changed within the subset of 159 inactive cases. There were 1,343 inactive subject profiles collected, which were altered due to corrections or additions 2 to 17 percent of the time. There were also a number of changes to the event circumstances of each homicide. These alterations occurred most frequently with respect to the subject age and race information.

The next section of Table 2 (under the heading of Event Circumstance) summarizes data on eight conditions of the homicide occurrence data that were selected for comparison. Asking lead detectives to revisit case file information resulted in data corrections in up to 38 percent of the 252 cases. Indeed, detectives concluded that research team members coded victim-suspect relationship information incorrectly in 72 cases. For instance, in one case the coder had concluded that a victim and suspect did not know each prior to the day of their fatal confrontation and that the motive was gang

related; however, the investigator explained that while the victim and offender were both gang members and they had not met in person, the confrontation had nothing to do with their gang affiliation. Instead, the physical incident was the result of a previous feud that played out on Facebook over a girl. Therefore, the data in the victim-suspect relationship and motive fields had to be corrected. These types of corrections were also common with respect to the original coding of the victim/suspect relationship, who initiated the incident, details related to a history of confrontation between the combatants, and the motive underlying the homicide event.

Moving to the second column of Table 2, note that additions commonly occurred to the event characteristics of the cases: detectives updated and/or supplemented data on 26 to 54 percent of the event-related data fields that were subject to follow-up review. For example, details on the nature of the victim/suspect relationship and motive were added or updated to 54 percent and 41 percent of the cases, respectively. Similar to the involved subject data, coding refinements related to event characteristics were needed even in the homicide cases where the investigation had concluded before the file review. As shown in the third column of Table 2, modifications to the event details were required in 16 to 54 percent of the cases deemed to be inactive at the time of the follow-up interviews.

The bottom panel of horizontal data arrayed in Table 2 provides summary information on changes that occurred to key details related to case dynamics as a result of detectives reviewing the data templates. While few errors were noted among the evidence measures (three to five percent of the cases were incorrectly coded), corrections occurred more frequently where a coder determination of a drug or gang locale was concerned (i.e., 10 to 40 percent of the cases). The second column of Table 2 reveals that

data additions were required for evidence measures in about half (44 to 54 percent) of the cases and for locale measures in 42 to 69 percent of cases. The imprecision associated with using case files as the sole source of information to capture case dynamics information becomes even more obvious when examining the inactive investigations, as modifications were made in 41 percent to 62 percent of the cases (see Table 2).

In sum, the official homicide case files reviewed in this study were not sufficient as a single source of investigations data. The data detailed in Table 2 show a significant amount of corrections and additions to key measures across multiple domains. The alterations were particularly pervasive in the inactive investigations. This suggests that even having unfettered access to full homicide case files is still likely to lead to incomplete and inaccurate data. Having the ability to conduct follow-up interviews with lead investigators to review the coding of the case files allowed for errors and missing data in key fields to be rectified. In turn, more holistic, current, and representative data were used to explore homicide investigation outcomes. This should shed light on the factors that may impact homicide clearance rates, and offer methodological guidance to future researchers as will be discussed in more detail in Chapter 5.

Univariate Analyses

A wide array of measures used to predict case outcomes in prior single-site homicide clearance studies were explored with the current data. Descriptive statistics for those measures are shown in two tables.[61] Table 3a provides descriptive information on all of the homicide cases in this study (N = 252), while Table 3b displays parallel information for the subset of "whodunit" cases (N = 192). As the first stage of homicide

[61] All measures were coded as described in the previous chapter.

case outcome model building, the means and standard deviations are used to describe all of the measures this study considered.

Dependent variable. As defined in chapter three, the case outcomes were measured with a dichotomous dependent variable of homicide closures. A review of Table 3a shows that 69 percent (s.d.= .47) of all homicides that occurred between 2009 and 2011 in the jurisdiction under study had been closed by mid-2014. Looking at the same dependent variable in the "whodunit" subset of cases (Table 3b), the clearance figure drops to 59 percent (s.d.= .49). Overall, the metro police department under study had a higher clearance rate than the national average during the three-year period.[62]

Involved subjects. The study data allowed for victim and suspect sex, race, age, and criminal history measures to be included from the involved subject domain. Out of the 252 victims, 46 (18 percent) were female. In the "whodunit" cases, 11 percent of the victims were women. A similar gender distribution was observed among the known suspects in the sample; 10 percent of the 234 known suspects in the full dataset were identified as being female, as were 6 percent among the subset of "whodunit" cases. Disproportionate representation of male victim and suspects was expected given that homicides are largely male phenomena (Addington, 2006; Davies, 2008; Fox & Zawitz, 2010). Referring to Tables 3a and 3b, note that an opposite sex dynamic (dichotomous measure) was noted for 27 (s.d.= .44) and 18 percent (s.d.= .36) of the total and "whodunit" cases, respectively.[63] The vast majority of cases involved male suspects and male victims.

[62] http://www.fbi.gov/about-us/cjis/ucr/crime-in-the-u.s/2013/crime-in-the-u.s.-2013/offenses-known-to-law-enforcement/clearances/clearancetopic_final
[63] Missing data necessitated multiple imputation exercises.

Table 3a. Descriptive Statistics (All Cases)

Variables	N	Min	Max	Mean/%	S.D.
Closed Cases	252	0	1	69%	0.47
Involved Subjects					
Victim/Suspect Opposite Sexes	252	0	1	27%	0.44
Victim/Suspect Interracial	223	0	1	6%	0.24
Victim 25 Yrs or Older	250	0	1	72%	0.45
Suspect 25 Yrs or Older	204	0	1	62%	0.49
Victim More than 5 Prior Arrests	252	0	1	42%	0.49
Suspect More than 5 Prior Arrests	252	0	1	41%	0.49
Event Circumstances					
Legitimate V/S Relationship	252	0	1	40%	0.49
Street-crime Motive	252	0	1	49%	0.50
Evening-Early Morning (9pm - 9am)	252	0	1	54%	0.50
Weekend Day (Saturday or Sunday)	252	0	1	34%	0.48
Gun Involved	252	0	1	96%	0.20
Substance Involved (Drugs or Alcohol)	252	0	1	43%	0.50
Case Dynamics					
Evidence Types Processed (count)	252	1	4	2.92	0.88
Significant Verbal Evidence	252	0	1	86%	0.35
Weapons-related Evidence	252	0	1	77%	0.42
Technological Evidence	252	0	1	67%	0.47
Biological Evidence	252	0	1	62%	0.49
Police-Frequented Area	252	0	1	40%	0.49
Indoor Location/Crime Scene	252	0	1	38%	0.49
Ecological Characteristics					
% High School Educated	252	56.80	100	80%	9.33
% College Educated	252	1.60	87.80	25%	19.29
Population	252	482	8720	3154.75	1839.64
(Ln) Density (population/sq. miles)	252	6.20	9.96	8.19	0.66
Proportion Vacant	252	0.04	0.52	0.24	0.12
% Employed	252	0.12	0.95	47%	0.16
% Owner-occupied Housing Units	252	4.60	89.80	36%	18.22
Median Income	252	5,764	222,922	33,452.48	28,491.20
Impoverished (income/avg. family size)	252	0	1	42%	0.49
Investigator Factors					
# Days Since Last Case Assignment	252	0	604	62.17	59.12
# Open Cases Each Year	252	0	4	1.65	1.14
# Cases Before New Case	252	0	18	5.83	4.66
Tenure (months in unit per case)	252	0	218	60.61	50.69
Average Workload (total cases/total years)	252	1	7	5.03	1.28
Competency Score (low to high ranking)	252	1.56	4.89	3.79	0.73

Table 3b. Descriptive Statistics (Whodunit Cases)

Variables	N	Min	Max	Mean/%	S.D.
Closed Cases	192	0	1	59%	0.49
Involved Subjects					
Victim/Suspect Opposite Sex	192	0	1	18%	0.36
Victim/Suspect Interracial	163	0	1	7%	0.25
Victim 25 Yrs or Older	190	0	1	73%	0.45
Suspect 25 Yrs or Older	145	0	1	56%	0.50
Victim More than 5 Prior Arrests	192	0	1	43%	0.50
Suspect More than 5 Prior Arrests	192	0	1	39%	0.49
Event Circumstances					
Legitimate V/S Relationship	192	0	1	28%	0.45
Street-crime Motive	192	0	1	63%	0.49
Evening-Early Morning (9pm - 9am)	192	0	1	56%	0.50
Weekend Day (Saturday or Sunday)	192	0	1	35%	0.48
Gun Involved	192	0	1	96%	0.19
Substance Involved (Drugs or Alcohol)	192	0	1	46%	0.50
Case Dynamics					
Evidence Types Processed (count)	192	1	4	2.97	0.89
Significant Verbal Evidence	192	0	1	85%	0.36
Weapons-related Evidence	192	0	1	76%	0.43
Technological Evidence	192	0	1	73%	0.45
Biological Evidence	192	0	1	63%	0.49
Police-Frequented Area	192	0	1	42%	0.50
Indoor Location/Crime Scene	192	0	1	30%	0.46
Ecological Characteristics					
% High School Educated	192	56.80	100	81%	9.16
% College Educated	192	1.60	85.70	27%	19.83
Population	192	482	8720	3266.26	1912.31
(Ln) Density (population/sq. miles)	192	6.20	9.96	8.23	0.62
Proportion Vacant	192	0.04	0.52	0.24	0.12
% Employed	192	0.12	0.95	48%	0.16
% Owner-occupied Housing Units	192	4.60	89.80	36%	18.44
Median Income	192	5,764	222,922	34,911.56	31,418.14
Impoverished (income/avg. family size)	192	0	1	42%	0.49
Investigator Factors					
# Days Since Last Case Assignment	192	0	604	59.80	55.36
# Open Cases Each Year	192	0	4	1.71	1.14
# Cases Before New Case	192	0	18	5.72	4.66
Tenure (months in unit per case)	192	0	204	60.88	50.59
Average Workload (total cases/total years)	192	1	7	4.90	1.31
Competency Score (low to high ranking)	192	1.56	4.89	3.78	0.76

In the 251 cases where the victim's race was known, 91 percent were identified as Black or African American. Likewise, of the 223 cases where a suspect's race was known, 96 percent were identified as Black or African American. This suggests that almost all of the homicide incidents comprising this sample were intraracial. As shown in Tables 3a and 3b, cases involving victims and suspects that were *not* both White or Nonwhite (a dichotomous measure) comprised only 6 percent (s.d.= .24) of the full sample of cases and 7 percent (s.d.= .25) in the "whodunit" subsample. As there is little variation in victim and suspects' race, this measure could not be included in multivariate analyses.[64]

The victim's age was unidentifiable in two of the 2009 to 2011 homicides. The ages of the other 250 victims varied from 0 (i.e., an infant) to 92 years old, with a mean of 33.44 (s.d.= 14.26). The range and average of ages were nearly the same for the 190 "whodunit" cases (mean = 33.50, s.d. = 12.94). The suspects' ages were a bit different, with a low of 16 years and a high of 79. In the 201 cases (80 percent) where the suspect's exact age was known, the mean age was 30.71 (s.d.= 12.17). Only 142 suspects' ages were known in the subset of 192 cases designated as "whodunits" (74 percent) and those persons were generally younger than what was observed within the full sample. Their ages ranged from 16 to 61, with a mean of 27.87 (s.d.= 9.36). While the victims and offenders in this study were slightly older than the average involved subject, about a third were under 25 years old as expected (Blumstein, 1995; Centers for Disease Control and Prevention, 2006; Smith & Cooper, 2011; Steffensmeier & Allan, 2000). Using the over-under dichotomous age measure described in Chapter 3, Table 3a shows that across all of

[64] This is discussed in the study limitations section of Chapter 5.

the cases 72 percent (s.d.= .45) of victims and 62 percent (s.d.= .49) of suspects[65] were over 24 years of age (see Table 3a). Among "whodunit" cases (Table 3b), the percentage of victims that were 25 or older remained largely the same (73 percent); however, this subset of cases was comprised of a smaller portion of older suspects (56 percent).

The systematic review of criminal history information on all victims and suspects named in the homicide files revealed significant levels of prior criminal justice contact among the persons comprising this sample. Somewhat surprising was the fact that victims were deemed more criminally involved than were their suspect counterparts; 69 percent of the 252 victims were found to have at least one prior arrest on their record at the time of the crime compared to 66 percent of the named suspects. Chronic offending was prevalent among the individuals named in the case files. Referring to the dichotomous criminal record measures shown in Table 3a, note that 42 percent (s.d.= .49) of victims and 41 percent (s.d.= .49) of the suspects from the full sample of 2009 to 2011 homicides had more than 5 prior arrests. Similar criminal history trends were observed in the "whodunit" cases (Table 3b). Among the 192 victims in this subsample of cases, a full 72 percent had previously been arrested, while for suspects the percentage was lower at 59. Moreover, 43 percent (s.d.= .50) of the victims and 39 percent (s.d.= .49) of the suspects in these cases were found to have five or more prior arrests to their credit.

Event circumstances. The current dataset afforded the opportunity for six measures of event circumstances to be considered for inclusion in the analysis: the relationship between the victim and offender, motive, time of day and day of week that the crime occurred, the type of weapon used, and involvement of drugs or alcohol.

[65] In 48 cases the suspect's age was unknown, therefore this measure is included for descriptive purposes but will not be used in multivariate analyses.

Investigators concluded that the majority of victims and suspects in the 2009 to 2011 homicides in this study did not have a legitimate or legal relationship. About 6 percent of victims and offenders were related; 10 percent were romantic partners; around 2 percent had legal business dealings; 32 percent were neighbors; and, less than 10 percent had some other justifiable connection.[66] When those categories were used to create a dichotomous indicator of legitimate relationships, it was observed that less than half of the cases involved a legitimate victim-suspect relationship. Table 3a shows that legitimate relationships were determined to exist between the victim and suspect in 40 percent (s.d.= .49) of all the homicide cases. That percentage dropped to 28 (s.d.= .45) among the subsample of "whodunit" cases (Table 3b).

When drug-, gang-, and robbery-related events were collapsed into a single dichotomous measure, 49 percent (s.d.= .50) of the killings were inferred to be linked to street-crime motives (see Table 3a). These numbers increased when the self-solving cases were excluded. As shown in Table 3b, street-crime motives were present in 63 percent (s.d.= .49) of "whodunit" cases.

Consistent with other studies, the data in Table 3a shows that the majority of homicides in this inquiry occurred during late night and early morning hours (Block & Davis, 1996; Laurikkala, 2011; Snyder & Sickmund, 2006; Tompson & Townsley, 2010; Wilson et al., 2004; Wolfgang, 1958). About half of the homicides (54 percent (s.d.= .50) in the full sample and 56 percent (s.d.= .50) in the “whodunit” subsample) happened between the hours of 9 p.m. and 9 a.m. Similarly, more homicides occurred on Saturdays (17 percent) and Sundays (17.5 percent) than any other days in the week. As shown in

[66] Some victims and suspects had more than one type of legitimate relationship. For example, in one case the offender was the next-door neighbor and babysitter of the victim.

Tables 3a and 3b, homicides occurring on the weekend comprised 34 percent (s.d.= .48) of all cases and 35 percent (s.d.= .48) of "whodunit" cases. Referring again to Tables 3a and 3b, note that almost all cases involved the presence of a firearm; this was the case with 96 percent of the homicides in both of this study's samples (all cases, s.d.= .20 and "whodunit" cases, s.d.= .19). Since the victim and/or suspect had a firearm during almost all of the homicides, this measure had to be excluded from multivariate analyses. Lastly, drugs and/or alcohol were involved in a sizable portion of the cases. As shown in Tables 3a and 3b, mind-altering substances were said to be involved in 43 percent (s.d.= .50) of the homicides in the full sample and 46 percent (s.d.= .50) of the 192 "whodunit" cases.

Case dynamics. Prior single-site clearance studies have considered the measures of evidence, police familiarity of a homicide area, and the physical attributes of the crime scene location as case dynamics that potentially affect homicide outcome. Each of these measures was explored in the current analysis. Tables 3a and 3b show the descriptive statistics of the evidence type measurs, as well as the variables used to create it for all of the 252 cases and the 192 "whodunit" cases. A comparison of the data in Table 3a to 3b reveals that the average amount of evidence collected and processed per investigation did not change a lot from the full sample to the subsample. On a scale of 1 to 4, the average number of evidence types collected and processed by investigators was 2.92 (s.d.= .88) among the full set of cases and 2.97 (s.d.= 0.89) in the "whodunit" cases.

Robust representation is observed in each of the four dichotomous evidence variables that were used to create the composite evidence types measure. Of the 252 homicide investigations, 86 percent (s.d.= .37) were supported by significant verbal evidence. This number dropped only slightly to 85 percent in the 192 "whodunit" cases

(s.d.= .36). Weapons evidence was collected and processed in 77 percent (s.d.= .42) of all cases and 76 percent (s.d.= .43) of the "whodunit" cases. Technological evidence, such as computers, videos, and cell phone records, were available in 78 percent (s.d.= 47) of all cases and 73 percent (s.d.= .45) of "whodunit" cases. Lastly, 63 percent (s.d.= .49) of the full sample of cases and 62 percent (s.d.= .49) of "whodunit" subsample included the collection and processing of biological evidence such as body fluids, hair, or fingerprints.

The next case dynamic measure to be considered was one assessing the prior call volume associated with the crime scene location and whether or not those addresses were associated with drug and/or gang activities. The flag of crime hot spots showed that about 40 percent (s.d.= .49) of the homicides occurred at addresses that produced 15 or more calls for service in recent years (i.e., police-frequented areas). The percentage only slightly increased to 42 percent (s.d.= .50) among the subsample of 192 "whodunit" cases. Lastly, the physical environment of crime scene was captured with a dichotomous measure differentiating between indoor and outdoor locations. Crime scenes were located indoors in 38 percent (s.d.= .49) of the full sample and in 30 percent (s.d.= .46) of the “whodunit” cases.

Ecological characteristics. It was determined that the 252 cases comprising this sample of 2009-2011 homicides occurred in 91 different census tracts spread across the study jurisdiction. Available socioeconomic and residency information suggest some communities suffered from more disadvantage and disorganization than other areas. The data in Tables 3a and 3b show that among the affected census tracts, the percent of residents over 25 years of age who possessed a high school diploma (or equivalent) ranged from a low of 56 percent to a high of 100 percent. The average percentage of adult

residents with diplomas was 80 percent (s.d.= 9.33) for the 91 census tracts comprising the full sample. Among the 78 census tracts where "whodunit" cases occurred, that percentage was slightly higher at 81 percent (s.d.= 9.16). Similarly, within the full complement of study census tracts, the percent of residents with college degrees ranged from about only 2 percent to 88 percent with a mean of 25 percent (s.d.= 19.29). That number was slightly higher at 27 percent (s.d.= 19.83) in the 78 "whodunit" cases tracts.

Data from the 2010 Census reveal a population range of 482 to 8,720 residents residing in the study census tracts. In the full sample, there was an average of 3,154.75 residents (s.d.= 1,839.64) per tract (see Table 3a). Similar figures were observed for the census tracts where the "whodunit" cases occurred slightly higher than the population average of ($\overline{x}$ =3,266.26, s.d.= 1,912.31). Correspondingly, the logged density measure produced a range of 6.20 to 9.96. Among all of the homicide cases, the average density was 8.19 (s.d.= .66). For the "whodunit" cases, the average density also increased to 8.23 (s.d.= .62). Some of the census tracts where homicides were reported had nearly all housing units occupied, while in other areas there were more housing units empty than those occupied. On average, 1 in 4 houses were vacant ($\overline{x}$= .24, s.d.= .12) in the study census tracts. There was also wide variation in the employment trends observed across the study census tracts, with the percent employed ranging from 12 to 95 percent. Comparing Tables 3a and 3b, the average percentage of people employed was nearly the same in the full sample and in the subsample of "whodunit" case ─ 47 (s.d.= .12) and 48 percent (s.d.= .16) respectively. In other words, the majority of the residents in the areas where the homicides generally occurred were not legally employed.

A similar portrait emerged with respect to the homeownership levels associated with the census tracts comprising the sample. Some neighborhoods saw as few as 5 percent of their residents living in a house they owned, whereas others exhibited as high as 90 percent owner-occupied housing units. Tables 3a and 3b reveal that the averages for the percent owner occupied homes were nearly identical at 36 percent for both the full sample and subsample of "whodunit" census tracts (all cases s.d.= 18.22, "whodunit" s.d.= 18.44).

Shifting attention to the income measures, it is noted that there was a large difference in the median incomes across the study census tracts. The poorest tract had a median income of only $5,764 annually, while the richest census tract posted a 2010 median income over 38 times that amount at $222,922. The average median income for census tracts in the full sample was $33,452.48 (s.d.= $28,491.20) compared to $34,911.56 (s.d.= $31,418.14) among the tracts in the "whodunit" case subsample.[67] In addition to the fact that homicide cases were often worked in communities with low incomes, some communities had a different average family size living off those incomes than others. The average family size in the census tracts was between 2 and 4, so the corresponding 2010 national poverty levels used were household incomes of $14,570 to $22,050. About 42 percent (s.d.= .49) of the neighborhoods comprising both the full and "whodunit" samples were deemed impoverished (see Table 3a and 3b).

Investigator factors. Six investigator specific measures were explored in this study: the amount of time between case assignments, the average number of open cases attributed to each detective annually, a count of cases assigned at the time of a new case,

[67] Since this measure was skewed, a logged median income was also explored. It was not significant in any analyses.

their tenure as a homicide detective, their average workload, and a peer-generated competency score. There were 28 investigators who served as lead detective on the 2009-2011 homicide cases comprising this sample. Twenty-seven of them oversaw one or more "whodunit" case. Referring to Tables 3a and 3b, note that during the study timeframe the detectives had a range of 0 to 604 days between case assignments.[68] On average, detectives were assigned a new case about every two months. In the full sample, the detectives had an average of 62.17 (s.d.= 59.12) days to work on a case before they had to start a new investigation. For "whodunit" cases, they had approximately three fewer days between assignments ($\bar{x}$ 59.80, s.d.= 55.36). Several detectives were able to close all of their cases while others had up to eight open investigations in the study timeframe (see Figure 1a and 1b for the distribution of case outcomes among investigators for all cases as well as the "whodunit" subset).

There were 80, 88, and 84 homicide cases that occurred in the study jurisdiction during the years 2009, 2010, and 2011 respectively. The first homicide case closed in this study was in February 2009 and the last was closed in June of 2014. Among those 176 closed investigations, some were completed the same day the murder was reported, while one case took 1,323 days to result in an arrest. Within each year, the investigators were unable to close between one and four of the cases assigned to them. On average, investigators were unable to close 1.65 (s.d.= 1.14) cases per year (Table 3a). Table 3b reveals that slightly lower success levels were achieved among the subset of "whodunit" cases ($\bar{x}$ 1.71, s.d.= 1.14). Of course, an investigator's workload is also defined by how many cases they are assigned to work when receiving a new case.

[68] A long interval between cases could mean the investigator was taken out of the homicide assignment rotation for a period of time or was tasked primarily with administrative responsibilities.

Not surprisingly, detective caseloads varied widely. The data show that the detectives had worked between 0 to 18 other cases over the three years prior to receiving a fresh case. Comparing Tables 3a and 3b, it seems the typical number of cases an investigator had been assigned since their last case was similar (roughly 6) among all of the homicides and of just the "whodunit" cases. Survey results reveal that 51.5 percent of the detectives claim that they are commonly expected to work 3 or more homicide cases concurrently.

Turning to the available data on detective tenure, note that the sample was comprised of homicide detectives who had been in that role for a period ranging from only a few days to more than 18 years. The average number of months an investigator had been working in the unit before the assignment of each case was 60.61 (s.d.= 50.69) among the full set of homicide cases (see Table 3a) and 60.88 (s.d.=50.59) among the "whodunit" cases (see Table 3b). In other words, detectives working homicide cases in this study generally had five years of homicide unit experience at the time they were assigned a case.

Regardless of how long an investigator had worked in the unit, the data reveal that detectives in this study worked up to seven homicides a year with an average workload of roughly five cases per year. For the full sample of cases (see Table 3a), the lead detective had an average caseload of 5.03 (s.d.= 1.28) compared to a slightly lower average of 4.90 (s.d.= 1.31) observed among the detectives working the "whodunit" cases (see Table 3b).

The ability of the investigators to solve the cases assigned to them was widely judged by their coworkers. Competency scores ranged from 1.56 to 4.89, on a 1 to 5 scale. On average, coworkers deemed the detectives to be quite competent, with an

average competency score of 3.78 (s.d.= .76) in the full sample and 3.79 (s.d.= .73) in the "whodunit" subsample.

The next step in the analysis plan was to perform bivariate analyses on all the variables detailed above. This step served two important roles in the analysis plan. First, there are a large number of variables described above, and not all can be included in a regression model with the current sample size due to limited degrees of freedom, as well as the potential for multicollinearity. Bivariate analyses allow variables that are not significantly related to clearances, and those that are collinear with other independent variables, to be trimmed from the subsequent multivariate analysis. Second, where there were alternative measures of the same construct, the analysis allowed for choosing the best measures to include in the multivariate models.

Bivariate Analyses

Bivariate analyses of 28 separate study variables were examined in an effort to build the best multivariate models. About half of the measures included in prior clearance research were supported at this stage. This study also found that a few of the new measures were associated with case outcomes. However, many of the variables were not significantly related to case closure as expected. The findings related to each measure are reviewed below.

Tables 4a and 4b present the two-tailed bivariate correlations of all the variables considered as predictors of case clearances in this study. Pearson correlation coefficients were used to examine the significance, strength, and direction of relationships between the dependent and independent variables. Then, the measures considered for multivariate analyses were further explored using cross-tabs for categorical variables and independent

samples t-tests for continuous measures. A detailed explanation with corresponding values can be found in Appendix XI.

A review of Tables 4a and 4b show that two measures from the involved subjects domain were significantly correlated with the case outcomes in both the full and "whodunit" samples: victim's age and suspect's criminal history. Both measures were related to case outcomes in the anticipated directions, contained no cells with expected counts less than five, and had significant Chi-square scores. Therefore, those measures were deemed appropriate for inclusion in the multivariate models. This study also included the intersex measure in the next stage of analyses for two reasons. First, it served as a control variable. A measure of victim's sex has been tested in all of the prior single-site clearance study, except for Schoeder and White (2009). Second, the intersex variable accounted for the limited distribution of individual victim and suspect sex measures and provided an opportunity to explore the use of a new predictor. These three measures comprised the involved subjects domain in the multivariate models detailed below. The measure of victims' chronic criminal histories was not included in the multivariate analyses, as it consistently did not have a significant bivariate relationship with the dependent variable.

Table 4a. Correlations (All Cases)

	1.	2	3	4	5	6	7	8	9	10	11	12
1. Closed Cases	1											
2. V/S Opposite Sex	.088	1										
3. V/S Interracial	.092	.024	1									
4. Victim 25 Yrs or Older	-.204**	.082	.119	1								
5. Suspect 25 Yrs or Older	-.054	.198**	-.004	.229**	1							
6. Victim >5 Prior Arrests	-.053	-.197**	-.092	.278**	-.005	1						
7. Suspect >5 Prior Arrests	.301**	-.054	.043	.051	.169*	.100	1					
8. Legitimate V/S Relationship	.338**	.368**	.016	-.127*	.133	-.093	.002	1				
9. Street-crime Motive	-.242**	-.296**	.110	.043	-.135	.038	.005	-.247**	1			
10. Evening-Morning Hours	-.126*	-.118	.007	.050	-.143*	.054	-.010	-.146*	.097	1		
11.Weekend Days	-.019	.000	-.053	-.004	.078	-.031	-.122	-.071	-.005	.060	1	
12. Gun Involved	-.061	-.086	-.032	-.090	-.188**	.062	-.020	-.065	.094	-.002	.072	1
13. Substance Involved	-.043	-.132*	.016	.156*	.141*	.235**	-.012	-.008	.246**	.036	.110	-.092
14. Evidence Types	.152*	-.050	.058	.033	-.200**	.112	.056	-.028	.214**	-.029	-.106	.135*
15. Significant Verbal Evd.	.199**	-.152	-.037	-.091	-.009	-.033	.007	-.003	-.064	-.072	.047	-.086
16. Weapons-related Evd.	.172**	-.080	-.009	-.020	-.159*	.106	.040	.027	.113	-.041	-.116	.111
17. Technological Evd.	-.060	-.063	-.025	.096	-.229**	.085	.023	-.115	.292**	.124*	-.024	.220**
18. Biological Evd.	.069	.142*	.158*	.044	.012	.066	.054	.052	.069	-.085	-.090	-.008
19. Police-Frequented Area	.151*	.011	.061	-.013	-.125	.015	.028	-.001	.021	.122	-.076	.016
20. Indoor Crime Scene	.173**	.278**	.115	-.007	.146*	-.060	.103	.273**	-.143*	-.103	-.042	-.074
21. % High School Educated	-.163**	.043	.168*	.001	.109	-.112	-.143*	-.003	.166**	-.074	-.080	.038
22. % College Educated	-.081	-.023	.251**	.054	.098	-.074	-.144*	-.059	.124*	.016	.010	.014
23. Population	-.242**	.030	.108	-.010	.001	-.084	-.085	-.019	.110	-.062	-.028	.041
24. Density	.079	-.091	.049	.093	.002	.110	-.028	-.077	.148*	.111	.004	-.026
25. Proportion Vacant	.057	-.002	-.108	-.022	.062	.101	.023	-.111	-.086	.062	.083	-.065
26. % Employed	-.053	.122	.093	.062	.030	-.085	.029	.011	-.007	-.070	.122	.055

27. % Owner-occupied Housing	-.105	-.007	.146*	.059	.032	-.050	-.096	-.041	-.043	-.028	.029	.153*
28. Median Income	-.110	-.012	.178**	-.050	-.034	-.102	-.167**	-.044	.100	-.005	.028	.081
29. Impoverished	.137*	-.041	-.145*	-.047	-.060	.069	.198**	.071	.021	.070	-.048	-.095
30. # Days Since Last Case	.104	.006	.103	-.082	.011	-.040	.049	.063	-.006	-.035	-.097	-.015
31. # Open Cases Each Year	-.430**	-.033	-.040	.141*	.027	.086	-.190**	-.119	.195**	.014	.054	.071
32. # Cases Before New Case	-.128*	-.093	-.015	-.017	-.081	.123	.132*	-.065	.107	-.068	-.109	-.013
33. Tenure	-.017	-.040	.161*	-.045	-.005	-.185**	.090	-.037	.001	.019	-.040	-.062
34. Avg. Workload	.038	.092	-.106	.092	.011	.144*	.064	.039	.029	.007	-.027	.028
35. Competency Score	.030	-.035	.037	-.055	-.105	-.145*	.068	-.046	-.012	.018	-.111	.001

**p ≤ .01; *p ≤ .05

Table 4a. Correlations (All Cases) - continued

	13	14	15	16	17	18	19	20	21	22	23	24
13. Substance Involved	1											
14. Evidence Types	.068	1										
15. Significant Verbal Evd.	-.003	.354**	1									
16. Weapons-related Evd.	-.018	.566**	.130*	1								
17. Technological Evd.	.079	.547**	-.065	.027	1							
18. Biological Evd.	.079	.577**	-.079	.068	.069	1						
19. Police-Frequented Area	-.047	.064	.024	.031	.063	.008	1					
20. Indoor Crime Scene	.127*	-.051	-.066	-.034	-.127*	.121	-.168*	1				
21. % High School Educated	-.023	-.019	-.082	-.057	.078	-.012	-.026	.019	1			
22. % College Educated	-.062	.005	-.052	-.032	.113	-.034	.054	-.004	.740**	1		
23. Population	-.085	-.009	-.046	.067	-.058	-.009	-.048	-.048	.292**	.068	1	
24. Density	.113	.002	-.084	-.070	.182**	-.033	.191**	-.025	.182**	.352**	-.391**	1
25. Proportion Vacant	.132*	-.020	.017	-.064	-.028	.044	-.038	.015	-.265	-.292**	-.478**	.100
26. % Employed	.142*	.011	.021	.047	.045	-.070	.013	-.061	.257**	.320**	.172**	-.178**

27. % Owner-occupied Housing	-.126*	.034	.000	-.021	-.003	.081	-.185**	.028	.223**	.279**	.189**	-.385**
28. Median Income	-.070	-.006	.002	.061	.005	-.072	-.072	.052	.371**	.487**	.151*	-.042
29. Impoverished	.007	-.006	-.033	.049	.000	-.017	.081	-.026	-.381**	-.459**	-.190**	.150*
30. # Days Since Last Case	-.033	.026	.029	.118	-.025	-.036	-.105	.169**	.094	.047	.055	-.041
31. # Open Cases Each Year	.183**	-.028	-.156*	-.081	.054	.087	-.095	-.068	.078	.050	.107	.003
32. # Cases Before New Case	.072	.087	.097	.007	.177**	-.072	.012	-.084	.018	-.007	.011	.018
33. Tenure	-.002	-.034	.058	.042	-.068	-.069	-.071	.047	-.028	-.061	.123	-.107
34. Avg. Workload	.070	.089	-.018	.070	.178**	-.011	.014	-.009	-.039	-.057	-.093	.128*
35. Competency Score	-.088	.070	.123	.119	-.048	0.11	-.111	.059	-.027	-.016	.040	-.083

**p ≤ .01; *p ≤ .05

Table 4a. Correlations (All Cases) - continued

	25	26	27	28	29	30	31	32	33	34	35
25. Proportion Vacant	1										
26. % Employed	-.092	1									
27. % Owner-occupied Housing	-.190**	.220**	1								
28. Median Income	-.166**	.239**	.429**	1							
29. Impoverished	.291**	-.262**	-.557**	-.482**	1						
30. # Days Since Last Case	-.045	-.076	.004	.024	.076	1					
31. # Open Cases Each Year	.004	.018	.037	.073	-.113	-.174**	1				
32. # Cases Before New Case	-.054	.058	-.068	-.031	.029	.112	.207**	1			
33. Tenure	-.081	-.054	.035	-.005	.049	.176**	-.004	.197**	1		
34. Avg. Workload	.106	.005	-.100	-.034	.064	.170**	.213**	.210**	-.253**	1	
35. Competency Score	-.023	-.024	-.010	.015	.032	.161*	-.070	.037	.590**	-.137*	1

**p ≤ .01; *p ≤ .05

Table 4b. Correlations (Whodunit Cases)

	1.	2	3	4	5	6	7	8	9	10	11	12
1. Closed Cases	1											
2. V/S Opposite Sex	-.077	1										
3. V/S Interracial	.129	.089	1									
4. Victim 25 Yrs or Older	-.260**	.165*	.120	1								
5. Suspect 25 Yrs or Older	-.118	.129	.043	.200*	1							
6. Victim >5 Prior Arrests	-.058	-.166*	-.082	.225**	-.015	1						
7. Suspect >5 Prior Arrests	.336**	-.072	.102	.061	.225**	.064	1					
8. Legitimate V/S Relationship	.250**	.173*	.090	-.118	.022	-.039	-.041	1				
9. Street-crime Motive	-.093	-.154*	.110	.038	.005	.016	.025	.021	1			
10. Evening-Morning Hours	-.139	-.050	.003	.119	-.072	.070	-.060	-.106	.046	1		
11.Weekend Days	-.008	.005	-.092	-.016	.077	-.045	-.146*	-.043	-.034	.090	1	
12. Gun Involved	-.048	-.124	-.064	-.120	-.200*	.112	-.015	-.004	.079	.106	.144*	1
13. Substance Involved	-.005	-.084	.039	.161*	.183*	.199**	-.029	.063	.238**	.041	.084	-.100
14. Evidence Types	.227**	-.099	.019	.006	-.227**	.085	.024	.058	.208**	-.073	-.089	.151*
15. Significant Verbal Evd.	.214**	-.195	-.061	-.122	-.036	-.077	.040	-.032	-.026	-.083	.069	-.082
16. Weapons-related Evd.	.182*	-.112	-.038	-.085	-.251**	.115	.024	.019	.170*	-.034	-.095	.151*
17. Technological Evd.	.045	-.027	-.061	.089	-.182*	.052	-.017	.009	.230**	.094	.035	.257**
18. Biological Evd.	.082	.072	.160*	.087	.005	.082	.025	.117	.067	-.127	-.146*	-.036
19. Police-Frequented Area	.226**	.019	.007	-.026	-.052	.039	.081	.069	-.044	.051	-.096	-.005
20. Indoor Crime Scene	.096	.149*	.250**	-.010	.081	-.077	.064	.160*	.009	-.041	-.004	-.056
21. % High School Educated	-.149*	.074	.166*	-.013	.170	-.109	-.157*	.050	.130	-.110	-.087	.013
22. % College Educated	-.040	.073	.236**	.010	.165*	-.088	-.119	.026	.075	.005	.036	-.002
23. Population	-.242**	.035	.066	.030	.008	-.075	-.031	.015	.088	-.049	-.067	.033
24. Density	.145*	-.029	-.015	-.031	.041	.117	-.040	.035	.101	.086	.048	.032
25. Proportion Vacant	.080	.016	-.123	-.001	.068	.091	.023	-.107	-.130	.060	.104	-.084
26. % Employed	-.070	.140	.085	.104	.094	-.062	.080	.036	-.036	-.025	.095	.037

27. % Owner-occupied Housing	-.132	.006	.160*	.104	.026	-.045	-.096	-.105	-.021	-.001	.038	.088
28. Median Income	-.089	.052	.159*	-.073	-.017	-.103	-.160*	.000	.075	.000	.032	.057
29. Impoverished	.161*	-.140	-.147	-.074	-.092	.082	.189**	.069	.000	.051	-.052	-.005
30. # Days Since Last Case	.100	-.075	.153	-.043	-.045	-.038	.102	.037	.042	-.047	-.071	-.005
31. # Open Cases Each Year	-.469**	.022	-.081	.195**	.032	.078	-.173*	-.070	.202**	.061	.014	-.025
32. # Cases Before New Case	-.109	-.072	-.063	-.026	-.041	.091	.149	-.020	.081	-.073	-.157*	-.090
33. Tenure	-.028	-.053	.155*	-.023	-.010	-.196**	.139	-.091	.003	.042	-.076	-.079
34. Avg. Workload	-0.27	.010	-.135	.103	.011	.136	.031	-.030	.139	.026	.001	-.029
35. Competency Score	.018	-.068	.036	-.071	-.159	-.190**	.120	-.083	-.002	.061	-.113	-.040

**p ≤ .01; *p ≤ .05

Table 4b. Correlations (Investigated Cases) - continued

	13	14	15	16	17	18	19	20	21	22	23	24
13. Substance Involved	1											
14. Evidence Types	.074	1										
15. Significant Verbal Evd.	.009	.365**	1									
16. Weapons-related Evd.	-.047	.589**	.104	1								
17. Technological Evd.	.114	.551**	-.061	.097	1							
18. Biological Evd.	.086	.584**	-.056	.069	.085	1						
19. Police-Frequented Area	-.057	.037	.002	.054	.016	.000	1					
20. Indoor Crime Scene	.226**	.019	-.076	.009	-.040	.150	-.179*	1				
21. % High School Educated	-.008	-.066	-.066	-.073	.045	-.059	-.058	.120	1			
22. % College Educated	-.082	-.044	-.069	-.071	.094	-.049	.062	.123	.759**	1		
23. Population	-.116	-.022	-.037	.088	-.093	-.034	-.096	-.058	.308**	.076	1	
24. Density	.125	-.062	-.078	-.100	.117	-.048	.197**	.041	.150*	.315**	-.511**	1
25. Proportion Vacant	.133	-.044	.013	-.053	-.046	.011	-.018	.015	-.329**	-.324**	-.508**	.153*
26. % Employed	-.194**	.029	.083	.041	.067	-.092	.053	-.025	.239**	.363**	.187**	-.137

27. % Owner-occupied Housing	-.145*	.045	-.011	-.048	.046	.086	-.205**	.089	.247**	.282**	.247**	-.415**
28. Median Income	-.097	-.020	.003	.056	.011	-.100	-.090	.140*	.376**	.464**	.162*	-.088
29. Impoverished	.028	-.011	.002	.103	-.103	.000	.079	-.110	-.446**	-.499**	-.238**	.153*
30. # Days Since Last Case	-.019	-.014	.020	.075	-.053	-.035	-.118	.177*	.120	.047	.053	-.062
31. # Open Cases Each Year	.204**	.013	-.144*	-.023	.094	.079	-.112	-.023	.079	.037	.113	.030
32. # Cases Before New Case	.035	.069	.135	.042	.126	-103	.002	-.056	.032	-.026	-.007	-.005
33. Tenure	-.051	.018	.066	.035	-.004	-.038	-.105	.063	-.070	-.079	.063	-.088
34. Avg. Workload	.107	.104	-.002	.077	.249**	-.045	.028	-.055	.002	-.028	-.095	.170*
35. Competency Score	-.131	.118	.131	.097	.020	.051	-.136	.063	-.057	-.015	-.009	-.055

**p ≤ .01; *p ≤ .05

Table 4b. Correlations (Investigated Cases) - continued

	25	26	27	28	29	30	31	32	33	34	35
25. Proportion Vacant	1										
26. % Employed	-.121	1									
27. % Owner-occupied Housing	-.227**	.229**	1								
28. Median Income	-.161*	.271**	.411**	1							
29. Impoverished	.362**	-.322**	-.552**	-.478**	1						
30. # Days Since Last Case	-.036	-.050	.035	.040	.012	1					
31. # Open Cases Each Year	-.011	.000	.026	.056	-.075	-.130	1				
32. # Cases Before New Case	-.060	.091	-.101	-.058	.034	.128	.247**	1			
33. Tenure	-.071	-.099	.015	-.035	.092	.139	.001	.229**	1		
34. Avg. Workload	.165	.023	-.130	-.022	.115	-.191**	.243**	.230**	-.208**	1	
35. Competency Score	-.018	-.031	-.032	.010	.044	.128	-.106	.085	.509**	-.084	1

**p ≤ .01; *p ≤ .05

In the next domain, a review of the bivariate correlation (see Tables 4a and 4b), cross-tab, and chi-square analyses (Appendix XI) suggested that three of the event circumstance measures were most suitable for multivariate modeling. The victim/suspect legitimate relationship, street-crime motives, and time of day measures were significantly associated with case outcomes as expected and were considered fit for modeling based on cross-tab statistics. No differences in outcomes were found for cases that occurred on the weekends or involved drugs or alcohol, so those measures were omitted from multivariate modeling exercises.

All three of the case dynamics domain measures were significantly related to case closures as expected (see Tables 4a and 4b). The model fit statistics for those measures were all within acceptable ranges as well. Given these results, evidence types, police-frequented area, and indoor crime scene measures were considered in the predictive models. Three of the nine measures comprising the ecological domain were judged suitable for multivariate modeling: percent high school educated, population density, and percent of population deemed to be impoverished. Each was significantly related to case outcomes in one or both of the homicide case samples, and independent samples t-tests and cross-tab statistics suggested they were appropriate for multivariate analyses. It should be noted that the relationship between high school education and case outcomes was in the opposite direction than expected. Additionally, an explanation for the density measure chosen is warranted. The density measure used in past studies ─ raw population total ─ was associated with case outcomes as predicted among the full homicide sample. However, that measure had a skewed distribution and was not representative of

Wolfgang's (1958) community size construct.[69] As such, the new density variable adjusted by land area was deemed more in line with the justification for including the measure in predictive modeling efforts. This variable exhibited a significant correlation with investigation outcomes in the sample of "whodunit" cases as anticipated, but in a positive direction. Lastly, homicide investigations in impoverished areas were more likely to be solved among the full sample of homicide cases. No significant associations with case statuses were found among the remaining six variables considered within the ecological domain: percent college educated, population, proportion vacant houses, percent employed, percent owner-occupied units, and median income. These variables were excluded from the multivariate modeling efforts.

Among the investigator domain measures considered, the number of open cases and total cases assigned measures were significant and in the expected direction. Individual sample t-tests also determined these measures to be a good fit for the next stage of analyses. The days since a detective's last case, tenure, average workload, and competency score variables were omitted from the multivariate modeling exercise. Those four measures were not significantly related to case outcomes in the full sample or in the filtered "whodunit" cases.

[69] Wolfgang (1958) hypothesized that higher population density should decrease clearance rates due to the area offering more anonymity and opportunities for offenders to hide. As in a study by Litwin and Xu (2007) a simple measure of tract population was also negatively related to case closures in the current data. However, that measure is not well aligned with Wolfgang's (1958) hypotheses about community size as simply using tract population may not represent actual levels of density because it fails to adjust for the land area of the given tract. A larger geographic area may have more total population than a smaller tract that is much more densely populated (i.e. an urban area with high or mid-rise apartment buildings), and thus perhaps offer less anonymity. Importantly, using a true density measure in the current data showed that density had a positive relationship with case closure and thus is not supportive of Wolfgang's ideas. This suggests that past studies using total population measures should be interpreted cautiously.

In sum, fourteen independent variables were identified as measures to be included in the predictive model of homicide investigation outcomes.[70] None of those measures were highly correlated with one another. Tolerance and VIF statistics were found to be within acceptable limits, as they were above .100 and below 10, respectively.[71] These results suggest no multicollinearity issues, which would compromise the multivariate analyses. Therefore, the next stage of analyses was to simultaneously examine these measures as possible predictors of case statuses.

Multivariate Analyses

Since the dependent variable was dichotomous, logistic regressions ($Y= \pi(x) + \varepsilon$) were used to explore homicide case outcomes (Hosmer & Lemeshow, 2000; Tabachnick & Fidell, 2001; Wright, 1995). The logit transformation works well for binomial responses (Hosmer & Lemeshow, 2000; Weisburd & Britt, 2007).[72] Also, logistic regression models accommodate non-normally distributed error terms, which are prone to yield inefficient estimates in linear regression models (Hosmer & Lemeshow, 2000; Long & Freese, 2006). This is important, because inaccurate estimates ultimately cause problems with hypothesis testing (Pallant, 2006). This is particularly relevant in the current study, as the samples are comprised of more than twice as many closed cases compared to open ones. Maximum likelihood estimates were used and allowed to converge until they could not be increased (Hosmer & Lemeshow, 2000; Weinberg &

[70] Those measures were (1) victim/suspect different sex, (2) victim 25 years or older, (3) suspect chronic arrest history, (4) legitimate v/s relationship, (5) street-crime motive, (6) evening to early morning hours, (7) evidence types amount, (8) police-frequented area, (9) indoor crime scene, (10) percent high school educated, (11) density, (12) poverty, (13) open cases, and (14) assigned cases

[71] Tolerance values ranged from .709 to .928 and VIF from 1.083 to 1.411 for all of the homicide cases. In the investigated subset, Tolerance values ranged from .695 to .904 and VIF from 1.106 to 1.439.

[72] When regressed, dichotomous dependent variables flatten out as the ceiling or floor is approached causing an S-shape whereas continuous variables do not because they have no limits.

Abramowitz, 2008).[73] The regression model allowed all other predictors in the involved subject, event circumstances, case dynamics, ecological characteristics, and investigator factors domains to be controlled for when examining each individual linear relationships. The results are discussed as probabilities of case closure given the modeled parameters.

Since the 252 homicide cases were concentrated within 91 census tracts and across 28 investigators, it was necessary to adjust the regression analyses for clustering correlations.[74] Controlling for clustering in these groups is necessary because the assumption of independent observations is violated (Hosmer & Lemeshow, 2000; Long & Freese, 2006). This allows for observations within the same census tracts or investigators to be correlated, while those in different census tracts or investigators are uncorrelated (Hosmer & Lemeshow, 2000; Long & Freese, 2006). In other words, not controlling for clustering would result in biased estimates. Moreover, a model comprised of just the census tract and investigator numbers was regressed on investigation outcomes. Both measures were significant predictors, further suggesting the need to account for the nesting of cases. The standard errors reported in the models were observed to be robust. Table 5 displays the coefficients, significance levels, and odds ratios for the logistic regression analyses for both the full set of homicide cases and the "whodunit" cases. The model fit and explained variance for both models are presented at the bottom of the table.

[73] This approach was used because least squares regression coefficient estimates do not work well for categorical variables.

[74] As there were not enough cases to have sufficient statistical power for conducting hierarchical-linear modeling (HLM), clustering was controlled for in Stata using a command that adjusts the logistic regression standard errors. The Stata program add on and coding language was adopted from the following open source: http://www.kellogg.northwestern.edu/faculty/petersen/htm/papers/se/se_programming.htm

All cases model. There were 250 cases included in the first model using the above-specified 14 independent variables to predict case closure. The results of this model are presented in the middle panel of Table 5 and show that the model required 14 degrees of freedom and was significant (Chi-square = min 135.120, max 135.684, μ 135.567). The Cox & Snell statistics indicated that the model accounted for 42 percent of the variation in whether a case was solved or not (Cox & Snell = min .418, max .420, μ 0.4186). Below findings for the measures in each of the five domains for the full sample of homicide cases are presented.

Table 5. Logistic Regressions

	All Cases			Whodunit Cases		
Variables	**B**	**se**	**OR**	**B**	**se**	**OR**
Constant	-3.698	4.179	0.025	-5.577	5.610	0.004
Involved Subjects						
Victim/Suspect Different Sex	-0.258	0.609	0.773	-0.338	0.638	0.713
Victim 25 Yrs or Older	-1.287**	0.586	0.276	-1.627**	0.759	0.197
Suspect More than 5 Arrests	1.877***	0.434	6.536	1.921***	0.507	6.831
Event Circumstances						
Legitimate V/S Relationship	1.835***	0.536	6.264	1.349**	0.525	3.853
Street-crime Motive	-1.190**	0.477	0.304	-0.571	0.453	0.561
Evening Hours	-0.615*	0.362	0.541	-0.619	0.418	0.539
Case Dynamics						
Evidence Types	0.768***	0.218	2.154	0.938***	0.236	2.554
Police-frequented Area	0.834**	0.409	2.302	0.975**	0.391	2.651
Indoor Crime Scene	0.580	0.441	1.786	0.659	0.589	1.933
Ecological Characteristics						
Density	1.073***	0.354	2.925	1.128**	0.467	3.088
% High School Educated	-0.050*	0.028	0.951	-0.040	0.036	0.961
Impoverished	-0.232	0.378	0.793	-0.090	0.419	0.914
Investigator Factors						
# Open Cases Each Year	-0.871***	0.215	0.419	-1.052***	0.184	0.349
# Cases Before New Case	-0.206	0.136	0.814	-0.201	0.145	0.818
***p ≤ .01; **p ≤ .05; *p ≤ 0.10	R^2 = 42% Cases (n = 250)			R^2 = 46% Cases (n = 190)		

Involved subjects. Table 5 reveals that two of the three variables from the involved subjects domain were found to be significant predictors of case outcomes when holding all other measures constant. Namely, the victims' age and suspects' chronic criminal history measures were significant at the $p<.05$ level and $p<.01$ level, respectively. The odds of an investigation into the death of a victim 25 years of age or older being closed were .276 time the odds for a victim 24 years of age or younger, holding all other measures in the model constant. The odds of a case being closed that involved a suspect with more than five arrest cycles were multiplied by 6.536 times the odds of a case involving a suspect with five or less arrests. This relationship was the strongest predictor in the model. This suggests that cases involving younger than average victims, and particularly those cases involving suspects with the arrest records of chronic offenders, have greatly increased chances of resulting in an arrest. Across all of the homicide cases, the victim and offender being opposite sex was not a significant predictor of case closure.

Event circumstances. The findings presented in Table 5 show that all of the measures tested in the event circumstances domain were significant predictors of homicide case outcomes in the full sample. Cases with legitimate victim/suspect relationships had 6.264 times the odds of closure compared to those with non-legitimate relationships, holding other measures constant. This relationship was significant at the $p<.01$ level and represents the second strongest predictor in the model. Next, the presence of street-crime motives significantly ($p<.05$) decreased the odds (.304) of case closure compared to other types of motives. Finally, the odds of a cases involving a late night or early morning homicide being closed were multiplied by .541 the odds of day homicide

case; however, this was only marginally significant at the p<.10 level.[75] These results suggest that cases involving legitimate relationships, motives other than street crimes, and homicides that occurred between 9am to 9pm are more likely to be solved.

Case dynamics. The results of the full cases model (Table 5) show that two of the three case dynamics domain measures were significant predictors of case outcomes. For every one-unit increase in the number of evidence types collected and processed by investigators, the odds of case closure were multiplied by 2.154 (p<.01). Murders occurring in police-frequented areas had over two times (2.302) the odds of closure than cases originating in areas not frequented by police (p<.05). This suggests that detectives are more likely to clear those cases that involve a multitude of types of processed evidence and are investigated in locations that are hot spots of crime. Indoor crime scenes were not significantly predictive of case closures.

Ecological characteristics. Referring again to Table 5, note that two of the three ecological characteristics were significant predictors of closed cases in the full model. For every one-unit increase in the logged density variable, the odds of case closure were multiplied by nearly three times (2.925, p<.01). Neighborhoods with more high-school-educated residents significantly (p<.10) decreased the odds (.951) of case closure, relative to areas with less-educated residents. These findings suggest that homicide cases originating in communities with more people and fewer high school graduates are more likely to result in an arrest. The impoverished measure was not statistically significantly related to case closure once all of the other case conditions were controlled.

[75] This measure was not significant before accounting for census tract and investigator clustering.

Investigator factors. Data presented toward the bottom of Table 5 indicate that only one of the two investigator-specific measures was predictive of case outcomes in the full sample. Specifically, the total number of open cases a detective had each year was shown to be predictive of case closures at the $p<.01$ level. For every one-unit increase in the number of cases an investigator had open, the odds of case closure multiplied by .419. This suggests that detectives struggle to achieve desirable outcomes when forced to juggle multiple cases at once. The measure that accounted for the number of cases a detective worked before they were assigned a fresh case did not predict case outcomes after all of the other domains' measures were considered.[76]

"Whodunit" cases model. The far right panel of Table 5 presents findings for the subset of homicides deemed "whodunit" cases, as they represent those inquiries where the case was not closed on scene and required follow-up investigative effort on the part of the detective. A total of 190 of the 252 cases in the full sample met this criterion and included complete data on the above-specified 14 independent variables. Again, the model required 14 degrees of freedom and was significant (Chi-square = min 114.858, max 116.007, μ 115.335). This model accounted for a slightly improved 46 percent of the variation in whether a case was solved or not (Cox & Snell = min .454, max .457, μ 0.455). A comparison of the "whodunit" model to the full model reveals similar results with just a few key differences ─ the strength of some predictors changed and three variables lost significance.

Examining the data presented in Table 5, note that for two of the five domains' (involved subjects and investigator factors) findings for the "whodunit" model were

[76] This was a notable change from the analyses that controlled for clustering.

generally the same as the full model results. Similarly, only minor changes were exhibited in two other domains: 1) the case dynamics measures were slightly stronger predictors of investigation outcomes in this model and 2) the marginal significance of the percentage of high school graduates was no longer found in the ecological characteristics domain. The most pronounced differences between the results of the full sample and "whodunit" models were evident in the event circumstances domain. Neither the street-crime motive or time of day measures were found to be significant in the model comprised exclusively on the "whodunit" cases. Moreover, the predictive odds of a victim and suspect having a legitimate relationships in closed cases reduced by nearly half (3.853) compared to the findings of the full model.

In Chapter 5, these findings are discussed in detail, including offering some reasoning behind them and comparing them to the results from past clearance studies. This concluding chapter will also discuss limitations of the current study and the implications for the findings for future research.

Chapter Five: Discussion

This study focused on adding to what is known about homicide clearances. A better understanding of homicide clearance patterns is important to improving police effectiveness. As explained in chapter one, decreased police effectiveness causes various social problems and further exacerbates the low clearance rates (e.g., people who do not view the police as effective are less likely to cooperate and provide information necessary for the police to be effective). While there is much to be learned about how to improve homicide investigation effectiveness, two main takeaways can be gleaned from the current research. One, there are quality issues associated with the data commonly used to conduct homicide clearance research. Two, it is meaningful to consider a wide range of measures organized into five distinct substantive domains when seeking to model homicide case outcomes.

This project was exploratory in nature and intended to contribute to the development of future studies rather than test any specific theory. Therefore, the conclusions offered here are framed according to the rationales provided by previous researchers and logical reasoning based on extensive fieldwork. It contributes to the literature by using case file data verified, updated, and extended by lead detective interviews to explore a wide range of measures within all five of the domains that predict homicide case closure. The following sections discuss what was learned and what it might mean.

Summary of Study Design and Findings

Data considerations. The data analyzed in this clearance study were collected via a multi-method design built around multiple forms of direct contact with police

department entities and supplemented by census data. The research design involved official case file reviews, police electronic database searches, extensive observations, individual interviews, census data, and survey administration. Several previous researchers have advocated for enhanced data collection protocols that include direct observation and questioning of the detectives who are most closely acquainted with the homicide investigations. The underlying premise is that these efforts might offer quality enhancements over the extant agency released datasets and homicide case file data, and in turn significantly improve homicide clearance research (Korosec, 2009, Litwin, 2004; Regoeczi & Jarvis, 2013; Schoeder & White, 2009).

Most homicide clearance studies have examined archival data. Archival datasets can be problematic for a number of reasons. To review a few, there are often extensive amounts of missing data in key fields. Many datasets are outdated or only include a year of the investigation for unsolved and difficult to solve cases. The data released are commonly restricted to what the investigator deems provable and pertinent to court proceedings. Moreover, the information is largely focused on involved subjects and event circumstances domains, while case dynamics and investigator factors details are generally absent. The present study was designed to overcome these issues and attempt to capture the extent to which the data were actually improved by moving beyond archival data. Accordingly, several observations are worth noting.

The findings presented in the previous chapter indicated that data collected from the official homicide case files changed quite a bit after discussing the investigation with the lead detectives. Primarily, this calls into question using the information found in official police records as the lone source of information when seeking to predict homicide

case outcomes. Case files were either not easily interpreted by non-practitioners or not thorough enough to the extent needed for making investigation outcome predictions. Details had to be corrected and added to a number of key data fields spanning across the various substantive domains of the investigation.

If this study had only used homicide case file data, the accuracy of the findings would most likely have been hindered due to the differences in data coding and percent missing. The amount of misinterpretations or coding errors revealed during the detective interviews suggest subsequent regression models might have produced erroneous results. This is most likely true for two key variables frequently used in prior clearance studies ─ motive and victim/offender relationship. Correspondingly, it is possible that the mixed findings reported by prior studies could be partly related to an overreliance on data derived from police reports. Moreover, the breadth of the homicide investigations data was vastly expanded because of the interviews.

Conducting the follow-up interviews with the homicide investigators significantly reduced the amount of missing data present in this study compared to the original dataset that was based solely upon case file reviews. The analyses in this study would not have even been estimable without the data additions. In part, a key advantage of the study was that it was designed to allow for the passage of time between the initial and follow-up data collection efforts. By interviewing the lead detective three to five years after the homicide occurred, the investigation was able to more fully develop. This afforded the research team the opportunity to capture more information than is typically available in agency released datasets that are rarely updated past one or two years. The benefit of noting which measures were the most affected by this passage of time was also valuable.

Follow-up data collection efforts were particularly helpful among case components coded with multiple categories, as we did not know those data were missing. For instance, when coding the evidence recorded in the case files, the researcher is limited by what is listed. Anything not listed in the file is assumed to have not been collected during the investigation. However, the interview additions to the coded templates in the current study call this assumption into question. Conducting follow up interviews with lead detectives resulted in evidence-specific information being added to nearly half of the cases under study here. This suggests that waiting a few years after the homicide to code the case file may pay valuable dividends with respect to the overall robustness of the data. While it is likely that some data will not be found in the case files regardless of when or how the data are gathered, this is a point that should be weighed carefully by future clearance researchers.

Importantly, this study finds that missing data in the case files often results from homicide detectives purposely omitting investigation details from the official record. The detectives in this study commonly used a working file to bring together case leads until they amassed the details needed to officially document a convincing story that justified an arrest warrant. The detectives claim that they do this because the process of officially documenting an entire investigation can be extremely time consuming. They also wrestle with knowing that all information included in the official case file is subject to meticulous scrutiny in court proceedings that ultimately dictate the outcome of the inquiry. The fact that additional data were collected on the investigations closed before the study began supports the assertion that the detectives only use arrest and prosecution relevant information to shape the official records. For instance, a large amount of

suspect-specific details were added to the database as a result of the face-to-face interviews with detectives. For cases without an arrest warrant, the investigators routinely consulted their working file for suspect details rather than any official reports.

It is fair to assume that clearance researchers have not been able to include key variables when depending solely upon archival datasets because detectives only report investigation details that solidify the guilt of a suspect. Similarly, the case files are largely descriptive of the involved subjects and event circumstances domains. Without the multi-method approach, not all of the relevant clearance domains could have been modeled. This is likely why previous research has yet to simultaneously analyze the five domains in a single model even though measures from each have been reported as significant predictors of case outcomes across studies. Importantly, the interviews were instrumental for more than just correcting coding and collecting missing data.

Reviewing the homicide cases with the lead detective also provided helpful insights on how to effectively organize and operationalize the data. The investigators routinely clarified the role of subjects involved in a case, the utility of evidence, and the ways that certain case conditions might affect suspect apprehension. This information was used to create measures based on how they represent the investigation rather than the homicide itself. For instance, previous literature has modeled the homicide motive in various ways and reported somewhat convoluted and contradictory findings as to how motives affect case closure. The investigators in this study repeatedly noted that cases with street-crime motives were more difficult to investigate than cases with other types of motives. Three reasons were forwarded in this regard: 1) increased likelihood that people with information about the homicide would refuse to give statements or lie to cover-up

other crimes, 2) there would be fewer leads to connect the victim and suspect, and 3) more evidence is needed than often available to convincingly place the blame of a murder on a suspect. Therefore, a new coding scheme was devised to capture whether the detective knowing a homicide was motivated by a street crime impacted the outcome of the investigation. Another example is that interviewing the investigators allowed for a new operationalization of the "whodunit" case classification, which was championed by Puckett and Lundman (2003) and Schoeder and White (2009). Past studies have been forced to rely on the length of time it took to make an arrest for coding “self-solvers” and “whodunit” case types. Sanders (1977), Simon (1991), and Innes (2003) have questioned the viability of this approach. This study was able to capture the case type based on the investigators' self-imposed definitions. As the first clearance study to do so, the groupings may be more precise than found in other studies. Overall, the present study provides important food for thought regarding the data used to examine homicide case closure and suggests that understanding investigations requires modeling that is more multifaceted.

The multifaceted data collection approach employed by this study produced a more comprehensive and complete dataset than would have been available had data been collected solely from case file reviews. In general, multi-method approaches allow researchers to be more confident in the data used to explore certain phenomena (Jick, 1979). Certainly, using the data templates to interview detectives was more straightforward and data entries were faster than traditional open-ended semi-structured interviews. It may have even encouraged better participation from investigators than would have resulted from more open-ended questions. Additionally, these methods can

be readily subject to replication given that a tangible data template and survey instrument have been created and tested. For sure, the efforts it took to complete the study were time intensive. While the benefits of this approach are many, several costs are discussed in the future research section below.

The data implications discussed above are a central contribution of this study. In addition, those data were examined with an eye toward gaining insight into what factors affect whether a homicide case is solved when all five of the investigation domains are considered.

Predictors of homicide case outcomes. There have been many measures reported to predict homicide case outcomes in past studies. The present study allowed for the majority of them to be explored with recent and complete data. In order to figure out which of the measures in the current study were significant predictors of investigation closure, a two-step process was employed. First, univariate and bivariate analyses were used to prune variables that were not fit for modeling. Bivariate statistics were particularly helpful when deciding what variables to forgo including in the multivariate analyses. Second, the innovative model specification required that all of the domains be represented and that case clustering be controlled. As a result, logistic regressions were used to examine the capability of fourteen variables to predict homicide investigation closure. To date, this study is the first clearance research that tests such a model.

Multivariate analyses identified 10 different factors as significant predictors of homicide case closures. Some of the current study results are consistent with previous findings in the incongruent clearance literature. Several measures exhibiting mixed support in the literature were significantly related to homicide case closure in this study

after coding refinements were applied to the data. This study also provides new findings related to homicide clearances. It should also be noted that measures were significant within all of the five clearance domains. The implications of these findings are presented within each domain below.

Involved subjects. Two measures from the involved subjects domain were found to predict the outcomes of the 2009 to 2011 homicide cases in the study jurisdiction. As hypothesized, case closures were likely to be observed if a victim was under 25 years of age or the suspect had more than 5 prior arrests. These observations applied to both the results of full sample and the "whodunit" subset.

The finding that cases with younger victims have increased chances of closure is consistent with the majority of previous clearance research (Alderden & Lavery, 2007; Litwin, 2004; Litwin & Xu, 2007; Puckett & Lundman, 2003; Regoeczi & Jarvis, 2013; Riedel & Rinehart, 1996; Wolfgang, 1958). While few single-site studies have provided an explanation for this pattern, two interpretations may apply. One argument has been that homicides involving youths are prioritized by the police (Black, 1976, 1980, 1995). Another justification has been that the cases are actually easier to solve (Klinger, 1997). These cases could be easier to solve because youths are often under the supervision of adults (Litwin, 2007). Moreover, in some cases, there may be more community outcry when a child is murdered that increases witness cooperation (Lee, 2005). Alternatively, cases with younger victims might include certain evidence as they are more often interpersonal (Lundman & Myers, 2011; Riedel & Rinehart, 1996), which gives the detective leads to work.

Where this study's age-related findings differ from previous clearance works is that it is first single-site study to report that age significantly affects case statuses in a southern state. It also suggests that the victim's age plays an important role in case outcomes even after all domains are considered. Finally, it sheds light on the point in which the victim's age may shift to decreasing the odds of case closure. This is a new finding because the current study used an operationalization of the victim's age that allowed for an examination of investigation outcomes among cases involving victims who were older than the majority of homicide victims and thus more likely to have aged out of criminality, which had not been previously tested in a single-site study. While many other clearance studies have reported that cases with younger victims are solved more frequently using continuous or wide-ranging categorical measures, this study used a specific age dichotomy to examine when the age of the victim might start to decrease the odds of closure.

The results suggest that investigations into the death of younger victims are more likely to be solved, while cases with victims that are at least 25 years old and older are less likely to result in an arrest. This means that there may be something fundamentally different about cases with victims older than the norm that affects the likelihood of closure. Reasons for why cases involving victims who were 25 years of age or older are less likely to be solved than investigations into the death of the majority of victims need to be explored.[77]

Turning to the other significant involved subjects domain measure, this study provides unique findings regarding the criminal history of suspects in homicide

[77] Specific suggestions as to how this relationship could be unpacked are provided in the future research section below.

investigations. As discussed in chapter two, there has been limited systematic inquiry of how an involved subjects' criminal history affects homicide investigations in clearance studies. Some previous single-site clearance research produced contradictory findings regarding the significance of victims' criminality,[78] while effects of a suspect's arrest record measure on case outcomes had not been examined prior to the current study. Presumably, those studies could not model the suspect criminality measure because the datasets used by the majority of clearances studies are missing suspect data. This study was able to overcome this problem due to the information collected during the investigator interviews. The lead detective identified the offenders arrested after the case files were coded and those who had not been arrested yet. Additionally, this study built on the operationalization of the measures previously used to test victims' criminal history. Instead of using a measure that merely indicates if the involved subject had ever been arrested, a chronic criminal history flag was created. Specifically, it is a contribution of this research to be the first single-site study to test suspect arrest records and to consider the chronic nature of the criminal history.

Findings show that cases involving suspects who are chronic offenders are more likely to result in arrest. This result was not surprising as it makes sense to model a suspect's criminal history rather than the victim's when examining which might influence an investigation; criminal history information is never needed to help locate a victim. It seems more logical that a suspect's criminal history might help an investigator identify, locate, and profile them to interview or arrest. Chronic offenders are more likely to be on probation or parole (Klein, 1997), so tracking their whereabouts at the time of the

[78] Several measures of victim criminal history were considered by this study, but none were significantly correlated with case outcomes. This will be discussed further below.

homicide and compelling an interview may be easier (Murphy & Lutze, 2009). In addition, since the police are trained to deal with criminals (Broderick, 1977; Fielding, 1988; Haberfeld, 2002), perhaps investigators are better getting information from chronic offenders (Leo, 2008; Kassin & McNall, 1991; Watson, 1983).

Moreover, the finding that the suspect's criminal history was the strongest predictor in both models shows that including this measure is an important advancement for single-site homicide clearance studies. This study suggests that criminal history records are an essential tool in homicide investigations. Therefore, prior studies may have some omitted-variable bias because suspect criminal history could not be controlled while examining the relationships between case closure and other predictors. In general, it seems that when investigators have certain knowledge about the involved subjects in a homicide, they are more likely to solve the case. This suggests it is important to continue to model this domain in clearance research.

Event circumstances. All of the event circumstances domain measures included in the multivariate models were significant predictors of investigation closure in the full sample model. This study finds that cases are more likely to be closed when the victim and suspect have a legitimate relationship, the motive is not street-crime related, and the murder happens during the daytime. These results were expected given the logic presented in the previous chapters; however, these findings are new because of differences in variable coding, strength of predictive values, and inclusion of variables representing all homicide case domains.

Previous single-site studies have found increased probabilities of closure in those cases involving legitimate relationships between the victim and offender (e.g., family

members) (Jiao, 2007; Lee, 2005; Xu, 2008). The majority of studies, however, did not include such a measure or did not report findings consistent with this study (Alderden & Lavery, 2007; Litwin, 2004; Litwin & Xu, 2007; Lundman & Myers, 2012; McEwen, 2013; Puckett & Lundman, 2003; Riedel & Rinehart, 1996; Regoeczi & Jarvis, 2013; Rydberg & Pizarro, 2014; Schroeder & White, 2009). This study explored a new operationalization of the victim and offender's relationship. The measure was created based on nuanced consideration of victim and offender relationships and the complexity of connecting the subjects during a homicide investigation. This approach focuses on the likelihood of developing investigation leads, rather than testing various relationship types that might impact case outcomes. The current research suggests that homicides with easily connectable people increase the odds that the detective will be able to "connect the dots" and isolate which person is responsible for the murder. This seems to support hypotheses that cases involving stranger relationships are more difficult to close, perhaps because it is harder for the detective to find a link between the victim and offender (Gilbert, 1983; Regoeczi & Riedel, 2003; Wellford & Cronin, 1999).

Moreover, it seems that discerning the victim and offender's relationship in terms of the connections that are likely to produce investigation leads may be a more intuitive approach compared to using multiple measures of relationship types. The legitimate victim and offender relationship measure examined in this study was the second strongest predictor of case outcomes in the model and those odds were two to three times higher than those reported in any other clearance study. The legitimate relationship measure was also significant in the multivariate model that included only the subset of cases deemed to be “whodunits.”

The odds of a legitimate victim/suspect relationship increasing case clearances in a "whodunit" cases were significantly different from the odds of other types of relationships; namely that association was only half as strong as observed in the full model. This finding could be driven by a smaller sample size, but is more likely because there were fewer legitimate relationships between victims and suspects in the “whodunit” cases. Given that legitimate relationships are less common among the more difficult cases, part of the usefulness of connecting people may be in helping the investigator define what kind of case they have to work. Additionally, perhaps the detectives rely less on obtaining leads from the victim and offender's relationship in "whodunit" case investigation because the majority of those homicides involve strangers or people associated through crime; thus their efforts to develop leads on that front are less likely to be fruitful (Innes, 2002b, 2003; Robert & Lyons, 2009; Wellford & Cronin, 1999; Wolfgang, 1958). Yet, when they are able to include a legitimate relationship in the "whodunit" investigation, the case is more likely to be solved. This measure was still the second strongest predictor of case closure in the model. The significance of this measure in both models highlights the need for it to be included in homicide clearance studies. Given that about half of the existing clearance research has not analyzed the victim and suspects' relationship due to missing data, it was an advantage of this study to include the measure, offer a novel coding, and test it along with the other five domain measures. This study suggests the measure influences model results and should be included as an event circumstances domain measure accordingly.

The next significant predictor of investigation closure was the street-crime motive measure. While a measure of motive has been explored by most single-site clearance

research, the findings are convoluted and mixed (Alderden & Lavery, 2007; Litwin & Xu, 2007; Puckett & Lundman, 2003; Regoeczi & Jarvis, 2013; Xu, 2008). This may be related to modeling fewer homicide case domains than found here. This study also benefits from having a unique dataset that provided enhanced information about motives, which allowed for a change in coding of the measure. The street-crimes motives variable employed by this study provides an alternative way to understand how the homicide motivation affects the case outcome. Knowing whether the motive was street-crime related may help detectives decide how to approach an investigation, interview people, and what factors produce the best leads (Cronin et al., 2007; Greenwood et al., 1977; Innes & Brookman, 2013; Sanders, 1977; Wellford & Cronin, 1999).

In the full sample model, cases with street-crime motives were less likely to be solved. These results are supported by a few prior studies showing that drug, gang, and robbery motives reduce the likelihood of clearances (Alderden & Lavery, 2007; Lee, 2005; Litwin, 2004; Roberts & Lyons, 2009). There are several possible explanations for this finding. It is likely that the people involved in a homicide motivated by a street crime lie or provide limited information to detectives more often than in homicides with other motives (Inbau, Reid, & Buckley, 1986; Wang, Chen, & Atabakhsh, 2004). This may be particularly true for the suspects, as people who commit drug-, gang-, or robbery-related crimes are more likely to have a criminal lifestyle (Cromwell & Birzer, 1996; Walters, 1990). Considering that investigators use verbal evidence to develop homicide cases (Chaiken et al., 1977; Greenwood et al., 1977; Innes, 2002a, 2002b, 2003; Innes & Brookman, 2013), deceitful and partial statements could be particularly dampening to the likelihood of closure. Moreover, witnesses are probably less likely to come forward with

any information in street-crime homicides for fear of retaliation or being labeled a snitch (Dennis, 2009; Innes, 2003; Innes & Brookman, 2013; Natapoff, 2004; Schroeder & White, 2009). These circumstances may also hinder the investigators' ability to verify information or know how to interpret other types of evidence (Blair & Rossmo, 2010; Kuykendall, 1982; Rossmo, 2004; Sanders, 1977). In other words, piecing the event together in a coherent way that helps identify a suspect and support probable cause for their arrest may be harder in cases with street-crime motives.

This is the first single-site study to find a change in the significance in the homicide motive between the full and whodunit model (see Alderen & Lavery, 2007; Puckett & Lundman, 2003). The fact that this measure was not significant in the "whodunit" model may suggest that many of the same factors that make those investigations more challenging to solve simply apply to all homicides with street-crime motives. Both classifications may be related to stranger homicides, cases with less evidence, and the frequency of those investigations being in neighborhoods with characteristics that decrease case closure odds. This means that there may be little difference in the ways in which a detective investigates a "whodunit" case and street-crime related homicide. Indeed, street-crime motives were present in the majority of "whodunit" cases (63 percent).

The time-of-day measure was significant in the full model as well. This is only the second single-site study to test a time-of-day measure and the findings are slightly different from previously reported (Alderden & Lavery, 2007). This study operationalized the time that homicides occurred using a dichotomous measure described by Wolfgang (1958), whereas Alderden & Lavery (2007) tested four categories of time

(i.e., early evening, late evening, late night, and early morning-daytime) with various lengths of hours in each segment and daylight was the referent. Alderden & Lavery (2007) did not find a significant relationship between late-evening homicides and case outcomes compared to incidents in early morning and daytime hours. This study finds that homicides occurring late at night and during early morning hours have a decreased likelihood of being solved.

As previously discussed, nighttime crime scenes may be harder for investigators to work than in the daylight (Chism & Turvey, 1999; Gardner, 2011). Regoeczi and colleagues (2008) hypothesized that "homicides occurring in the late evening and early morning may take longer to clear due to delays in interviewing witnesses, collecting and processing physical evidence, and publicizing calls for assistance through the media that can occur when someone is killed in the middle of the night" (p.146). It may be that there are fewer witnesses around after dark and those who are present may be less willing to cooperate. Reduced visibility might hinder investigators' efforts to locate and document physical evidence (O'Hara, & O'Hara, 1988; Peterson, Mihajlovic, & Gilliland, 1984). It may also be the case that nighttime homicides result in the lead detective being woken and/or having to drive in from home, depending on the shift they are assigned (Innes, 2002a, 2002b; Simon, 2001). The resulting lack of alertness might compromise the investigator's ability to manage the crime scene, which is an instrumental component of the criminal investigation process (Chaiken et al., 1977; Geberth, 1996; Greenwood & Petersilia, 1975; Lyman, 2001). In addition, homicides occurring at night may be more likely to involve strangers (Wolfgang, 1958), reducing the number of leads investigators can work to identify a suspect.

While the time of day may be related to case outcomes through one or more of these conditions, the effects were not significant among the subset of "whodunit" cases that require more investigative efforts. These results were also different compared to Alderden & Lavery (2007) as their findings related to the timing of homicides were similar in both models.[79] In this study, the explanatory power of the time-of-day measure may have been washed out in the "whodunit" model due to the differences in the distribution of other measures that were stronger predictors. For example, there were fewer legitimate relationships between the victim and suspects in the subsample, so that measure may account for the variance explained by time of day if more stranger homicides occur at night. Alternatively, the percentage of cases involving a late night or early morning homicide was nearly the same in the full dataset (54 percent) and the "whodunit" subset (56 percent), so the change in significance could have also been related to a loss in statistical power from removing 60 cases in the subset analysis. In the next domain, there were no changes in the statistical significance of measures between the full cases and "whodunit" homicides.

Case dynamics. In this study, two of the case dynamics domain measures were significant predictors of investigation outcomes as anticipated. The findings suggest that cases were more likely to be solved when the investigator had more types of evidence at his/her disposal and when the crimes occurred in an areas frequented by the police. Generally, the results are in line with previous research showing that homicide investigations are enhanced by the presence of verbal and physical evidence (Baskin & Sommers, 2010; Blair & Rossmo, 2010; Davies, 2008; Fisher, 2004; Greenwood et al.,

[79] Their coding of "whodunit" cases was also different as they relied on the amount of time it took for a case to be cleared and this study employed the investigators' definitions of case difficulty.

1977; Marché, 1994; Riedel, 2008; Roberts, 2007); and, that information sharing and hot-spots policing increase police effectiveness (Braga & Weisburd, 2010; Braga et al., 2004; Chen et al., 2003; Florence et al., 2001; Redmond, & Baveja, 2002; Sherman et al., 1989). The specific findings, however, are new to the clearance literature as the robust data used in this study allowed for novel operationalizations of these measures.

Measures in the case dynamics domain have not been as commonly included in clearance studies, particularly compared to the involved subjects and event circumstances domains (see Table 1). This is largely due to the fact that prior researchers have not been afforded the permissions necessary to collect the data for such measures. The increased access to investigations in this study allowed for a thoughtful exploration of this domain. Not only do those data suggest that the case dynamics domain is important to model in clearance research, this is the first study to consider multiple evidence types and a police-frequented areas measures in the same model. This was only possible because the research team collected data from two rarely approved sources − police databases and homicide detectives. As a result, those data were used to operationalize an evidence and police-frequented area measure not previously tested. The coding approach resulted in the case dynamic measures being among the most robust predictors of case closure observed in the present multivariate modeling efforts.

Research related to the use of physical evidence in investigations is still rather scarce, but scholars have been noting the role of witness statements since Max Stern's (1931) paper on unsolved 1924 to 1928 Wisconsin murders. This study moved past measuring the presence and commonness of these evidence types in a homicide investigation and focused on the usability and assortment that were available to the

investigator. No other known clearance study has considered the additive effects of evidence types when examining homicide investigations (see McEwen, 2013; Regoeczi & Jarvis, 2013; Schroeder & White, 2009). The current findings suggest that as the breadth of meaningful evidence available to investigators increases, so do the odds of case closure. This relationship was a lot stronger than any predictors previously reported in studies examining individual evidence measures. With more types of evidence in play, it seems that investigators are able to develop more leads to identify and support the identification of a killer. Evidence may be particularly helpful for an investigator to understand the order and circumstances of events that lead to a homicide (Horvath & Meesig, 1996; Weston & Wells, 2003). Toward that end, more types of evidence could help them to triangulate case details and conduct interviews (Geberth & Bagerth, 1996; Hartwig et al., 2006).

The validity of these findings is supported by the fact that the evidence types measure was coded to account for the usability of the evidence. Other studies have not been able distinguish between the verbal and physical evidence that was collected and that was worked. Evidence is collected in nearly every homicide case, but it is not always usable (Hails, 2009; Parker & Peterson, 1972). As one of the few clearance studies that has been able to include evidence measures, it is also an advantage of the current research to control for this fact. The limited operationalizations in prior research have likely contributed to the inconclusive findings regarding the use of evidence types in homicide investigations reported. Since the dataset used in this study was setup to specify the evidence that had been successfully processed for use in the investigation, the evidence measure was more representative of the contribution of evidence in an investigation than

previously reported. The police-frequented areas measure was also coded in an attempt to improve upon previous clearance literature research.

Only one other single-site study has examined the role of police presence in a homicide incident area on case outcomes and the results differ from this study. Jiao (2007) controlled for how often homicides occurred in particular districts of Chicago under the assumptions that areas overburdened with incidents would have strained resources and desensitize detectives. It is likely that Jiao (2007) did not find significant difference in case status because the measure narrowly included homicides. Based on the police innovations literature, this study explored a broader measure of crime hot spots to consider whether any police familiarity with the area where the homicide occurred impacted case outcomes. The findings suggest that cases are more likely to be solved when they are investigated in an area of the jurisdiction that is subject to high levels of police presence. In terms of the availability of resources, perhaps investigators are better able to capitalize upon existing or past police efforts in some areas where homicides occurred. Plus, apprehending a suspect is probably faster with information about where and with whom they typically associate. For example, if an area has a gang problem, investigators may be able to draw upon gang-unit work to identify the gang members when investigating a gang-related killing. Research on intelligence-led policing and supports this logic (Kennedy, Caplan, & Piza, 2001; Manning, 1992; Parry, 2006; Peterson, 2005; Ratcliffe, 2012).

Community-oriented policing suggests that intelligence gathering is easier when officers are familiar with the people and social ecology of an address or street segment where crime occurs (Giacomazzi & Brody, 2004; Giacomazzi et al., 2004; Goldstein,

1987; He et al., 2005; Vito et al., 2005; Weisburd et al., 1988; Zhao et al., 2002, 2003). For instance, officers who spend time in a certain community interacting with the people residing there would be expected to gain access to "the word on the street" about a murder before patrol officers in other areas. In the jurisdiction under study, it is a common practice that officers who know anything about a homicide from interactions with local citizens notify and even submit supplementary reports to the lead homicide detective. Additionally, these investigators are known to use police responses to calls for service in these areas to amplify their search of involved parties by internally broadcasting suspect details or giving presentations at shift roll call. The idea is that since patrol officers are likely to be in the area anyway, they can "be on the lookout for" certain people the homicide investigators need to interview.

The role of evidence types and police-frequented areas in homicide investigations seem to be slightly more influential in "whodunit" cases. Specifically, the predictive strength of both of these measures increased modestly in the subsample model. This makes sense because an investigation would likely need more evidence and policing knowledge when it is not a "self solver." Clearly, the case dynamics are measures needed in analyses of case outcomes. Neighborhood traits were also related to investigation outcomes.

Ecological Characteristics. It is a benefit of this study that more individual relationships between ecological characteristic and case status could be explored than any single-site study previously. Only a handful of single-site clearance studies have examined the effects of measures from this domain on homicide investigations. As a result, there are few consistencies in what measures have been included and how they

were operationalized. This study extends the clearance literature by modeling three ecological characteristics related to where homicides occurred: population density, the percent of residents with a high school education, and the percent of residents deemed to be impoverished. No other study has been able to model the ecological characteristic domain alongside the other four domains, which may in turn have compromised their findings. In the current study, the population density and the percent of residents with a high school education measures were shown to be predictive of case outcomes in the full sample, while controlling for all of the homicide investigation domains. These findings suggest that it is important to model ecological characteristics measures in clearance study analyses.

While a few past clearance studies have considered density and education measures, these measures had not been previously tested as they were coded in this study. Indeed, there is still a lot to be learned about how area residency and socioeconomic community conditions impact homicide investigations (Puckett & Lundman, 2003; Regoeczi & Jarvis, 2013). This study suggests that case closures are higher in neighborhoods where residents live closer to one another and have less educational attainment. While it was hypothesized that these measures would significantly predict case outcomes, the directions of association were unanticipated. Explanations for each are provided in turn.

Clearance studies have used the count of residents within the census tract where a homicide occurred as a density measure. They included the measure to account for Wolfgang's (1958) supposition that as community size increases, so does offender anonymity. It was assumed that increased anonymity would decrease offender detection,

and thus reduce case closures. However, this has not been confirmed as those studies yielded inconsistent findings (Litwin, 2004; Litwin & Xu, 2007). In an attempt to clarify the role of density in homicide investigations, this study used a calculated measure of community size that controls for the census tract bounds ─ the same number of residents cannot live in every tract. This is the first single-site clearance study that has used this approach. As a result, this is the only study to find that density has a positive effect on closures and the odds ratios were about three times stronger than any previously reported.

The community density measure was a strong predictor of investigation outcomes in both models. There are three plausible explanations for the finding that community size improves the odds of case closure. One, simple logic suggests that more people living in an area increases the likelihood of someone witnessing a homicide and more witnesses multiplies the chances of one providing significant verbal evidence. Two, densely populated areas may have more streetlights, cameras, and open landscaping that allows for the incident to be observed and reported. For example, the jurisdiction under study has police cameras and city lights throughout the core business and residential districts, which research show improves the detection of crimes (Pease, 1999; Welsh & Farrington, 2009). Three, in areas with more density, the fact that residents are less likely to know everyone may be related to their willingness to get involved in an investigation. Warner (2007) found that social trust and cohesion in neighborhoods reduced the likelihood that someone would report a crime. When a witness does not have a community relationship with an offender, that person may have less hesitation about talking to the police. In communities where residents know one another, neighbors may feel more protective of certain offenders. Those residents may have watched the offender

grow up or consider them family and therefore not want anything bad to happen to the individual, similar to why domestic violence is underreported (Felson, Messner, Hoskin, & Deane, 2002). Therefore, it would be easier for investigators to develop case leads in denser communities. While the relationship between case closure and the education measure was not in the predicted direction, helpful conclusions can still be drawn for these findings.

Only one other single-site study has analyzed a measure of area educational attainment on investigation outcomes. Litwin (2004) found the percentage of residents with a college degree was not significantly related to case closure. The measure was intended to represent the social disadvantage variation among neighborhoods. It was included to test assumptions about police discretion found in the extralegal perspective. The idea is that police respond to areas with less culture or sophistication differently than other neighborhoods (Black, 1976). Another argument could be that areas with social disadvantage are less welcoming and approving of the police (Kane, 2005; Schuck, Rosenbaum, & Hawkins, 2008; Reisig & Parks, 2000; Sampson & Jeglum-Bartusch, 1998). Like Litwin (2004), this study did not find the same operationalization of education was related to investigation outcomes. However, a new education measure was also tested. This is the first known single-site clearance research to examine area educational attainment using a measure of the percentage of residents with high school diplomas or equivalent. The results suggest it is a significant negative predictor of case closure.

Murders were more likely to be solved when they occurred in neighborhoods comprised of fewer residents who had graduated high school. There are several

conceivable reasons for this relationship. First, people in areas with less education may have fewer jobs that take them away from the community. Research shows a long standing and direct relationship between educational attainment and employment (Kettunen, 1997; Nickell, 1979). When there are more people home to potentially witness homicides or hear information to serve as informants, the likelihood of them providing a detective with case leads may increase. Alternatively, it may be harder to interview people in neighborhoods with better-educated people. Areas with better socioeconomic status may be quicker to refer detectives to a lawyer to speak on their behalf rather than agree to an interrogation. Research shows that indigent people are less likely to retain and consult with a lawyer than those who can afford private representation (Anderson, 2009; Hanson et al., 1992; Leiken, 1970; Rattner, Turjeman, & Fishman, 2008). It may also be the case that people who know their rights well are less easily intimidated into providing information about homicides or consenting to searches for evidence. Support for these explanations can be found in research that shows citizens who have knowledge of the justice system are more likely to have negative perceptions and interactions with police (Manning, 1978, Hawk-Tourtelot & Bradley-Engen, 2012). However, these explanations may only apply to self-solving cases, as this measure was not a significant predictor of case closure in the "whodunit model.

The fact that the education measure was not significant among the subset of cases could also be related to the reduced sample size. There was little difference between the mean percentages of high school graduates in the full homicide cases (80 percent) and "whodunit" cases (81 percent). With 60 additional cases in the full sample model, the measure was only marginally significant. This may suggest the changed significance

level is due to limited statistical power. There were only 78 census tracts in the subsample of whodunit cases. Similarly, statistical power issues may be related to why only one investigator factor was significant.

***Investigator factors*.** This study finds that measures within the investigator factors domain contribute to predicting homicide case closures. This was expected given the accumulation of investigations studies that suggest there are variations in how homicide cases are worked by detectives (Carter, 2013; Cloninger & Sartorious, 1979; Cornin et al., 2007; Eck, 1992; Hawk & Dabney, 2014; Innes, 2002b, 2003; Keel et al., 2009; Kuykendall, 1982; Miletich, 2003; Rossmo, 2004; Sanders, 1977; Wellford & Cronin, 1999). Nonetheless, since there has been limited overlap between investigative process and case outcomes research, this study provides new findings regarding the influence of the detective. Most clearance studies have not included measures from this domain, presumably because the requisite data are difficult to access. It was an advantage of the multi-method design employed by the current research that allowed for collection of investigator-specific data.

Those data also support the argument that investigator measures should be modeled. As noted earlier, this study found that part (13 percent) of the variance in case outcomes is attributable to the detective who was assigned the case. The investigators worked between 1 and 18 cases within the 3-year study timeframe. Those murders were solved in 69 percent of the full sample and 59 percent in the "whodunit" cases (see Tables 3a and 3b). This equated to some investigators having zero closed cases; while others had zero open (see figure 1a and 1b). In fact, 46 percent of the investigators had a solve rate less than or equal to the overall unit average among the full sample. For the "whodunit"

cases, however, the percentage of investigators at or below the unit clearance average increased to 56 percent. In general, the data showed there were differences in case outcomes among detectives. Specifically, investigator workload, tenure, and competency were explored for how they might relate to homicide case outcomes.

The results suggest that the investigators' workload has a meaningful effect on the likelihood of case closure. This is the first single-site study to find that the number of open cases assigned to a detective was a significant positive workload predictor. The only other study to examine investigators active cases was Rydberg and Pizarro (2014) and they reported a negative relationship. In the current study, cases assigned to investigators with fewer open cases have increased odds of being solved. This makes sense, as conventional wisdom suggests the more work someone has to do, the less time they are going to have to work on each task assigned. Research testing this logic in other fields shows that high workloads result in less effective employees (Brookhuis & Waard, 2001; Robert & Hockey, 1997). For investigators, a heavy caseload may reduce productivity in other ways (Marché, 1994), such as less time to canvas for witnesses and interview people. Investigators experiencing additional strain in what is already a highly stressful job, can cause fatigue, burnout, and other negative effects on the detective's ability to close a case (Bakker & Heuven, 2006; Brookhuis & Waard, 2001; Burke, 1993; Collins & Gibbs, 2003; Dabney et al., 2013; Lee & Ashforth, 1996; Robert & Hockey, 1997; Terkel, 1978). For example, it may reduce the ability of the detective to successfully trace the victim's history of relationships and confrontations This could reduce the likelihood of the detective linking the victim and suspect or tracking down a suspect, which are both important to an investigation (Innes, 2003; Jiao, 2007; Lee, 2005; Riedel, 1994, 2008;

Sanders, 1977; Xu, 2008). Similarly, working on multiple cases at once might not allow the investigator enough focus to interpret case evidence or conduct interviews thoroughly due to being overburdened. In other words, it seems that when investigators' attention is divided between multiple cases, the likelihood of cases being solved decreases.

These findings also suggest that omitting investigator factors could introduce bias into predictive investigation outcome models. Interrelated, the significance of adjusting for the nesting of homicide cases within investigators should be noted as it changed the study findings. Within-detective grouping of cases need to be taken into account statistically for the same reasons that apply to the clustering of investigations within the same neighborhoods (see Litwin, 2004; Puckett & Lundman, 2003). Continuing to use this study's approach or a similar technique may help to clarify some of the inconsistencies in the homicide clearance literature. Since the current study was exploratory, the measures not found to predict case outcomes are worth noting as well.

Domain measures not related to homicide case closures. Despite hypotheses to the contrary, the majority of the measures explored in this study were not significant predictors of investigation outcomes. Specifically, the findings discussed in this section are different from the studies that forwarded these measures. Drawing upon the extant literature for guidance, homicide investigation data were used to create 34 variables.[80] Three of the variables had to be excluded after univariate analyses (i.e., victim/suspect interracial, suspect 25 or older, and firearms) due to a lack of variation observed in the current dataset. There were four evidence category measures that were only included for descriptive purposes, as they were subsequently consolidated into an evidence types

[80] This count does not include the dependent and "whodunit" case variables.

scale. Of the 27 variables remaining, the bivariate analyses revealed that half were not significantly related to case outcomes. These measures were excluded from subsequent multivariate modeling to compensate for the small sample size in the current study. Multivariate modeling of the remaining 14 variables revealed that 3 were not predictive of homicide outcomes when holding all other indicators constant. In the end, this study failed to reject the null hypothesis for 20 of the 30 measures that were considered. Null findings were observed among variables representing each of the five substantive domains of homicide clearance.

Since the primary goal of this study was to explore a wide variety of case outcome measures using a multi-method dataset and a new modeling approach, a brief review of the null findings is provided below. The discussion is divided into two sections. First, the measures that did not have a significant bivariate correlation with case closures are presented. Second, the discussion moves to the measures that were significantly correlated with investigation outcomes at the bivariate level but failed to remain so when controlling for other variables within a theoretically informed multivariate model.

Measures not correlated with investigation outcomes. Fourteen of the measures explored in this study were not correlated with case closures at the bivariate level. In the involved subjects domain, the victim/suspect intersex and victim chronic criminal history measures did not exhibit significant correlations with the dependent variable. Most of the previous clearance studies did not find the victim's sex significant, and were unable to include suspect sex (Litwin 2004; Puckett & Lundman 2003; Regoeczi & Jarvis, 2013; Riedel & Rinehart, 1996; Rydberg & Pizarro, 2014; Xu, 2008). Using a new operationalization that included the suspect data, this study suggests that the victim and

suspect being different of opposite sex is also not related to case closure. Next, the victims' chronic arrest history was not related to case closure. These results are dissimilar to Alderden and Lavery's (2007) and Jiaos' (2007) studies, as they found that victims' arrest record was a significant predictor of case outcomes.[81]

In the event circumstance domain, measures of homicides that occurred on a weekend and involved drugs or alcohol were not significantly correlated with case outcomes. Wolfgang (1958) conducted the only prior single-site clearance study to report these measures. His descriptive findings suggested that homicide cases involving weekend homicides and substance use were solved less often, which was obviously contrary to the findings of this study.

Five ecological characteristics domain measures were not related to case status in the present study: percent college educated, proportion vacant, percent employed, percent owner-occupied units, and median income. Few studies have explored each of these measures. Therefore, including them in this study adds to the conversation about those findings. Similar to this study, Puckett & Lundman (2003) and Litwin (2004) accounted for the clustering of homicide cases within census tracts and found income was not significantly related to homicide arrests. Conversely, Xu (2008) reported a significant relationship, which does not align with the current findings. Litwin (2004) also found no significant effect of neighborhood levels of college education and employment status. This study adds to the notion that there is not an independent effect of those measures on case outcomes. However, the lack of association between case closure and owner-

[81] After supplemental analyses, Alderden and Lavery (2007) reported that victims' arrest record was significant in a model reduced to only the cases with instrumental and gang motives. In the current study, the victims' criminal history did not have a significant association with street-crime motives either.

occupied units and vacancy is contrary to the findings reported by Xu (2008). This may suggest there is a difference in how the area residency in a mid-western city changes case outcomes compared to a southern jurisdiction. Alternatively, given that the data used in that study were only up to 1995, the difference in findings may be related to the 2007 to 2009 economic recession that collapsed the housing bubble. That crash resulted in negative real equity, foreclosures, a mortgage and credit crisis, and widespread abandonment of real properties. Additional research is warranted in this area.

Finally, four of the investigator factors domain measures were not related to homicide case closures in the bivariate analysis portion of this study. Those measures were the number of days since an investigator's last case assignment, length of tenure as a homicide detective, average annual caseload, and peer-generated competency score measures. As this domain has been subject to the least systematic inquiry by past researchers, the current results help narrow down what should be considered to account for the investigators' role in case outcomes and leave room for other operationalizations to be explored. The length of time between investigators' case assignments has only been examined by one other study, and they found that the longer detectives went without a case, the greater the odds the case would be unsolved. This was not true for detectives in this study. Rydberg and Pizzaro (2014) suggested that when investigators go longer without a case, they may get rusty, which decreases the likelihood that they will solve that next case. It is likely that was not a factor for the detectives in this study because many were working open cases between assignments and they consult on other detective's cases when they are not focused on a new investigation.

Additionally, it seems the use of a tenure proxy measure for investigator experience may not have compromised Puckett and Lundman's (2003) results. This study employed a direct measure and found no significant relationship as well; yet, research by Marché (1994) suggests it matters. Perhaps the assumption that increased experience translates into better work (Cronin et al., 2000) is not accurate as measured by tenure, with other investigator differences accounting for variations in their clearances. Alternatively, other operationalizations of tenure could also be explored, such as time on the force or experience as any type of detective. Maybe some detectives have developed certain skills from their prior experiences in other investigative units or connections and knowledge from their experiences in patrol that are more helpful to solving homicides compared to detectives without such experiences. It may also be valuable to explore other ways of capturing these experiences that move beyond the simple notion of tenure. This study explored several operationalizations of the workload concept. While the average workload variable was not correlated with investigation success, the two other workload variables (i.e., the total number of open cases an investigator was carrying when assigned a particular case and their number of open cases per year) were significantly related to closures. Additional work is needed to help resolve this issue.

This study was the first clearance project to use a detective competency score measure. The data for this variable were collected based on extensive observations within the studied homicide unit. There are different personality traits, "soft skills," and levels of commitment to the job among the investigators in this study. There was even a crew of four detectives who were assigned to a complex case squad because they were considered to have (and scored as) above average competency. Therefore, it was surprising that the

measure was not significantly correlated with case closure at the bivariate level. This finding may actually be attributable to the aforementioned complex case squad though. Those four detectives were known to assist in other investigators' cases and be reassigned cases deemed by commanders to be most challenging or high profile. Some support for this rationale can be seen when examining a subset of just those types of cases. Using a sample of 141 cases that the investigators identified as being the most challenging to clear (i.e., removing average investigations from the "whodunit" classification), a difference between the overlap of competency levels and closure rates was identified. The detectives with below average competency scores were assigned 39 percent of the hardest cases, which they closed 26 percent of the time. The detectives with above average competency scores were assigned (or reassigned) 50 percent of those cases and solved 40 percent of them. Future research should consider other operationalizations of competency that can adjust for the reassignment of cases and thus be more reflective of the research team's observations. Turning to the multivariate analyses, several measures that were related to case status in the bivariate analysis ended up not predicting the likelihood of closure when modeled alongside other relevant variables.

Correlated measures that were not significant outcome predictors. Homicides occurring in indoor locations, impoverished areas, and the number of cases assigned to investigators were not significantly predictive of case outcomes in either the full or whodunit multivariate models. Although homicide scene location has been reported as a significant predictor in single-site clearance studies, those findings may have been compromised by not being able to include a direct measure of case evidence (Alderden & Lavery, 2007; Jiao, 2007; Litwin, 2004; Litwin & Xu, 2007; Lundman & Myers, 2012;

Regoeczi & Jarvis, 2013; Rydberg & Pizarro, 2014; Xu, 2008). Considering it is likely that the type of crime scene is related to the kinds, amounts, or value of evidence in a homicide case, accounting for the contribution of evidence in the current model may have changed the significance of the body location measure. Regoeczi, Jarvis, and Riedel (2008) suggested that crime scenes with bodies found in a home "should better preserve physical evidence" (p.146) and Litwin (2004) noted that the "[b]ody location is important because it may indicate the likelihood of eyewitnesses" (p.332). The one study that was able to include both an evidence and crime-scene location measure in the same model, did not account for significant verbal evidence (McEwen, 2013). The omitted measures in prior studies may explain the differences in findings. It is also plausible that the difference in findings is related to how the evidence measure was operationalized. Previous studies coded all evidence collected in a homicide investigation, whereas the measure in this study focused on the usability of evidence. This likely heightened the precision of the measure so that it explained the variance in case outcomes previously approximated by other measures.

Additionally, crime scene location may not significantly affect case outcomes when all domains of influence are simultaneously considered and when the researcher is able to control for the clustering of cases among investigators. For instance, homicides related to street crimes may be more likely to occur outside of the victim's home, while homicides between intimately-involved subjects may be more likely to occur indoors. It is also possible that case outcomes are more dependent on how lead investigators work and manage certain crime scenes, rather than the type of scene itself. Accounting for verbal and physical evidence, street-crime motives, legitimate victim and offender's

relationships, and the lead detective may have been related to why this study did not find that crime scene location affected case outcomes.[82]

In the ecological characteristics domain, the impoverished measure used in this study was not significantly predictive of case status as hypothesized. This finding is similar to those of Puckett and Lundman (2003) and Litwin (2004) showing that the median income of an area does not seem to change the success of a homicide investigation. This may suggest that using income or poverty status to explore SES constructs, such as Litwin and Xu (2007) and Regoeczi and Jarvis (2013) did, is more appropriate ─ particularly in exploration of how certain area conditions may change witness cooperation, fear of crime, collective efficacy, and/or police prioritization of cases.

Finally, for investigator factors, it seems the total number of cases assigned to a detective does not change the likelihood of their closing a case. This is in line with the findings of the Puckett and Lundman (2003) study. Perhaps, as others have suggested, certain management styles and the creative allocation of resources serve to mitigate the hypothesized negative impact of higher caseloads (Borg & Parker, 2001; Greenwood et al., 1977; Marché, 1994). This study could not account for these possibilities or investigator thoroughness due to data limitations.

Limitations

This study is not without limitations. The key weaknesses of this project are site and data related. First, the study site may be different from other jurisdictions in a way that restrictions the generalizability of the study results. Specifically, this jurisdiction is a

[82] Supplemental models supporting some of the above propositions are available upon request.

located in a southern state. Research suggests there are significantly different levels of honor culture and violent interpersonal conflict in southern regions (Felson & Pare, 2010; Rice & Goldman, 1994). These conditions could affect homicide investigations, and thus research results. There are also higher percentages of gun owners and fewer carry restrictions in the state under study compared to other regions. Evidence of this is revealed in that a gun was present in the majority of the homicide incidents in this study. These regional variations could potentially explain the divergence of any of the findings from those reported in other studies, and should be considered when framing the results.

As for the city under study, the 2009 to 2011 overall violence rates were higher than most like-sized jurisdictions.[83] The racial composition of the city was also different from other cities. This may reduce the likelihood of similar studies finding the same results in other areas.[84] Specifically, the city is majority Black or African American and most homicide cases in this study involved Black or African American victims and offenders. This means that nearly every homicide case had at least one involved subject that was a racial minority. This is important because research suggests racial minorities, particularly Black or African American citizens, have significantly different criminal justice outcomes compared to Whites (Blumstein & Beck, 1999; Carroll, 1982; Henderson et al., 1997; Mauer, 1999, 2002; Kennedy, 1997; Russell, 1998; Sampson & Lauretson, 1997; Smith & Alpert, 2002; Spohn, 2000; Tonry, 1995, 1996; Walker et al., 2003). Part of the difference is found in the way the police treat and decide to arrest racial minorities (Black & Reiss, 1967; Browning et al., 1994; D'Allessio, & Stolzenberg, 2003; Hepburn, 1978; Lamberth, 1996; Mastrofski, Reisig, & McLuskey, 2002; Smith,

[83] http://www.fbi.gov/about-us/cjis/ucr/ucr-publications#Crime
[84] http://quickfacts.census.gov/qfd/

Visher, & Davidson, 1984). As a result, the findings presented here may be more relevant to predicting homicide investigation outcomes among similar majority Black or African American populations.

There are also aspects of the police department under study that may compromise the generalizability of the findings detailed above. This study was based on a homicide unit in a major city urban municipal department. As such, the findings may not be applicable to smaller city or rural departments. Moreover, the homicide unit is centrally located at the police department headquarters. Decentralized units and the investigators assigned to them may function in a significantly different way that changes predictors of homicide case closure compared to centralized units. The department under study experienced roughly 100 homicides per year and deployed a contingent of roughly 20 lead investigators to investigate them. This resulted in a higher homicide caseload for the majority of the detectives (Keel, 2008; Keel et al., 2009). Department caseload variations are also likely to affect study results, and findings from agencies with high caseloads may not be generalizable to jurisdictions with lower caseloads. Case assignments in the homicide unit in this study are done using a non-team, unit-based rotation system. Research sites where the unit has a shift-based case assignment rotation or where cases are worked in teams may not find similar results as this study as well. Finally, all of the homicides cases investigated by the department in this study were initiated by the local Medical Examiner's office reporting a death as suspicious. As such, there is some potential the data could miss relevant cases that were not designated as homicides by the medical examiner, and thus, the findings of this study may not be the same as research in a site where the case-initiation process is different.

Turning to the data restrictions, this study could not replicate some of the measures tested in previous clearances studies. Those measures include the victim's citizenship status, if they were transported to a hospital, the involvement of media outlets, multiple victims, a count of people on a crime scene, and the level effort put forth by investigators. Studies that are able to include one or more of those measures may produce different results than found here. There were also a few missing data issues within measures included in this study. Most notably, a missing case file precluded the inclusion of any relevant information on one homicide that occurred during the study timeframe. Moreover, victim and/or suspect sex data were not available for 16 of the cases. Although imputed data were utilized to replace values for those cases, the results should be considered cautiously. Unfortunately, the suspect age variable could not be included in analyses due too many missing cases. In addition, it is important to note that suspect data are not the same as offender data, as not all of the suspects had been arrested. The criminal justice status of the suspects' in the cases ranged from nonexistent to incarceration. Specifically, there were suspects who had not been identified, those who were strongly linked to the case but the investigator deemed to be falling short of the probable cause requirements for arrest, some with pending arrest warrants, others awaiting trial or on trial, and a group already convicted. This means that the suspect data in this study represent both the offenders that the homicide investigators were working toward arresting and those whom had been arrested.

There are also shortcomings raised by the criminal history data used in this study. The criminal history data were focused exclusively on arrests counts. Details regarding the severity (i.e., misdemeanor or felony) and pattern of the arrests over time were not

provided. There were no dates associated with the arrests to examine criminal desistance or to control for the date of the event. Arguably, the results could be affected by not accounting for the length or desistance of a criminal career. Some involved subjects could have accumulated arrests over a number of years or many years prior but the data were not that specific. There was no way to measure the lambda effect among the victims and offenders' criminal history either. Those who were incarcerated would have a lower arrest count because they were not free to commit crimes. Without the arrest dates, it was also impossible to limit the suspects' arrest counts to the cycles before the homicide so they are comparable to the victims data. In addition, some suspects' arrest records may not be included in the data. Unlike victims, profile searches had to be completed for the suspects without a SID listed in the case file. Any suspect profile devoid of the requisite details needed to run the criminal history queries (i.e., name, date of birth, race, and sex) would not have been matched. Similarly, data on 11 victims under 17 years of age were not provided by the State due to juvenile protection laws, and there were 2 cases with unidentified victims (which were excluded from analyses).

The findings of this study may have been compromised by the fact that it relies heavily on the perceptions of investigators. Measures such as the homicide motive, areas known for drugs or gangs, and the "whodunit" classification were coded largely based upon the perceptions of the lead investigator in the case. While the detective's opinions were seemingly logical, grounded in their experience, and often supported by other case details, the data may not reflect reality. In other words, some data are representative of the way in which the case was worked more than facts about the homicide incidents. Notably, detectives' perceptions of the crime scene location may be influenced by the

proximity of drug or gang activities rather than specific knowledge of each homicide address.

On the other hand, caution should also be used when trying to compare this study to other research because of improvements made to the data relative to past studies. The dataset used in this study is the first of its kind. The methods used to collect those data may have reduced spuriousness and gathered more detailed information about investigations than was possible with other datasets. In part, differences in findings compared to past studies may be due to having the measures to account for all five of the domains of a homicide case. This study may thus have a decreased the likelihood of erroneous findings compared to other clearance research. For these reasons, this study should be framed within the larger literature and not viewed as a single, authoritative source of homicide investigation outcome findings. Homicide clearance research is important and more work is needed to build upon the data improvements and findings of the current study if we are to truly understand the factors that affect case closure.

Implications for Future Research

Given the study findings related to data collection and measure modeling, future clearance research should move past the noted disadvantages of using data derived from archival sources. Instead, it should focus on collecting information specifically designed to answer investigation outcome questions. This study can serve as a stepping stone toward providing more valid, complete, contemporary, appropriate, and generalizable datasets. However, there are notable challenges associated with collecting similar data in this manner.

Foremost, gaining access to homicide unit files has been difficult for scholars. Approval to interview (and survey) homicide investigators is even harder to achieve. Finally, it is practically unheard of that researchers were allowed to search police databases and obtain involved subjects' criminal history information in a clearance project. A strong working relationship with a police department is needed to just get past the "red tape" of planning this type of project. Afterwards, the cost of time and funding become central concerns.

Although the first stage of this project's data collection was in conjunction with other research goals, it took over four years to complete the dataset. A more focused research team could complete the same tasks in less time; however, it is likely that it would still take multiple years. Just reviewing (over 400) homicide case files took Regoeczi and Jarvis (2013) sixteen months. Reading and recording data on one case file can take half an hour or several hours, depending on the depth of the investigation and how many data points are being collected. Then, interviews would require numerous months.

In this study, it took over six months of rigorous scheduling to review just over two hundred and fifty cases with 29 lead detectives. More researchers would undoubtedly speed up the process; yet, assuming that the investigators would be available may be problematic. While the investigators in this study were generally accommodating, interviews were canceled frequently due to new cases and case leads. Obviously, the more time and number of researchers devoted to the data collection will require increasingly large amounts of grant funding. Limiting the sample size is not an option as the possible statistical analyses and generalizability of the data must be considered.

Future research ought to include a larger sample size. In doing so, multilevel logistic regression equations could be utilized to account for the nesting of homicide cases assigned to detectives and explore the differences between cases outcomes for those detectives (Bryk & Raudenbush, 2002). In other words, investigator factors could be examined as they vary across cases, while also testing case differences between investigators. Therefore, securing funding for such a large project may be problematic, and will require major investment from private or federal funding organizations.

Whether future research replicates the data collection methods used by this study or uses a different approach to building a thorough homicide investigations dataset, all five of the substantive domains need to be modeled in predictive analyses. Case dynamics, ecological characteristics, and investigator factors domains should be accounted for alongside the other more commonly modeled domains (i.e., involved subjects and event circumstances), to provide a holistic model of homicide investigation outcomes. Not only were measures in each domain significant in this study, but the strongest predictor of case status was a variable no other single-site study has been able to analyze ─ suspect chronic arrest record. This suggests that missing variables may have biased results in past studies. Similarly, in a model of just the crime scene locations measure regressed on case status, indoor crime scenes significantly ($p<.01$) increased the odds of a case being solved by 2.258 times. However, when all of the other domain measures' correlations with case outcomes were held constant, the variable was no longer significantly associated with case closure. This suggests that erroneous conclusions are more likely when significant relationships are not modeled.

One way that future clearance research efforts could provide more holistic models would be to build around and upon the measures this study found to predict case closure. Similarly, research that explores the reasons for the relationships presented here will build the clearance literature. For example, the age cut-point measure findings suggest there is a significant difference in case outcomes among the older than average victims but work is needed to explain why. Perhaps homicides with victims older than in the average case involve fewer witnesses or ones that are harder to interview. Older witnesses may be less likely to come forward, easily intimidated into not sharing information, or willing to work with the police. It could be harder to identify the victim's relationship with the suspect, the suspect's motive, or find evidence in those cases. These rationales could be tested to further understand clearance drivers.

Researchers should also explore the measures not modeled here and attempt to improve the operationalization of clearance measures whenever possible. Moreover, researchers should continue to explore measures that are based on the homicide investigations literature when examining homicide case outcomes. When modeling detective differences in case closures, future research should especially focus on differences in areas such as unit structures, management, documentation practices, case-assignment systems, workload, training, and other factors police agencies can potentially modify to increase clearance rates. Given the infancy of the case dynamics and investigator factors domains, there seems to be a lot of room for exploring measure operationalizations. Indeed, homicide investigations are multifaceted, so our predictive models must be as well.

Conclusion

Comprehensive approaches to modeling homicide investigation measures will advance our evidence-based understanding of the factors that affect case outcomes. Advancement is needed given the outlined gaps in the homicide clearance literature. Only after these gaps have been adequately addressed can research move past exploring the correlates of homicide clearances to reporting causal relationships and testing theories. In turn, future work can inform homicide investigation practice and policy, and may help reverse the declining trend in homicide clearances over the past half century.

The likelihood of accomplishing this without better datasets than have been commonly available is low. Conclusions about the data and findings provided here need to be considered within the scope of this study. However, measures from each clearance domain could not have been modeled if the project had not used a multi-method data collection design. Specifically, the follow-up interviews with lead detectives led to more accurate and complete data across all domains in the current study, compared to what was collected through the case-file reviews alone. Measures from each of the domains have been found to correlate with case outcomes across the clearance literature. In this study, measures within each domain were also significant in a model that simultaneously accounted for all of the domains. Therefore, researchers need to tap the five domains, and more work is needed to refine and operationalize measures within each domain. For these reasons, other scholars should be mindful of making definitive conclusions with archival data. It is dangerous to make strong decisions about theory or policy given the current state of clearance data and mixed research findings. Indeed, this study provides more

questions regarding data quality than easy fixes and foundations for making broad statements.

One solution to expanding the datasets and research on homicide clearances may be to find ways to further embed researchers into police departments. The success of investigator interviews and surveys in the current study suggests complete data and modeling can be accomplished through such an approach. Specifically, this study provides support for the argument that police departments should employ an in-house (fulltime) criminologist. Sherman (1998) described evidence-based policing as a process of using the best available research on policing to evaluate practices. Researchers need to be involved in the development and process of policing so the police are encouraged use tactics supported by research. Sherman (1998) contends that a house criminologist could shrink the gap between academics and practitioners. It is likely that this strategy might create a feedback loop of evidence for "what works" that would guide, streamline, strengthen, and improve research as much as practice (Sherman et al, 1997).

Appendices

Appendix I: Critical Incident Review Project Approved Proposal

For nearly a decade and a half, cities across the country have implemented some variation of the "focused deterrence" group violence strategy. The model, "first demonstrated as 'Operation Ceasefire' in Boston in 1996 and subsequently in many other jurisdictions, relies on direct communication to violent groups by a partnership of law-enforcement, service providers, and community figures. Together the partnership delivers a unified 'no violence' message, explains that violence will bring profound law enforcement attention to the entire group, offers services and legitimate alternatives to group members, and clearly articulates community norms against violence. Where properly implemented, rapid reductions in serious violence are routine, with low levels of actual enforcement and the enthusiastic support of affected communities." This evidence-based intervention model is currently in operation in over 50 jurisdictions nationwide and has consistently exhibited significant and sustained reductions in targeted crime problems.[85] **Controlling for demographic, social, and crime related factors, Boston's Operation Ceasefire program was associated with a 63% decrease in the number of monthly youth homicides, 32% decrease in monthly calls for service due to shots fired, a 25% decrease in the number of monthly gun assaults, and a 44% decrease in the number of youth gun assaults per month in the high risk districts during its first two years**. The observed decreases far exceeded those experienced in 39 comparison cities during the same pre-post test time period. Stockton, CA saw average monthly counts of gun homicides dropped 35% in year 1 of the program and were largely sustained over the 5 year intervention period. Comparable outcomes were demonstrated for a focused deterrence program implemented in Cincinnati, Minneapolis, Indianapolis, and Lowell, MA. While interventions designed around the focused deterrence model have been shown to achieve dramatic and usually sustained reductions in targeted violence, the complexities of the collaborative effort can jeopardize the sustainability of the intervention. To combat this sustainability issue, jurisdictions such as Cincinnati have moved to implement more structure and control over the partnership and its operations. The Cincinnati Initiative to Reduce Violence (CIRV) is built around a tight organizational structure and utilizes principles borrowed from corporate America to enhance the efficiency and sustainability of its partnership. By clearly defining roles and responsibilities of participating partner organizations, Cincinnati has found that they can achieve more accountability of better conflict resolution within their intervention program which has flourished since 2006.

The proposed [redacted] intervention seeks to focus on a manageable geographic area (Zones 1 & 3) and to replicate the tight organizational structure of the successful Cincinnati program (see proposed organizational chart below). This structure and focused application will increase the likelihood of prompt and sizable results and allow for clearly defined leadership roles and span of control.

A "no violence" message will be directly delivered to gang members via three main conduits. **First, trained outreach workers (i.e., ex-gang members) are deployed to targeted neighborhood streets**. These "violence interrupters" directly engage community members in the targeted neighborhoods, making in-roads with gang members and their social support systems. Along with community entities, they relay the message of the collective intolerance of violent

[85] A full list of agencies and published program evaluations available at http://www.nnscommunities.org.

behavior, note that gang members are afforded higher surveillance and priority by the justice system, and provide information and coordinated referrals to social service providers. **Second, law enforcement partners engage in an intelligence gathering exercise to identify street gangs and groups responsible for violent offending in the targeted neighborhoods and the directly (e.g., knock and talks, field interviews) and indirectly (surveillance) build felony cases on them.** Emphasis is placed on identifying the individuals who are responsible for violent behavior and align themselves with a formal gang or loosely affiliated group of criminal peers. The relationships that comprise each gang/group as well as the relationships between independent gangs/groups in the targeted area are mapped out using social network analysis techniques and software. **Third, carefully orchestrated "call-in" sessions are used to deliver the "no violence" message in a concentrated and unified format.** Here, a group of at-risk probationers and parolees are ordered by a judge to report to a courtroom at a designated day/time. A 60-90 minute session is called to order and select law-enforcement and prosecution authorities detail the formal consequences awaiting individuals arrested for violent offending. At-risk youth are confronted with the intelligence information to establish legitimacy. It is emphasized that violent crime emanating from gang/group affiliation is afforded the highest priority and that formal sanctions will be brought against all members of a group when any single member engages in serious violent crime. Outreach workers and service providers reinforce the message that the violence must stop and present service referrals as an alternative to violent street life. The session concludes with comments from community members such as family members of murder victims, faith-based officials, and elected officials who seek to emphasize the personal and community harm caused by the violence. Ongoing reinforcement of targeted enforcement messaging and sustained social service referral efforts serves a "carrot and stick" function to remove protracted violence from the community while at the same time provide real and meaningful pathways from the violent lifestyle.

The [redacted] Police Department will serve as the lead agency in a broad based partnership. [redacted] will be responsible for program coordination and be the primary law enforcement agency. With the exception of a yet to be identified Executive Director for the project, there currently exists the personnel and commitment needed to launch the program. Law enforcement support to the [redacted] Special Enforcement Section will be provided by the [redacted] County Sheriff's Department, ATF, U.S. Marshals, and officers from the [redacted] Department of Correction - Probation Division and [redacted] Pardons & Parole. Adjudication partners will include the [redacted] County Superior Court and U.S. Attorney's Office. Service delivery will be coordinated through the screening and programming infrastructure of the [redacted] Community Impact Program (A-CIP). Community engagement will be coordinated among the Mayor's Office for Weed & Seed, [redacted] Community Policing Section, Visions Unlimited Community Development, Inc., willing faith-based entities, and the members of NPU L and V. Georgia State University will provide logistical support to all program components and conduct program evaluation.

<u>Project Atlas Goal</u>

- The goal is to unite community members, service providers, and law enforcement in a coordinated partnership to substantially reduce levels of gang and gun violence in Zones 1 and 3

<u>Project Atlas Projected Results</u>

- A prompt reversal in the upward trend in homicides, firearm injuries, and gang-related crime

- Significant annual reductions (25% in first year) in homicides and gunshot injuries in Z1 and Z3

Project Atlas Implementation Steps

- Intelligence Gathering (know the players)
    - Identify violent gangs/groups via homicide review and zone-level assessment
    - Identify positive influences and willing partners in the community
- Organize Resources
    - Assemble organizational structure and solidify partnerships
    - Secure public and private funding for project implementation and evaluation
    - Organize community around the message "stop the shooting or else"
- Communicate
    - Law enforcement, service and community teams interact with violent groups
    - Call ins to communicate directly the core message, consequences and alternatives
- Reinforce the Message
    - React swiftly and severely to shootings/killings with law enforcement and prosecution
    - Intervene quickly with support for positive behaviors
- Show Results
    - Data driven analysis to demonstrate and communicate the desired results

Appendix II: Police Department Letter of Support

February 24, 2011

Dean A. Dabney, Ph.D.
Department of Criminal Justice
Georgia State University
P.O. Box 4018
Atlanta, GA 30302-4018

Dear Dr. Dabney:

This letter confirms the [redacted] Police Department's support of the proposed "Criminal Justice Researcher-Practitioner Fellowship Placement Program [redacted]'s Anti-Violence Strategy" that is being submitted to the National Institute of Justice for funding consideration. The department is committed to working with the Georgia State University (GSU) research team to implement Project [redacted] as means to significantly reduce the level of group-related youth violence in [redacted] Representatives from both organizations will collaborate on planning and implementation of the project.

The department welcomes the prospects of funding for an Executive Director position to assist in the overall planning and execution of Project [redacted] activities. This employee of the [redacted] Police Department will assist with grant solicitation and reporting activities, including co-authorship of a final report to the National Institute of Justice describing the partnership and the associated lessons learned.

Per the existing Memorandum of Understanding, th[redacted] Police Department will provide access and office space accommodation to GSU researchers to assemble intelligence information on youth gangs and groups operating in the city. It is anticipated that this information will inform targeted enforcement strategies, community capacity building activities, and a series of Projec[redacted] "call-in" sessions. The department also welcomes the efforts of professionally trained outreach workers and the service delivery efforts of partner criminal justice agencies to assist in enforcement efforts and service delivery targeting at-risk youth.

Project [redacted] research activities will comply with departmental policies, applicable laws and ordinances, will not interfere with official police operations, and the confidentiality of the department and its officers will be protected throughout the data collection and dissemination process.

Sincerely,

[redacted]
Chief of Police

Appendix III: Critical Incident Review Data Template

Critical Incident Review Data Template

* = Look for specific wording
9M = Look at Supplemental Report

Data Case #_____ (5 digits)

Date Recorded: ____/____/_____ *Coder #*:_____ *Case ID#:* _____

**Lead Investigator*:_____ *ME Case #*:_____

**Date Occurred*: ___/___/_____ *Time of Day*: _____(military time)

Address: _____

_____ Zip Code:_____ **Beat*: _____

*Number Killed:*_____ Open / Closed *Number Wounded*: _____

Information: Subject #1

☐**Victim** ☐**Witness/Involved Party** ☐**Offender**

If Offender, Role: Shooter Combatant Look-out Driver

Name:_____AKA:_____

Address:_____

_____Zip Code:_____ *Beat*: _____

Gender: M/ F/ O / U *Race:* B/ W/ H/ A/ Other

DOB: ____/_____/_____ *Age at Incident:*_____

Cause of Death [Medical Examiner's Report]:
Poison Bled Out Internal Bleeding Broken Spine/Neck Drowned

Affixation Burns Organ Failure Pre-existing condition Other_____

Manner of Death [Medical Examiner's Report]/ Injury:

Homicide Self-Inflicted Accidental Assault Undetermined

Other_____

*Number of **Current** Arrests Related To [GCIC/ICIS Database]: Date Arrested:__/__/___*

Gangs ____ Violence: ____ Property:_____ Public Order:____

Other: _____ Drug Possession _____ Drug Distribution _____

Known Criminal Involvement: Subject #1

TO REDUCE ERROR: PLEASE LOOK AT DATES

Prior Criminal Record: Yes No Unknown

Prior Arrests: Yes No *Number*: _____

*Number of Charges **Prior to this Incident** Related To [GCIC/ICIS Database]:*

Gun____ Gangs ____ Violence: ____ Property:____ Public Order:____

Probation/Parole ___ Other: ___ Drug Possession ____ Drug Distribution ___

Multistate Arrestee: Yes No *Number*: _____
Prior Convictions: Yes No *Number*: _____

Number of Total Conviction charges Related To [GCIC Database]:

Gun____ Gangs ____ Violence: ____ Property:_____ Public Order:____

Probation/Parole ___ Other: ____ Drug Possession ___ Drug Distribution ___

Criminal Justice Status at Time of Offense [criminal history or driving record on GCIC]:

Inactive Probation Parole Pretrial Release Other:_____

Prior Criminal Justice Status (circle all that apply) [GCIC]:

None Prison Jail Probation Parole Other:_____

Gang Affiliation *(ICIS Database or Homicide Spreadsheet)*:

Member: Known Suspected *Leadership Role*: YES / NO / UNK

Associate: Known Suspected *Zone of Central Operation*:_____

Name of Gang:_____

Identifying Marks (tally) *(GCIC Database or Medical Examiner's Report):*:

Gang Tattoo____ Other Tattoo____ Brand____

Gang Paraphernalia____ Scar____ Other____

Drug/Alcohol in System (circle all that apply) [Medical Examiner's Report: Toxicology]:

YES / NO / UNKNOWN

If yes, specify:_____

If yes, specify:_____

If yes, specify:_____

Information: Subject #2

☐Victim ☐Witness/Involved Party ☐Offender

If Offender, Role: Shooter Combatant Look-out Driver

Name:_____AKA:_____

Address:_____

_____Zip Code:_____ *Beat*: _____

Gender: M/ F/ O / U *Race:* B/ W/ H/ A/ Other

DOB: ____/_____/_____ *Age at Incident:*_____

Cause of Death [Medical Examiner's Report]:

Poison Bled Out Internal Bleeding Broken Spine/Neck Drowned

Affixation Burns Organ Failure Pre-existing condition Other_____

Manner of Death [Medical Examiner's Report]/ Injury:

Homicide Self-Inflicted Accidental Assault Undetermined

Other_____

*Number of **Current** Arrests Related To [GCIC/ICIS Database]: Date Arrested:__/__/___*

Gangs ____ Violence: ____ Property:_____ Public Order:____

Other: _____ Drug Possession _____ Drug Distribution _____

Known Criminal Involvement: Subject #2

TO REDUCE ERROR: PLEASE LOOK AT DATES

Prior Criminal Record: Yes No Unknown

Prior Arrests: Yes No *Number*: _____

*Number of Charges **Prior to this Incident** Related To [GCIC/ICIS Database]:*

Gun____ Gangs ____ Violence: ____ Property:_____ Public Order:____

Probation/Parole ___ Other: ____ Drug Possession ___ Drug Distribution ___

Multistate Arrestee: Yes No *Number*: _____

Prior Convictions: Yes No *Number*: _____

Number of Total Conviction charges Related To [GCIC Database]:

Gun____ Gangs ____ Violence: ____ Property:_____ Public Order:____

Probation/Parole ___ Other: ____ Drug Possession ___ Drug Distribution ___

Criminal Justice Status at Time of Offense [criminal history or driving record on GCIC]:

Inactive Probation Parole Pretrial Release Other:_____

Prior Criminal Justice Status (circle all that apply) [GCIC]:

None Prison Jail Probation Parole Other:_____

Gang Affiliation *(ICIS Database or Homicide Spreadsheet)*:

Member: Known Suspected *Leadership Role*: YES / NO / UNK

Associate: Known Suspected *Zone of Central Operation*:_____

Name of Gang:_____

Identifying Marks (tally) *(GCIC Database or Medical Examiner's Report):*:

Gang Tattoo____ Other Tattoo____ Brand____

Gang Paraphernalia____ Scar____ Other____

Drug/Alcohol in System (circle all that apply) [Medical Examiner's Report: Toxicology]:

YES / NO / UNKNOWN

If yes, specify:_____

If yes, specify:_____

If yes, specify:_____

Information: Subject #3

☐Victim ☐Witness/Involved Party ☐Offender

If Offender, Role: Shooter Combatant Look-out Driver

Name:_____AKA:_____

Address:_____

_____Zip Code:_____ *Beat*: _____

Gender: M/ F/ O / U *Race:* B/ W/ H/ A/ Other

DOB: ____/_____/_____ *Age at Incident:*_____

Cause of Death [Medical Examiner's Report]:

Poison Bled Out Internal Bleeding Broken Spine/Neck Drowned

Affixation Burns Organ Failure Pre-existing condition Other_____

Manner of Death [Medical Examiner's Report]/ Injury:

Homicide Self-Inflicted Accidental Assault Undetermined

Other_____

*Number of **Current** Arrests Related To [GCIC/ICIS Database]: Date Arrested:__/__/___*

Gangs ____ Violence: ____ Property:_____ Public Order:____

Other: _____ Drug Possession _____ Drug Distribution _____

Known Criminal Involvement: Subject #3

TO REDUCE ERROR: PLEASE LOOK AT DATES

Prior Criminal Record: Yes No Unknown

Prior Arrests: Yes No *Number*: _____

*Number of Charges **Prior to this Incident** Related To [GCIC/ICIS Database]:*

Gun____ Gangs ____ Violence: ____ Property:_____ Public Order:____

Probation/Parole ___ Other: ____ Drug Possession ___ Drug Distribution ____

Multistate Arrestee: Yes No *Number*: _____

Prior Convictions: Yes No *Number*: _____

Number of Total Conviction charges Related To [GCIC Database]:

Gun____ Gangs ____ Violence: ____ Property:_____ Public Order:____

Probation/Parole ____ Other: ____ Drug Possession ___ Drug Distribution ____

Criminal Justice Status at Time of Offense [criminal history or driving record on GCIC]:

Inactive Probation Parole Pretrial Release Other:_____

Prior Criminal Justice Status (circle all that apply) [GCIC]:

None Prison Jail Probation Parole Other:_____

Gang Affiliation *(ICIS Database or Homicide Spreadsheet)*:

Member: Known Suspected *Leadership Role*: YES / NO / UNK

Associate: Known Suspected *Zone of Central Operation*:_____

Name of Gang:_____

Identifying Marks (tally) *(GCIC Database or Medical Examiner's Report):*:

Gang Tattoo____ Other Tattoo____ Brand____

Gang Paraphernalia____ Scar____ Other____

Drug/Alcohol in System (circle all that apply) [Medical Examiner's Report: Toxicology]:

YES / NO / UNKNOWN

If yes, specify:_____

If yes, specify:_____

If yes, specify:_____

Information: Subject #4

☐Victim ☐Witness/Involved Party ☐Offender

If Offender, Role: Shooter Combatant Look-out Driver

Name:_____AKA:_____

Address:_____

_____Zip Code:_____ *Beat*: _____

Gender: M/ F/ O / U *Race:* B/ W/ H/ A/ Other

DOB: ____/_____/_____ *Age at Incident:*_____

Cause of Death [Medical Examiner's Report]:

Poison Bled Out Internal Bleeding Broken Spine/Neck Drowned

Affixation Burns Organ Failure Pre-existing condition Other_____

Manner of Death [Medical Examiner's Report]/ Injury:

Homicide Self-Inflicted Accidental Assault Undetermined

Other_____

*Number of **Current** Arrests Related To [GCIC/ICIS Database]: Date Arrested:__/__/___*

Gangs ____ Violence: ____ Property:_____ Public Order:____

Other: _____ Drug Possession _____ Drug Distribution _____

Known Criminal Involvement: Subject #4

TO REDUCE ERROR: PLEASE LOOK AT DATES

Prior Criminal Record: Yes No Unknown

Prior Arrests: Yes No *Number*: _____

*Number of Charges **Prior to this Incident** Related To [GCIC/ICIS Database]:*

Gun____ Gangs ____ Violence: ____ Property:_____ Public Order:____

Probation/Parole ___ Other: ____ Drug Possession ____ Drug Distribution ___

Multistate Arrestee: Yes No *Number*: _____

Prior Convictions: Yes No *Number*: _____

Number of Total Conviction charges Related To [GCIC Database]:

Gun____ Gangs ____ Violence: ____ Property:_____ Public Order:____

Probation/Parole ___ Other: ____ Drug Possession ____ Drug Distribution ___

Criminal Justice Status at Time of Offense [criminal history or driving record on GCIC]:

Inactive Probation Parole Pretrial Release Other:_____

Prior Criminal Justice Status (circle all that apply) [GCIC]:

None Prison Jail Probation Parole Other:_____

Gang Affiliation *(ICIS Database or Homicide Spreadsheet)*:

Member: Known Suspected *Leadership Role*: YES / NO / UNK

Associate: Known Suspected *Zone of Central Operation*:_____

Name of Gang:_____

Identifying Marks (tally) *(GCIC Database or Medical Examiner's Report):*:

Gang Tattoo____ Other Tattoo____ Brand____

Gang Paraphernalia____ Scar____ Other____

Drug/Alcohol in System (circle all that apply) [Medical Examiner's Report: Toxicology]:

YES / NO / UNKNOWN

If yes, specify:_____

If yes, specify:_____

If yes, specify:_____

Information: Subject #5

☐**Victim** ☐**Witness/Involved Party** ☐**Offender**

If Offender, Role: Shooter Combatant Look-out Driver

Name:_____AKA:_____

Address:_____

_____Zip Code:_____ *Beat*: _____

Gender: M/ F/ O / U *Race:* B/ W/ H/ A/ Other

DOB: ____/_____/_____ *Age at Incident:*_____

Cause of Death [Medical Examiner's Report]:

Poison Bled Out Internal Bleeding Broken Spine/Neck Drowned

Affixation Burns Organ Failure Pre-existing condition Other_____

Manner of Death [Medical Examiner's Report]/ Injury:

Homicide Self-Inflicted Accidental Assault Undetermined

Other_____

*Number of **Current** Arrests Related To [GCIC/ICIS Database]: Date Arrested:__/__/___*

Gangs ____ Violence: ____ Property:_____ Public Order:____

Other: _____ Drug Possession _____ Drug Distribution _____

Known Criminal Involvement: Subject #5

TO REDUCE ERROR: PLEASE LOOK AT DATES

Prior Criminal Record: Yes No Unknown

Prior Arrests: Yes No *Number*: _____

*Number of Charges **Prior to this Incident** Related To [GCIC/ICIS Database]:*

Gun____ Gangs ____ Violence: ____ Property:_____ Public Order:____

Probation/Parole ____ Other: ____ Drug Possession ___ Drug Distribution ___

Multistate Arrestee: Yes No *Number*: _____

Prior Convictions: Yes No *Number*: _____

Number of Total Conviction charges Related To [GCIC Database]:

Gun____ Gangs ____ Violence: ____ Property:_____ Public Order:____

Probation/Parole ___ Other: ___ Drug Possession ____ Drug Distribution ___

Criminal Justice Status at Time of Offense [criminal history or driving record on GCIC]:

Inactive Probation Parole Pretrial Release Other:_____

Prior Criminal Justice Status (circle all that apply) [GCIC]:

None Prison Jail Probation Parole Other:_____

Gang Affiliation *(ICIS Database or Homicide Spreadsheet)*:

Member: Known Suspected *Leadership Role*: YES / NO / UNK

Associate: Known Suspected *Zone of Central Operation*:_____

Name of Gang:_____

Identifying Marks (tally) *(GCIC Database or Medical Examiner's Report):*:

Gang Tattoo____ Other Tattoo____ Brand____

Gang Paraphernalia____ Scar____ Other____

Drug/Alcohol in System (circle all that apply) [Medical Examiner's Report: Toxicology]:

YES / NO / UNKNOWN

If yes, specify:_____

If yes, specify:_____

If yes, specify:_____

Incident Details

Type of Location (*circle all that apply*) [Narrative or ICIS Database]**:**

Victim's Home (Inside/Outside) Suspect's Home (Inside/Outside) Other's Residence: (Inside/Outside) _____

Bar Street/lot Auto Park Retail

Hospital School Cemetery Occupied Building

Empty Building Secluded Area Hotel Other:_____

Known Drug Locale: YES / NO Known Gang Locale: YES / NO

Prior to Day of Incident, Would Victim Have Recognized Defendant
[Narrative or ICIS Database]**:** YES / NO / UNKNOWN If YES, how:

1. Family: YES / NO Relationship: _____

2. Other Close Relationship:

Child's Boyfriend/Girlfriend	Babysitter	Friends	Childhood Friends
Cohabitant/Roommate	Lover/Spouse	Estranged	Rival

3. Romantic Relationship: YES / NO

4. Non-Intimate Friendship:

   Neighbors Community Involvement Other :_____

5. Legitimate Business Relationship:

   Co-Worker Landlord/Tenant Partner Other:_____

6. Marketing of Narcotics:

   Dealer User/Buyer Co-worker Competitor Other: _____

7. Prostitution Related:

   Pimp Prostitute Client Other: _____

8. Gang Relationship:

   Same Rival Allied Recruit Recruiter Other:_____

9. Stranger Relationship:

   Law Officer Security Guard Victim Witness/Defendant Felon

   Hate Crime Bystander Media Random Target F.O.A.F.

   Mistaken ID Other:_____

10. OTHER:_____

History of Confrontation between Victim-Defendant? [Narrative]:YES/NO/Unknown

If YES, was the feud related to any of the following **(*circle all that apply*)**:

Drug Dealing	Drug Robbery	Other Robbery	Business dealing
Theft by Defendant	Theft by Victim	Individual dispute	Group dispute
Retaliation	Sudden dispute	Mental	Domestic violence
Insult/Words	Unk	Racial/Ethnicity Clash	Romantic Relationship

Other:_____

Did the Above Contribute Directly to This Homicide/Assault: YES NO Unknown

Primary Event to Initiate Incident (*circle all that apply*)**:**

Verbal Insult	Physical Altercation	Weapon Brandished	Threat Response
Other: _____			Unknown

Who initiated the incident? (*circle all that apply* & insert subject #)**:**

Suspect Victim Witness Other UKN

Mutual: Subject#_____-AND- Subject#_____

Social Circumstances Surrounding Current Incident (*circle all that apply*) [Narrative or ICIS]:

Drug Dealing	Love Interest	Business Dealing	Theft by Defendant
Theft by Victim	Gang Related	Redress of Insult	Matter of Opinion
Racial/Ethnic Clash	Domestic Violence	Barroom Dispute	Legitimate Recreation
Illegitimate Rec.	Drug/Alcohol Use	Random Encounter	Other:_____

Personal Motive for this Act Would Best be Noted as(*circle all that apply*)[Narrative]**:**

Drug Related Gang Related Domestic Violence Robbery Burglary

Hate Crime Other Felony Mistaken Identity Random Killing Escalation

Retaliation Unknown Illicit sex OTHER:_____

Weapons Report

Weapon(s) Used by Arrestee/Suspect (*circle all that apply*) [Narrative or ICIS]:

Revolver Pistol Shotgun Long Gun Assault Rifle Knife

Drugs Fire Auto Sharp Object Blunt Object

Hands/Feet Unknown Gun Other: _____

If Firearm:

1. Make:_____ Model:_____

   Caliber: _____ Serial #:_____

2. Make:_____ Model:_____

   Caliber: _____ Serial #:_____

3. Make:_____ Model:_____

   Caliber: _____ Serial #:_____

4. Make:_____ Model:_____

   Caliber: _____ Serial #:_____

Was Victim in Possession of a Weapon? [Narrative or ICIS]:YES /NO/UNKNOWN

Revolver Pistol Shotgun Long Gun Assault Rifle Knife

Drugs Fire Auto Sharp Object Blunt Object

Hands/Feet Unknown Gun Other: _____

If Firearm:

1. Make:_____ Model:_____

   Caliber: _____ Serial #:_____

2. Make:_____ Model:_____

   Caliber: _____ Serial #:_____

3. Make:_____ Model:_____

   Caliber: _____ Serial #:_____

Evidence Report

*Forms of Evidence Collected***? (*circle all that apply)*** [Narrative or ICIS]:

Witness Statement	Phone Records	Finger Print(s)	Crime Scene Video
Crime Scene Photo	Other Video	Victim Testimony	3rd Party Testimony
Fibers	Other Bodily Fluids	DNA Object	Impression(s)
Blood	Confession	Weapon	Vehicle
GSR	Body	Clothing	Hair
Anonymous Tip	Financials	Projectile	Shell Casing(s)
Drugs	Bullet	Other:_____	

Forms of Evidence were Processed? **(*circle all that apply)*** [Narrative or ICIS]:

Witness Statement	Phone Records	Finger Print(s)	Crime Scene Video
Crime Scene Photo	Other Video	Victim Testimony	3rd Party Testimony
Fibers	Other Bodily Fluids	DNA Object	Impression(s)
Blood	Confession	Weapon	Vehicle
GSR	Body	Clothing	Hair
Anonymous Tip	Financials	Projectile	Shell Casing(s)
Drugs	Bullet(s)	Other:_____	

Types of Evidence that had/have Evidentiary Value? ***(circle all that apply)*** [Narrative or ICIS]:

Witness Statement	Phone Records	Finger Print(s)	Crime Scene Video
Crime Scene Photo	Other Video	Victim Testimony	3rd Party Testimony
Fibers	Other Bodily Fluids	DNA Object	Impression(s)
Blood	Confession	Weapon	Vehicle
GSR	Body	Clothing	Hair
Anonymous Tip	Financials	Projectile	Shell Casing(s)
Drugs	Bullet(s)	Other: _____	

Vehicle Information:

Subject#____YR:__Make:_____Model:_____Color:____State:___Plate:_____

Subject#____YR:__Make:_____Model:_____Color:____State:___Plate:_____

Subject#____YR:__Make:_____Model:_____Color:____State:___Plate:_____

Incident Group/Gang Member Involvement (GMI)

GMI Likely GMI Non-GMI

Category:

Notes:_____

_____

_____

_____

_____

Information: Subject #_____ Case#_____

☐**Victim** ☐**Witness/Involved Party** ☐**Offender**

If Offender, Role: Shooter Combatant Look-out Driver

Name:_____AKA:_____

Address:_____

_____Zip Code:_____ *Beat*: _____

Gender: M/ F/ O / U *Race:* B/ W/ H/ A/ Other

DOB: ____/_____/_____ *Age at Incident:*_____

Cause of Death [Medical Examiner's Report]:

Poison Bled Out Internal Bleeding Broken Spine/Neck Drowned

Affixation Burns Organ Failure Pre-existing condition Other_____

Manner of Death [Medical Examiner's Report]/ Injury:

Homicide Self-Inflicted Accidental Assault Undetermined

Other_____

*Number of **Current** Arrests Related To [GCIC/ICIS Database]: Date Arrested:__/__/___*

Gangs ____ Violence: ____ Property:_____ Public Order:____

Other: _____ Drug Possession _____ Drug Distribution _____

Known Criminal Involvement: Subject #__

TO REDUCE ERROR: PLEASE LOOK AT DATES

Prior Criminal Record: Yes No Unknown

Prior Arrests: Yes No *Number*: _____

*Number of Charges **Prior to this Incident** Related To [GCIC/ICIS Database]:*

Gun____ Gangs ____ Violence: ____ Property:_____ Public Order:____

Probation/Parole ____ Other: ____ Drug Possession ____ Drug Distribution ___

Multistate Arrestee: Yes No *Number*: _____

Prior Convictions: Yes No *Number*: _____

Number of Total Conviction charges Related To [GCIC Database]:

Gun____ Gangs ____ Violence: ____ Property:_____ Public Order:____

Probation/Parole ___ Other: ___ Drug Possession _____ Drug Distribution ___

Criminal Justice Status at Time of Offense [criminal history or driving record on GCIC]:

Inactive Probation Parole Pretrial Release Other:_____

Prior Criminal Justice Status (circle all that apply) [GCIC]:

None Prison Jail Probation Parole Other:_____

Gang Affiliation *(ICIS Database or Homicide Spreadsheet)*:

Member: Known Suspected *Leadership Role*: YES / NO / UNK

Associate: Known Suspected *Zone of Central Operation*:_____

Name of Gang:_____

Identifying Marks (tally) *(GCIC Database or Medical Examiner's Report)*:

Gang Tattoo____ Other Tattoo____ Brand____

Gang Paraphernalia____ Scar____ Other____

Drug/Alcohol in System (circle all that apply) [Medical Examiner's Report: Toxicology]:

YES / NO / UNKNOWN

If yes, specify:_____

If yes, specify:_____

If yes, specify:_____

Appendix IV: Subject Data Collected

Role:
victim, witness/involved party, offender, or combination

If offender, role:
shooter, combatant, look-out, or driver

Personal info:
name, aka, address, beat of address, gender, race, DOB, age at incident

If victim, COD:
poison, bled out, internal bleeding, broken spine/neck, burns, affixation, drowned, organ failure, pre-existing condition, or other explained

Manner of death:
homicide, assault, accidental, self-inflicted, undetermined, or other

Related arrests:
date and type (gang, violence, property, public order, drug possession, drug distribution or other)

Prior CH record:
yes, no, or unknown

Prior arrests:
yes, no, or unknown, type, and amount

Prior convictions:
yes, no, or unknown, type, and amount

Gang affiliation:
member (known or suspected), associate (known or suspected), leadership role (yes, no, or unknown), zone of central operation, name of gang

Identifying marks:
gang tattoos, other tattoos, brand, gang paraphernalia, scar, other

Drug/alcohol:
yes (specify), no, or unknown

Appendix V: Incident Data Collected

Location: date, address, zone, time of day,

Location type:
victim's home, school, park, hospital, bar, auto, retail, hotel, drug locale, street/lot, secluded area, cemetery, other, gang locale, drug locale, suspect's home, occupied building, other's residence, or empty building

Victim/offender relationship:
family & type, other close relationship (child's boy/girlfriend, babysitter, friends, childhood friends, cohabitant/roommate, lover/spouse, estranged, rival), romantic relationship, non-intimate others (neighbors, community involvement, other), legitimate business(co-worker, landlord/tenant, partner, other), marketing of narcotics (dealer, user/buyer, co-worker, competitor, other), prostitution related (pimp, prostitute, client, other), gang relationship (same, rival, allied, recruit /recruiter, other), stranger relationship (law officer, security guard, victim, witness/defendant, felon, hate crime, bystander, media, random target, friend of a friend, mistaken identity, other) or other

Confrontation between victim/offender:
dealing drugs, drug robbery, other robbery, business dealing, theft by defendant, theft by victim, individual dispute, group dispute, retaliation, sudden dispute, mental, domestic violence, insult/words, unknown, romantic relationship, or racial/ethnicity clash

Did the above contribute directly to this homicide: Yes, no, or unknown

Primary event to initiate incident:
verbal insult, physical altercation, weapon brandished, threat response, other, unknown

Who initiated the incident: suspect, mutual, victim, witness, other , or unknown

Social circumstances surrounding current incident:
drug dealing, love interest, business dealing, theft by defendant, theft by victim, gang related, redress of insult, matter of opinion, racial/ethnic clash, domestic violence, barroom dispute, legitimate recreation, illegitimate recreation, drug/alcohol use, random encounter, or other

Personal motive:
drug related, gang related, domestic violence, robbery, burglary, hate crime, other felony, mistaken identity, random killing, escalation, retaliation, illicit sex

Appendix VI: Evidence Data Collected

Collected, processed, and/or of evidentiary value:

Witness statement	Vehicle
Phone records	GSR
Prints	Body
Video	Clothing
Photo	Hair
Other Video	Tip
Victim testimony	Financial
Fibers	Projectile
Bodily fluids	Shell Casings
DNA	Drugs
Impression	Bullets
Blood	Electronics
Confession	Other explained
Weapon	

Appendix VII: IRB Approval

INSTITUTIONAL REVIEW BOARD

Mail: P.O. Box 3999
Atlanta, Georgia 30302-2999
Phone: 404/413-3500
Fax: 404/413-3504

In Person: Dahlberg Hall
30 Courtland St, Suite 217

April 14, 2014
Principal Investigator: [redacted]
Study Department: GSU - Georgia State University
Study Title: [redacted] Critical Incident Review
Funding Agency: Emory Center for Injury Control (ECIC)
Review Type: Expedited Amendment
IRB Number: H11291, Reference Number: 326375

Approval Date: 02/05/2014
Expiration Date: 02/04/2015
Amendment Effective Date: 04/14/2014

The Georgia State University Institutional Review Board reviewed and **approved** the amendment to your above referenced Study.
This amendment is approved for the following modifications:

- Students that are no longer working on this research were removed
- In addition to the collected data from critical incident case files in this study, each of the 30 detectives who investigated a homicide during 2009, 2010, & 2011 will be asked to review the templates and take an follow-up exit survey. All corresponding fields about human subjects and methods have been changed accordingly
- The project funding has been changed from yes to no
- An informed consent has been added
- A follow-up survey on case solvability factors has been added

The amendment does not alter the approval period which is listed above and the study must be renewed at least 30 days before the expiration date if research is to continue beyond that time frame. Any unanticipated/adverse events or problems resulting from this investigation must be reported immediately to the University Institutional Review Board.

For more information visit our website at www.gsu.edu/irb.

Sincerely,

[redacted], IRB Chair

[redacted]

Federal Wide Assurance Number: 00000129

Appendix VIII: Investigator Specific Case Summary Tables Example

Count	Case #	Date	Time	Beat	Location	Victim	Offender	Incident
1	000000000	Mm/dd/yyyy	0000	000	Address	Last, First (age, sex, age)	Last, First (age, sex, age)	• Closed Blunt force trauma to head • School • Robbery
2	000000000	Mm/dd/yyyy	0000	000	Address	Last, First (age, sex, age)	Last, First (age, sex, age)	• Open • Found in a vehicle in the parking lot of a Texaco • GSW to torso • Delayed death

Appendix IX: Interview and Survey Informed Consent

Georgia State University, Andrew Young School of Policy Studies
Department of Criminal Justice and Criminology

INFORMED CONSENT FORM FOR SOCIAL SCIENCE RESEARCH

Title: "Critical Incident Review Study Follow-up"

Principal Investigator: Dr. [redacted], Associate Professor
Georgia State University, Department of Criminal Justice,
P.O. Box 4018, Atlanta, Georgia 30302

I. Purpose:
You are invited to take part in a research study, along with 30 other detectives. The purpose of the study is to confirm previously collected homicide file data. You will be asked to note the key factors that led to solving or not solving each case. You are being asked to participate because you are or were the lead investigator on at least one 2009, 2010, or 2011 homicide case. The goal is to speak with each investigator about their caseload over this period. We will spend roughly 15 minutes confirming the details of each case. That is to say, the case review portion of this project could take anywhere from 15 minutes to multiple hours depending on how many cases you were lead. You will also be asked to confirm information from each case file and update on new developments. Afterwards, you will be given a follow-up survey. The survey is interested in factors that help or hinder solving homicide cases. The survey will take about 15 minutes to complete. In other words, the total length of your participation in this study will vary from other detectives' as it depends on your individual experiences. This study will be conducted between March 2014 and July 2015. Your participation is voluntary and appreciated.

II. Procedures:
If you decide to participate, you will be asked to allow the conversation to be voice recorded. The recorder will be on while discussing both the homicide case data templates and the follow-up survey. If you do not want to be recorded, you have that option and can still participate. The recordings are merely for back-up, thus change nothing else about your rights as a participant in this study. This effort will take place over the course of a single shift assignment. It will be at a time and place convenient to you as is designed to interfere as little as possible with your daily work duties. All information will be collected, handled, and protected by a trained researcher.

III. Risks:
In this study, you will not have any more risks than you would in a normal day of life. You may decline to answer any question that makes you uncomfortable.

IV. Benefits:

Participation in this study will not benefit you personally. We hope to gain information that will help reduce crime by improving criminal justice policies and practices. Research findings will be available to anyone upon request.

V. Voluntary Participation and Withdrawal:

Participation in research is voluntary and will not be reported. You do not have to be in this study and your decline with not affect your job status. Additionally, you can skip question and/or can stop participating at any time.

VI. Confidentiality:

We will keep your interview private to the extent allowed by law. The details of the conversation will not be shared with co-workers or supervisors. Specifically, APD will not know whether you participate or not. Only the research team, members of the Georgia State University (GSU) Institutional Review Board, and/or the Office for Human Research Protection (OHRP) will have access to the information you provide. The information you provide will be stored in a locked filing cabinet. The cabinet will be housed in a private office. This office will be in the Department of Criminal Justice and Criminology at Georgia State University. Your name and other facts that might point to you will not appear when we present this study or publish its results. The findings will be summarized and reported in group form. You will not be personally identified in result dissemination. The number at the top of your survey will be used instead of names or badge numbers.

VII. Contact Persons:

Contact Dr. [redacted] at 404.[redacted] or [redacted]@gsu.edu if you have questions, concerns, or complaints about this study. You can also call if you think you have been harmed by the study. Call [redacted] in the Georgia State University Office of Research Integrity at 404-413-3513 or [redacted]@gsu.edu if you want to talk to someone who is not part of the study team. You can talk about questions, concerns, offer input, obtain information, or suggestions about the study. You can also call [redacted] if you have questions or concerns about your rights in this study.

VIII. Copy of Consent Form to Subject:

You will be given a copy of this informed consent to keep.

If you are willing to volunteer for this research , please sign below.

_____ _____, 2014

Participant Date

_____ _____, 2014

Principal Investigator or Researcher Obtaining Consent Date

Appendix X: Critical Incident Review Project: Follow-up Survey

Georgia State University, Department of Criminal Justice and Criminology
Critical Incident Review Project: Follow-up Survey

The purpose of this survey is to supplement the critical incident review project data—a research project that included 2009 to 2011 homicide file data. There are 50 questions which should take approximately 15 minutes of your time. There is no penalty for not completing this survey; it is absolutely voluntary. You are free to skip any questions you deem problematic. All participation is greatly appreciated. Please check the appropriate box or write in answers as each question dictates. If you have any questions or concerns about this survey and/or the study, feel free to contact Dr. [redacted] at 404.[redacted] or [redacted]@gsu.edu. Thank you so much!

Survey #_____ Date:_____

Atlas Cases Reviewed _____

1. Do you live in city limits? □ Yes □ No
2. How long have you worked for this department? _____years _____months
3. How long is your tenure as a Homicide Detective? _____years _____months
4. Are you still a Homicide Detective? □ Yes □ No
5. What (other) assignment(s)/role(s) are you serving currently, such as SWAT, Cold Case, and/or Fugitive?
   _____
   _____
6. Which watch are you currently assigned? □ Day watch □ Evening watch
7. When did you start working this watch? _____Month, _____Year
8. Did you receive any training specific to being a homicide detective, either before or after your transfer? □ Yes □ No
9. On average, how many investigators help on a crime scene? _____
10. Generally speaking, do you think the administrative oversight in the unit is:
    □ Not enough? □ Just about right? □ Too much?
11. Do you regularly work an extra job? □ Yes □ No

12. Would you like more teamwork among investigators to occur?
    □ Yes □ No

13. Generally, are you pleased with the departmental resources available to you when working cases? □ Yes □ No

14. Please list any resources you would like to be more available from the department:
    _____
    _____

15. Do you feel that decisions at police departments are
    made fairly? □ Yes □ No
    in your best interest? □ Yes □ No
    made based on the best available information? □ Yes □ No
    consistent across cases and investigators? □ Yes □ No

16. Do you personally diagram all of your crime scenes? □ Yes □ No

17. Do you think the 5/15/30/45/60/etc. file reviews are helpful? □ Yes □ No

18. On a scale from 1 (not at all satisfied) to 5 (extremely satisfied), generally how satisfied with your job would you say you are?
    - □ 1: I am not at all satisfied with being a police officer
    - □ 2: Somewhat unsatisfied
    - □ 3: Indifferent/neutral
    - □ 4: Somewhat satisfied
    - □ 5: I am extremely satisfied with being a police officer

19. On a scale from 1 (not at all satisfied) to 5 (extremely satisfied), generally how satisfied with working in this department would you say you are?
    - □ 1: I am not at all satisfied with working at APD
    - □ 2: Somewhat unsatisfied
    - □ 3: Indifferent/neutral
    - □ 4: Somewhat satisfied
    - □ 5: I am extremely satisfied with working at APD

20. Have you ever worked for another police department? □ Yes □ No

21. What information systems do you regularly use when working cases?
    _____
    _____
    _____

22. Do you prefer to approach your homicide casework using more of a team or individualistic orientation? □ Individual □ Team

23. Do you normally work on □ Less than 3 cases at a time or □ More than 3?

24. Based on your experience, what is the maximum number of cases that you can effectively work in a calendar year? _____ cases

25. How often do you share/receive information from the following:
(Please check the appropriate box per entity type.)

	Not often	Somewhat often	Very often
Patrol Officers			
Homicide Investigators			
Homicide Supervisors			
Other Investigative units			
Other local/state agencies			
Federal Agencies			

26. Do you regularly run criminal history checks on the following people in your cases?

	Never	Rarely	Mostly	Always
Victim				
Suspect				
Involved Party				
Witness				
Family				
Associates				

27. Do you typically interview at least one member of the victim's family? □ Yes □ No

28. Do you typically interview at least one friend to the victim? □ Yes □ No

29. In your opinion, what are the characteristics of a neighborhood that might increase or decrease case solvability?

Increase: _____
_____
Decrease:_____
_____

30. In your opinion, what are some characteristics of a crime scene increase or decrease case solvability?

    Increase: _____
    _____
    Decrease:_____
    _____

31. In general, how important do you think interviewing the following people ranks in solving a case? (Check one of the following categories for each type of person below.)

	Inconsequential	Helpful	Important	Critical
Offender				
Witnesses				
Involved Parties				
Family				
Friends				
Neighbors				
Acquaintances				

32. In general, how willing are the following people to cooperate with in a homicide investigation? (Check one of the following categories for each type of person below)

	Never willing	Sometimes willing	Generally willing	Mostly willing	Always willing
Offender					
Witnesses					
Involved Parties					
Family					
Friends					
Neighbors					
Acquaintances					

33. Do you think any of the above case factors are more prevalent in this jurisdiction than elsewhere, thus helping increase the department's homicide clearance rate?

    ☐ Yes ☐ No

    Explain:_____
    _____
    _____

34. Generally, do you think the public respects the police? □ Yes □ No

35. In general, do you regularly update victims' families regarding the status of an investigation? □ Yes □ No

36. In general, do you think it is better to share or withhold information from subjects during formal case interviews?
□ Withhold information □ Share information

37. Do you regularly canvas a neighborhood(s) for information regarding a homicide(s) during a case investigation? □ Yes □ No

38. All things equal, where do you prefer to conduct interviews?
□ Inside of your department □ Outside of your department

39. How often do you work with community leaders and/or service providers to solve cases?
□ Never □ Rarely □ Frequently □ All cases

40. In general, do you think the media hinders or helps in your investigations?
□ Hinders □ Helps

41. On average, what is the probability of solving homicide cases for each motive below? (Check one of the following categories for each type of motive below.)

	None	Low	Moderate	High
Romantic				
Money				
Drugs				
Gang				
Crime				
Unknown				

42. What are the 3 most important things that enhance case solvability?
1. _____
2. _____
3. _____

43. What are the 3 biggest things that impede case solvability?
1. _____
2. _____
3. _____

44. What is the highest degree you have earned?

- □ High School or GED
- □ Certification or advanced training
- □ Bachelor's Degree
- □ Master's Degree
- □ Law Degree
- □ Doctorate Degree

If you went to college, please list all degree majors obtained:

_____

45. What year did you obtain your highest degree? _____

46. As of today, how old are you? _____years

47. Have you served in the military? □ Yes □ No

48. How would you describe your racial/ethnic background; that is, which group(s) describes you best:

- □ White or Caucasian
- □ Black or African American
- □ Hispanic or Latino/a
- □ Asian
- □ American Indian, Alaska Native, Native Hawaiian, or Other Pacific Islander
- □ Other, please specify:

  _____

49. What is your gender? □ Female □ Male

The last question, #50, is on the next/last page.

50. For each of the detectives listed below, indicate the level of confidence you would have in them to clear a “who-done-it” case involving the death of a close friend or loved one (wherein you are not a suspect)?

Please circle the appropriate rank (*excluding those you have not worked with and yourself*) between **1 = extremely low confidence** & **5 = extremely high confidence**

[redacted]	1	2	3	4	5
[redacted]	1	2	3	4	5
[redacted]	1	2	3	4	5
[redacted]	1	2	3	4	5
[redacted]	1	2	3	4	5
[redacted]	1	2	3	4	5
[redacted]	1	2	3	4	5
[redacted]	1	2	3	4	5
[redacted]	1	2	3	4	5
[redacted]	1	2	3	4	5
[redacted]	1	2	3	4	5
[redacted]	1	2	3	4	5
[redacted]	1	2	3	4	5
[redacted]	1	2	3	4	5
[redacted]	1	2	3	4	5
[redacted]	1	2	3	4	5
[redacted]	1	2	3	4	5
[redacted]	1	2	3	4	5
[redacted]	1	2	3	4	5
[redacted]	1	2	3	4	5
[redacted]	1	2	3	4	5
[redacted]	1	2	3	4	5
[redacted]	1	2	3	4	5
[redacted]	1	2	3	4	5
[redacted]	1	2	3	4	5
[redacted]	1	2	3	4	5
[redacted]	1	2	3	4	5
[redacted]	1	2	3	4	5
[redacted]	1	2	3	4	5
[redacted]	1	2	3	4	5

You have completed the survey. Thank you for your time!

If you have any comment or additions, please use the back of this page to explain.

Appendix XI: Bivariate Statistics Explained

Tables 4a and 4b present the two-tailed bivariate correlations of all the possible variables considered as predictors of case clearances in this study. Pearson correlation coefficients and significance values for the significant relationships follow a list of the measures not associated with case outcomes in each subsection below for all cases and the whodunit subsample. Those are represented on a negative-one to one scale, with values closer to zero being a weaker relationship. Then the measures considered for multivariate analyses were further explored using cross-tabs for categorical variables and independent samples t-tests for continuous measures. The Chi-squares and t-values are included accordingly.

Involved Subjects. Not all of the involved subjects measures were significantly related to case outcomes as expected. For all of the cases and those included in the "whodunit" subsample, the intersex, interracial suspect age, and victim chronic arrests were not significantly related to case outcomes. This suggests there are no differences between the outcomes of cases with same sex victim and suspects, suspects 25 years and older, and victims with more than 5 prior arrests compared to cases with different sex victim and suspects, suspects 24 years or younger, and victims without chronic arrest histories. However, Table 4a and 4b show that two involved subject measures were significantly related to case outcome. Cases with victims over 25 years old had a mild and negative association with investigation outcomes in both the full homicide data (-.204, $p<.01$) and the "whodunit" cases data (-.260, $p<.01$). Cases with victims 24 years of age or younger more likely to have been closed. Homicides involving suspects with a chronic criminal history (i.e., more than 5 arrests) had a moderate and positive relationship with case outcomes in both data groups (all cases .301, $p<.01$, "whodunit" cases .336, $p<.01$). Investigations with suspects who have been arrested over five times were solved more often. Indeed, the victim's age and suspects' criminal history measures were significantly related to homicide case outcomes.

The goodness-of-fit for including these measures in multivariate analyses were further inspected. Cross tabulations with the dependent variable suggested the victim's age and suspects' criminal history measures were appropriate for multivariate analyses, as there were no cells with expected counts less than five for these variables. Additionally, the Chi-square for the measure of the victims' age group was 10.381 and for suspects' chronic arrest history was 22.808 across all of the homicides. Both of these values were well above the 1.96 significance threshold. Similarly, among the "whodunit" cases, the Chi-square for the victims' age group measure was 12.868 and for suspects' chronic arrest history was 21.705. Since nearly all previous clearance studies have included a victim and/or suspect sex measure in their predictive analyses, this study included intersex as a control variable. In the multivariate model, these three measures comprised the involved subjects domain.

Event Circumstances. Only a few of the anticipated circumstances measures were significantly correlated with case closures. Tables 4a illustrates that among the event circumstances in the full homicide cases, weekend days, gun involved, and substance use measures were not significantly correlated with case outcome. This

indicated that there were no differences in cases outcomes for homicides that occurred on the weekends, there was a gun, and drugs or alcohol were involved compared to cases on weekdays, without a gun used, and no substances involved. Therefore, these measures were excluded from multivariate analyses. Referring to Table 3b, note that the same variables are not significant for the reduced set of "whodunit" cases, with the addition of street-crime motives and evening to morning hours.[86] Within the "whodunit" subsample, the outcome of cases with street motives and those that occur in evening to morning hours were not different than for cases with other types of motives and where the person was killed during the day. Of the event circumstances that were significantly related to case outcome, the directions and strengths of their associations varied.

In the full dataset (Table 4a), legitimate relationships had a moderate and positive relationship (.338, $p<.01$) with case outcomes while the street-crime motives (-.242, $p<.01$) and early to morning hours (-.126, $p<.05$) variables show mild and negative associations with case arrests. Cases with victim and offenders with a legitimate relationship were more likely closed.

While cases involving street-crime motives or homicides that occurred between 9pm and 9am were more likely to be open. For the "whodunit" cases (Table 4b), legitimate relationship had a mild and positive correlation (.250, $p<.01$) with case status. Comparing Tables 4a and 4b, the strength of association between the victim and suspect's relationship measure and case outcome declined; however, cases with a legitimate relationship were still more likely to be closed. These measures were then examined for goodness-of-fit.

Cross tabulations of these measures with the dependent variable confirmed they were appropriate for multivariate analyses, as there were no cells with expected counts less than five for these variables. Additionally, for all of the homicides, the legitimate relationship, street motives, and evening to morning measures had Chi-square values over the significance threshed at 28.841, 14.723, and 4.026, respectively. In the "whodunit" cases, those values changed to 11.983 for legitimate relationship, 1.664 for street motive,[87] and 3.733 for the evening to morning hour measures. In sum, the three predicted event circumstance domain measures included in multivariate models were legitimate relationship, street-crime motives, and time of day measures since they were significant at the bivariate level.

Case Dynamics. As with the prior two domains, not all of the predicted case dynamic measures were significantly related to investigation success. The data in Tables 4a show that other than two of the variables used to create the evidence types scale (i.e., technological and biological evidence) all of the case-dynamic measures were significantly associated with case outcomes for the full homicide cases. Table 3b shows that the same was true for the "whodunit" cases with the addition of indoor crime scenes. Investigated case outcomes for homicides with indoor and contained crime scenes were not different from for those with outdoor and defused crime scenes. For all of the cases, evidence types (.152, $p<.05$), significant verbal evidence (.199, $p<.01$), and weapons-related evidence (172, $p<.01$) had mild and positive associations with case outcome. For

[86] The evening to morning hours measure was significant at the $p<.10$ level for "whodunit" cases.

[87] This measure did not meet the critical value of 1.96 to be significant but is included in multivariate modeling because it was significant among all of the cases.

the "whodunit" cases, the strength of the relationships slightly increased, but evidence types (.227, p<.01), significant verbal evidence (.214, p<.01), and weapons-related evidence (.182, p<.05) were still in the mild and positive range. Cases with more evidence are generally closed compared to cases with fewer evidence types. Similarly, the police-frequented area measure had mild and positive correlation (.151, p<.05) with case outcome for all cases; yet, the "whodunit" cases association had just a slightly stronger mild association (.226, p<.01). Cases in police-frequented areas are more often solved. Indoor crime scenes had a mild and positive relationship with case outcomes (.173, p<.01) for all cases. Cases where the victim's body was found indoors are likely to be solved cases. These variables were further examined for inclusion in multivariate analyses.

Cross tabulations of these measures with the dependent variable confirmed they were appropriate for multivariate analyses, as there were no cells with expected counts less than 5 for these variables. The Chi-square for the evidence in all of the homicides was 6.323, for police-frequented areas it was 5.762, and for crime scenes indoors was 7.512. All of these values are greater than the required 1.96 significance threshold. For the "whodunit" cases, the Chi-squares were 10.266 for the evidence types, 9.784 for police-frequented areas, and 1.787 crime scene location measures. Given these results, the case dynamic domain measures included in multivariate models were evidence types, police-frequented area, and indoor crime scene measures.

Ecological Characteristics. Turning to ecological characteristic, case status was not significantly related to the percentage of people with college degrees, density, proportion vacant, percent employed, percent owner occupied household units, or area median income for all of the homicide cases (see Table 4a). Therefore, for the 2009 to 2011 homicide cases in the jurisdiction under study, there were no case outcome differences for areas with higher percentages of college degrees among area residents, densely-populated tracts, or more vacant neighborhoods, compared to cases among areas with fewer college degrees, less population density, and less vacant properties. Additionally there were no significant case outcome differences for cases in areas with higher employment percentages, more owner-occupied units, or greater median incomes, compared to those with less employment, owner-occupied units, and median incomes. Accordingly, these variables were excluded from subsequent multivariate analyses. As shown in Table 4b, these results were the same for the "whodunit" cases, with one exception. In addition to the measures of area high school graduates, total tract population, and impoverished being significantly correlated with case closures, area density was as well.

For the full dataset and the “whodunit” subset, the percent of high school educated (all cases -.163, p<.05, "whodunit" cases -.149, p<.01) and total tract population (all cases -.242, p<.01, "whodunit" cases -.242, p<.01) had mild and negative relationships with case outcomes. Cases in areas with more and better-educated people were less likely to be closed. In both the full and just the "whodunit" homicide cases data also had a mild and positive associations with impoverished (all cases .137, p<.05, "whodunit" cases .161, p<.05). Areas with an average income less than or equal to the poverty level were more likely to have closed cases. Density also had a mildly positive

correlation (.145, p<.05) with investigated case closures. More people in an area where a homicide occurred were more common among closed cases.

Although tract population is a count of residents in an area, the negative association with case outcome may suggests it is more a measure of the total area than community size, particularly given the correlation with the density measure that accounts for the sparseness of people in a tract has a positive relationship with case closures. Therefore, the density measure was used instead of the total tract population. To further examine the three area measures, percent of high school graduates (or equivalency), density, and impoverished to predict cases outcomes, independent samples t-tests and a cross-tab were run. For all of the cases, the percent high school t-value was 2.610 and density was 1.252. Among the "whodunit" cases, the t-values were 2.077 and 2.016 for education and density, respectively. The Chi-square for impoverished was 4.755 for all of the homicides and 4.997 in "whodunit" cases. Given the bivariate results, these three measures were included in multivariate analyses.

Investigator Factors. As with the prior domains, investigator factor measures were also examined at the bivariate level. Again, not all of the predicted measures were significantly associated with the dependent variable. Tables 4a and 4b illustrate that four variables were not suitable to include in multivariate models. Measures of the days since a detective's last case, tenure, average workload, and competency scores were not significantly related to case outcomes for all cases and in the filtered "whodunit" cases. In other words, there was no significant difference between cases closures for those assigned to detectives longer after their previous case compared to cases detectives worked closer to the assignment of their previous case. Cases investigated by detectives with more tenure were not significantly likely to have different outcomes than those worked by detectives with less tenure. Cases assigned to lead detectives with a higher overall average workload compared to those among detectives with a lower overall average workload were not more likely to be solved. Finally, cases among investigators with higher competency scores did not have significantly different outcomes than those worked by investigators with lower competency scores. Consequently, these measures were excluded from multilevel analyses. There were, however, two investigator factor domain measures with significant bivariate relationships with homicide case statuses.

Table 4a shows that for all of the homicide cases, the number of open cases the assigned detective had per year (-.430, p<.01) was moderately and negatively correlated with case closures. Cases assigned to detectives with more open cases were less likely to be closed. Similarly, for all of the homicides, the total of cases assigned to a detective before each new case (-.128, p<.05) had a significantly mild and negative association with case outcome. Cases assigned to detectives with more cases assigned to work were more likely to be unsolved. Referring to Table 4b, only the number of open cases produced significant correlation (-.469, p<.01) with case status for the "whodunit" cases. These two workload measures had similar individual samples t-tests results. The open cases measure had a t-value of 7.521 and the total number assigned had a value of 2.033 for all of the homicide cases. Of the "whodunit" cases, the amount of open cases measure had a t-value of 7.311 and the cases assigned measure was 1.515. Since these investigator factors domain measures were significantly related to case outcomes at the bivariate level, they were included in the next stage of analyses.

References

Addington, L. A. (2006). Using national incident-based reporting system murder data to evaluate clearance predictors: A research note. *Homicide Studies*, *10*(2), 140-152.

Addington, L. A. (2007). Hot vs. cold cases: Examining time to clearance for homicides using NIBRS data. *Justice Research and Policy*, *9*(2), 87-112.

Alderden, M. A., & Lavery, T. A. (2007). Predicting homicide clearances in Chicago: Investigating disparities in predictors across different types of homicide. *Homicide Studies*, *11*(2), 115-132.

Alesina, A., & Ferrara, E. L. (2000). *The determinants of trust* (No. w7621). National Bureau of Economic Research.

Anderson, E. (1999). *The code of the streets: Decency, violence, and the moral life of the inner city.* New York, NY: W.W. Norton & Company Ltd.

Anderson, H. A. (2009). Penalizing poverty: Making criminal defendants pay for their court-appointed counsel through recoupment and contribution. *University of Michigan Journal of Law Reform, 42*, 323.

Babbie, E. (2007). *The practice of social research*. (11th ed.). Belmont, CA: Thomson Higher Education.

Baden, M. M., & Hennessee, J. A. (1989). *Unnatural death: Confessions of a medical examiner*. New York: Random House.

Bakker, A. B., & Heuven, E. (2006). Emotional dissonance, burnout, and in-role performance among nurses and police officers. *International Journal of Stress Management*, *13*(4), 423.

Barkan, S. E. (2006). *Criminology: A sociological understanding*. Upper Saddle River, NJ: Prentice Hall, Inc.

Baskin, D., & Sommers, I. (2010). The influence of forensic evidence on the case outcomes of homicide incidents. *Journal of Criminal Justice*, *38*(6), 1141-1149.

Bastian, L. D., & Taylor, B. M. (1994). *Young Black male victims*. Washington, DC: US Department of Justice, Office of Justice Programs, Bureau of Justice Statistics, NCJ-147004.

Bateson, N. (1984). *Data construction in social surveys*. London, England: George Allen & Unwin.

Bayley, D. H. (Ed.). (1998). *What works in policing*. Oxford University Press.

Bayley, D. H., & Bittner, E. (1997). Learning the skills of policing. In R. G. Dunham & G. Alpert (Eds.), *Critical issues in policing: Contemporary readings* (3rd ed., pp. 114-137). Prospect Heights, IL: Waveland

Bayley, D. H., & Garofalo, J. (1989). The management of violence by police patrol officers. *Criminology*, *27*(1), 1-26.

Bayley, D. H., & Mendelsohn, H. (1969). *Minorities and the police: Confrontation in America* (p. 91). New York: Free Press.

Bechara, A., & Martin, E. M. (2004). Impaired decision making related to working memory deficits in individuals with substance addictions. *Neuropsychology*, *18*(1), 152.

Beeghley, L. (2003). *Homicide: A sociological explanation*. Lanham, Maryland: RowMan & Littlefield Publishers, Inc.

Beyerlein, K., & Hipp, J. R. (2005). Social capital, too much of a good thing? American religious traditions and community crime. *Social Forces*, *84*(2), 995-1013.

Bhagat, R. S., Allie, S. M., & Ford, D. L. (1995). Coping with stressful life events: An empirical analysis. *Occupational Stress: A Handbook*, 93-112.

Black, D. (1976). *The behavior of law*. New York, NY: Academic Press.

Black, D. (1995). The epistemology of pure sociology. *Law & Social Inquiry*, *20*(4), 829-870.

Black, D., & Reiss, A. J. (1967). Patterns of behavior in police and citizen transactions. In *Studies in crime and law enforcement in major metropolitan areas*. Washington, DC: US Government Printing Office.

Black, D. J. (1980). *The manners and customs of the police*. New York: Academic Press.

Blair, J. P., & Rossmo, D. K. (2010). Evidence in context: Bayes' theorem and investigations. *Police Quarterly*, *13*(2), 123-135.

Blau, R. (1993). *The cop shop: True crime on the streets of Chicago*. Reading, MA: Addison-Wesley.

Block, C. R., & Christakos, A. (1995). Intimate partner homicide in Chicago over 29 years. *Crime and Delinquency*, *41*(4), 496–526.

Block, C. R., Block, R. L., & the Illinois Criminal Justice Information Authority. (1998). *Homicide in Chicago, 1965–1995*. Chicago: Illinois Criminal Justice Information Authority. Ann Arbor, MI: Inter-university Consortium for Political and Social Research.

Block, C. R., Christakos, A., Jacob, A., & Przybylski, R. (1996). *Street gangs and crime: Patterns and trends in Chicago.* Illinois Criminal Justice Information Authority.

Block, R., & Davis, S. (1996). The environs of rapid transit stations: A focus for street crime or just another risky place? In R. V. M. Clarke (Ed.), *Preventing mass transit crime*, (pp. 237-57). NY: Criminal Justice Press.

Bloom, B. S. (1986). Automaticity: The hands and feet of genius. *Educational Leadership*, *43*(5), 70-77.

Blumstein, A., & Beck, A. J. (1999). Population growth in US prisons, 1980-1996. *Crime & Justice*, *26*, 17-62.

Blumstein, A. (1995). Youth violence, guns, and the illicit-drug industry. *Journal of Criminal Law and Criminology*, 86(1), 10-36.

Blumstein, A., & Wallman, J. (Eds.). (2006). *The crime drop in America*. Cambridge University Press.

Blumstein, A., Cohen, J., & Hsieh, P. (1982). *The duration of adult criminal careers. U.S. Department Of Justice.* Office of Justice Programs, National Institute of Justice.

Blumstein, A., Rivara, F. P., & Rosenfeld, R. (2000). The rise and decline of homicide and why. *Annual Review of Public Health*, *21*(1), 505-541.

Bonta, J., Law, M., & Hanson, K. (1998). The prediction of criminal and violent recidivism among mentally disordered offenders: A meta-analysis. *Psychological Bulletin*, *123*(2), 123-142.

Borg, M. J., & Parker, K. F. (2001). Mobilizing law in urban areas: The social structure of homicide clearance rates. *Law and Society Review*, *35*(2), 435-466.

Boyatzis, R. E. (1982). *The competent manager: A model far effective performance*. New York: John Wiley and Sons.

Braga, A. A., & Weisburd, D. (2010). *Policing problem places: Crime hot spots and effective prevention*. Oxford University Press.

Braga, A. A., Hureau, D. M., & Papachristos, A. V. (2010). The relevance of micro places to citywide robbery trends: A longitudinal analysis of robbery incidents at

street corners and block faces in Boston. *Journal of Research in Crime and Delinquency*, *48*(1), 7-32.

Braga, A. A., Hureau, D. M., & Papachristos, A. V. (2014). Deterring gang-involved gun violence: Measuring the impact of Boston's Operation Ceasefire on street gang behavior. *Journal of Quantitative Criminology*, *30*(1), 113-139.

Braga, A. A., Kennedy, D. M., Waring, E. J., & Piehl, A. M. (2001). Problem-oriented policing, deterrence, and youth violence: An evaluation of Boston's Operation Ceasefire. *Journal of Research in Crime and Delinquency*, *38*(3), 195-225.

Braga, A. A., McDevitt, J., & Pierce, G. L. (2006). Understanding and preventing gang violence: Problem analysis and response development in Lowell, Massachusetts. *Police Quarterly*, *9*(1), 20-46.

Braga, A. A., Papachristos, A. V., & Hureau, D. M. (2014). The effects of hot spots policing on crime: An updated systematic review and meta-analysis. *Justice Quarterly*, *31*(4), 633-663.

Braga, A. A., Pierce, G. L., McDevitt, J., Bond, B. J., & Cronin, S. (2008). The strategic prevention of gun violence among gang-involved offenders. *Justice Quarterly*, *25*(1), 132-162.

Broderick, J. J. (1977). *Police in a time of change*. Morristown, NJ: General Learning Press.

Broidy, L. M., Daday, J. K., Crandall, C. S., Sklar, D. P., & Jost, P. F. (2006). Exploring demographic, structural, and behavioral overlap among homicide offenders and victims. *Homicide Studies*, *10*(3), 155-180.

Brookhuis, K. A., & de Waard, D. (2001). Assessment of drivers' workload: Performance and subjective and physiological indexes. In Hancock, P.A., & Desmond, P.A. (Eds.), *Stress, workload and fatigue,* Mahwah, NJ: Lawrence Erlbaum Associates.

Brough, P., & Frame, R. (2004). Predicting police job satisfaction and turnover intentions: The role of social support and police organisational variables. *New Zealand Journal of Psychology*, *33*(1), 8-16.

Brown, B., & Benedict, R. W. (2002). Perceptions of the police: Past findings, methodological issues, conceptual issues and policy implications. *Policing: An International Journal of Police Strategies & Management*, *25*(3), 543-580.

Brown, R. A. (2005). Black, White, and unequal: Examining situational determinants of arrest decisions from police-suspect encounters. *Criminal Justice Studies: A Critical*

Journal of Crime, Law and Society, 18(1), 51-68.

Brown, R. A. & Frank, J. (2006). Race and officer decision making: Examining differences in arrest outcomes between Black and White officers. *Justice Quarterly, 23*(1), 96-126.

Brown, S. P., & Leigh, T. W. (1996). A new look at psychological climate and its relationship to job involvement, effort, and performance. *Journal of Applied Psychology*, *81*(4), 358.

Browne, A., & Flewelling, R. (1986, November). Women as victims or perpetrators of homicide. In *annual meeting of the American Society of Criminology, Atlanta*.

Browne, A., & Williams, K. R. (1989). Exploring the effect of resource availability and the likelihood of female-perpetrated homicides. *Law and Society Review*, *23*(1), 75-94.

Browne, A., & Williams, K. R., & Dutton, D. G. (1999). Homicide between intimate partners: A 20-year review. In M. D. Smith & M. A. Zahn (Eds.), *Homicide studies: A sourcebook of social research* (pp. 149-164). Thousand Oaks, CA: Sage Publication, Inc.

Browning, C. R., Dietz, R. D., & Feinberg, S. L. (2004). The paradox of social organization: Networks, collective efficacy, and violent crime in urban neighborhoods. *Social Forces, 83*(2), 503-534.

Browning, S., Cullen, F. T., Cao, L., Kopache, R., & Stevenson, T. J. (1994). Race and getting hassled by the police: A research note. *Police Studies, 17*(1), 1-11.

Brownstein, H. H., Baxi, H. R. S., Goldstein, P. J., & Ryan, P. J. (1992). The relationship of drugs, drug trafficking, and drug traffickers to homicide. *Journal of Crime and Justice, 15*(1), 25-44.

Burke, R. J. (1993). Toward an understanding of psychological burnout among police officers. *Journal of Social Behavior & Personality, 8*(3), 425-438.

Bursik Jr., R. J., & Grasmick, H. G. (1993). Economic deprivation and neighborhood crime rates, 1960-1980. *Law & Society Review, 27*(2), 263.

Campbell, D. W., Sharps, P. W., Gary, F., Campbell, J. C., & Lopez, L. M. (2002). Intimate partner violence in African American women. *Online Journal of Issues in Nursing, 7*(1), 1-20.

Campbell, J. C., Glass, N., Sharps, P. W., Laughon, K., & Bloom, T. (2007). Intimate partner homicide review and implications of research and policy. *Trauma, Violence,*

& Abuse, *8*(3), 246-269.

Campbell, J. C., Webster, D., Koziol-McLain, J., Block, C., Campbell, D., Curry, M. A., ... & Laughon, K. (2003). Risk factors for femicide in abusive relationships: Results from a multisite case control study. *American Journal of Public Health*, *93*(7), 1089-1097.

Carroll, L. (1982). Race, ethnicity, and the social order of the prison. In R. Johnson & H. Toch (Eds.), *Pains of imprisonment.* Beverly Hills, CA: Sage Publication.

Carter, D. L. (1985). Hispanic perception of police performance: An empirical assessment. *Journal of Criminal Justice*, *13*(6), 487-500.

Carter, D. L. (2013). *Homicide process mapping: Best practices for increasing homicide clearances*. Washington, DC: U.S. Department of Justice, Bureau of Justice Assistance.

Carter, D. L., & Carter, J. G. (2015). Effective police homicide investigations evidence from seven cities with high clearance rates. *Homicide Studies*, volume, page numbers. doi: 1088767915576996

Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. (2006). *Web-based injury statistics query and reporting system*. Retrieved from http://www.cdc.gov/ncipc/wisqars.

Chaiken, J. M., Greenwood, P. W., & Petersilia, J. (1977). The criminal investigation process: A summary report. *Policy Analysis*, *3*(2), 187-217.

Chen, H., Schroeder, J., Hauck, R. V., Ridgeway, L., Atabakhsh, H., Gupta, H., ... & Clements, A. W. (2003). COPLINK Connect: information and knowledge management for law enforcement. *Decision Support Systems*, *34*(3), 271-285.

Chisum, W. J., & Turvey, B. E. (1999). An introduction to crime reconstruction. *Criminal profiling: An introduction to behavioral evidence analysis*, Waltham, MA: Academic Press.

Christakos, A., Jacob, A., & Przybylski, R. (1996). Street gangs and crime: Patterns and trends in Chicago. In P. J. Cook, J. Ludwig, & A. A. Braga (Eds.), *Criminal Records of Homicide Offenders* (2005). Illinois Criminal Justice Information Authority.

Cloward, R. A., & Ohlin, L. E. (2013). *Delinquency and opportunity: A study of delinquent gangs.* Danvers, MA: Routledge.

Cohen, L. E., & Felson, M. (1979). Social change and crime rate trends: A routine activity approach. *American Sociological Review*, *44*(4), 588-608.

Cohen, L. E., Kluegel, J. R., & Land, K. C. (1981). Social inequality and predatory criminal victimization: An exposition and test of a formal theory. *American Sociological Review*, *46*(5), 505-524.

Collins, P. A., & Gibbs, A. C. C. (2003). Stress in police officers: A study of the origins, prevalence and severity of stress-related symptoms within a county police force. *Occupational Medicine*, *53*(4), 256-264.

Cook, J., & Laub, J. H. (1998). The unprecedented epidemic in youth violence. In M. Tonry & M. H. Moore (Eds.), *Crime and justice: A review of research* (pp. 34-51). Chicago, IL: University of Chicago Press.

Cook, P. J., Ludwig, J., & Braga, A. A. (2005). Criminal records of homicide offenders. *Journal of the American Medical Association*, *294*(5), 598-601.

Cook, T., & Tattersall, A. (2010). *Blackstone's senior investigating officers' handbook*. Oxford: Oxford University Press.

Cooper, A., & Smith, E. L. (2011). *Homicide trends in the United States, 1980-2008*. Washington, DC: US Department of Justice. Bureau of Justice Statistics Reports & Trends, 36.

Cordner, G. W. (1989). Police agency size and investigative effectiveness. *Journal of Criminal Justice*, *17*(3), 145-155.

Costa, D. L., & Kahn, M. E. (2001). *Understanding the decline in social capital, 1952-1998* (No. w8295). National Bureau of Economic Research.

Cromwell, P. F., & Birzer, M. L. (Eds.). (1996). *In their own words: Criminals on crime: An anthology*. Los Angeles, CA: Roxbury Publishing Co.

Cronin, J. M., Toliver, J. I., Murphy, G. R., Weger, R. E., & Spahr, L. L. (2007). *Promoting effective homicide investigations.* Washington, DC: Police Executive Research Forum, U.S. Department of Justice Office of Community Oriented Policing Services.

Cureton, S. R. (2000). Justifiable arrests or discretionary justice: Predictors of racial arrest differentials. *Journal of Black Studies*, *30*(5), 703-719.

D'Allessio, S. J., & Stolzenberg, L. (2003). Race and probability of arrest. *Social forces*, *81*(4), 1381-1397.

Dabney, D. A., Copes, H., Tewksbury, R., & Hawk-Tourtelot, S. R. (2013). A qualitative assessment of stress perceptions among members of a homicide unit. *Justice Quarterly, 30*(5), 811–36.

Dabney, D. A. (2013). *Crime types: A text/reader*. (2nd ed.). New York, NY: Wolters Kluwer Law & Business.

Davies, H. J. (2007). Understanding variations in murder clearance rates: The influence of the political environment. *Homicide Studies, 11*(2), 133-150.

Davies, K. (2008). *The murder book: Examining homicide*. Upper Saddle River, NJ: Pearson Education, Inc.

Decker, S. H. (1981). Citizen attitudes toward the police: A review of past findings and suggestions for future policy. *Journal of Police Science and Administration, 9*(1), 80-87.

Decker, S. H. (1995). *Arrestees and guns: Monitoring the illegal firearms market*. Washington, DC: U.S. Department of Justice.

Decker, S. H. (1996). Deviant homicide: A new look at the role of motives and the victim-offender relationships. *Journal of Research in Crime and Delinquency, 33*(4), 427-449.

DeLisi, M., & Regoli, B. (1999). Race, conventional crime, and criminal justice: The declining importance of skin color. *Journal of Criminal Justice, 27*(6), 549-557.

DeLisi, M., & Conis, P. J. (2011). *American corrections: Theory, research, policy, and practice*. Jones & Bartlett Publishers.

DeLisi, M., Hochstetler, A., Jones-Johnson, G., Caudill, J. W., & Marquart, J. W. (2011). The road to murder: The enduring criminogenic effects of juvenile confinement among a sample of adult career criminals. *Youth Violence and Juvenile Justice, 9*(3), 207-221.

DeLisi, M., Kosloski, A., Sween, M., Hachmeister, E., Moore, M., & Drury, A. (2010). Murder by numbers: Monetary costs imposed by a sample of homicide offenders. *The Journal of Forensic Psychiatry & Psychology, 21*(4), 501-513.

Dennis, A. (2009). Collateral damage? Juvenile snitches in America's' wars' on drugs, crime and gangs. *American Criminal Law Review, 46*(3), 1145.

Dobrin, A. (2001). The risk of offending on homicide victimization: A case control study. *Journal of Research in Crime and Delinquency, 38*(2), 154-173.

Donaldson, S. I. & Grant-Vallone, E. J. (2002). Understanding self-report bias in organizational behavior research. *Journal of Business and Psychology, 17*(2), 245-280.

Eck, J., & Weisburd, D. (Eds.). (1995). Crime and place. *Crime prevention studies*: vol. *4*. Criminal Justice Press.

Eck, J. E. (2003). Problem-oriented policing and its problems. In W. Skogan (Ed.), *Community policing: Can it work?* Belmont, CA: Wads worth.

Eck. J. E. (1992). Criminal investigations. In Cordner, G. W. & Hale, D. C. (Eds.), *What works in policing: Operations and administration examined*, Chapter 2. Highland Heights, KY: Anderson Publishing Co.

Eliopulos, L. N. (1993). *Death investigator's handbook: A field guide to crime scene processing, forensic evaluations, and investigative techniques*. Boulder, CO: Paladin Press.

Engle, R. S., Sobol, J. J., & Worden, R. E. (2000). Further exploration of the demeanor hypothesis: The interaction effects of suspect's characteristics and demeanor on police behavior. *Justice Quarterly, 17*(2), 235-258.

Entman, R. M., & Rojecki, A. (2000). *The Black image in the White mind: Media and race in America.* Chicago, IL: University of Chicago Press

Feist, A., & Newiss, G. (unpublished). Watching the detectives: Analysing hard-to-solve homicide investigations. London: Home Office.

Felson, R. B., Messner, S. F., Hoskin, A. W., & Deane, G. (2002). Reasons for reporting and not reporting domestic violence to the police. *Criminology*, *40*(3), 617-648.

Felson, R. B., & Pare, P. P. (2010). Gun cultures or honor cultures? Explaining regional and race differences in weapon carrying. *Social forces*, *88*(3), 1357-1378.

Fendrich, M., Mackesy-Amiti, M. E., Goldstein, P., Spunt, B., & Brownstein, H. (1995). Substance involvement among juvenile murderers: Comparisons with older offenders based on interviews with prison inmates. *Substance Use & Misuse*, *30*(11), 1363-1382.

Fielding, N. (1988). *Joining forces: Police training, socialization, and occupational competence*. London: Routledge.

Fisher, B. A., & Fisher, D. R. (2012). *Techniques of crime scene investigation*. Boca Raton, FL: CRC Press.

Flewelling, R. L., & Williams, K. R. (1999). Categorizing homicides: The use of disaggregated data in homicide research. In Smith, M.D., & Zahn, M.A. (Eds.) *Homicide: A sourcebook of social research*, (pp.96-106), Thousand Oaks, CA: Sage Publications.

Florence, C., Shepherd, J., Brennan, I., & Simon, T. (2011). Effectiveness of anonymised information sharing and use in health service, police, and local government partnership for preventing violence related injury: Experimental study and time series analysis. *The BMJ*, *342*.

Fox, J. A. (1996). *Trends in juvenile violence*. Washington, DC: US Department of Justice, Bureau of Justice Statistics.

Fox, J. A., & Zawitz, M. W. (1997). *Homicide trends in the United States*. US Department of Justice, Office of Justice Programs, Bureau of Justice Statistics.

Fox, J. A., & Zawitz, M. W. (2010). *Homicide trends in the United Sates*. Washington, DC: US Department of Justice, Bureau of Justice Statistics.

Garcia, L., Soria, C., & Hurwitz, E. L. (2007). Homicides and intimate partner violence a literature review. *Trauma, Violence, & Abuse*, *8*(4), 370-383.

Gardner, R. M. (2011). *Practical crime scene processing and investigation*. Boca Raton, FL: CRC Press.

Geberth, V. J., & Bagerth, V. J. (1996). *Practical homicide investigation: Tactics procedures, and forensics techniques.* (3rd ed.). Boca Raton, FL: CRC Press.

Gendreau, P., Little, T., & Goggin, C. (1996). A meta-analysis of the predictors of adult offender recidivism: What works? *Criminology*, *34*(4), 575-608.

Giacomazzi, A. L., & Brody, D. C. (2004). The effectiveness of external assessments in facilitating organizational change in law enforcement. *Policing*, *27*(1), 37-55.

Giacomazzi, A. L., Riley, S., & Merz, R. (2004). Internal and external challenges to implementing community policing: Examining comprehensive assessment reports from multiple sites. *Criminal Justice Studies*, *17*(2), 223-238.

Gilbert, J. N. (1983). A study of the increased rate of unsolved criminal homicide in San Diego, California, and its relationship to police investigation effectiveness. *American Journal of Police, 2*(2), 149-166.

Gill, C., Weisburd, D., Telep, C. W., Vitter, Z., & Bennett, T. (2014). Community-oriented policing to reduce crime, disorder and fear and increase satisfaction and legitimacy among citizens: A systematic review. *Journal of Experimental*

Criminology, *10*(4), 399-428.

Goldstein, H. (1977). *Policing a free society*. Cambridge, MA: Harvard University Press.

Goldstein, H. (1979). Improving policing: A problem-oriented approach. *Crime & delinquency*, *25*(2), 236-258.

Goldstein, P. J. (1989). Drugs and violent crime. In Weiner, N.A., & Wolfgang, M.E. (Eds.). *Pathways to Criminal Violence*, (pp.16-48). Newbury Park, CA: Sage Publications.

Goleman, D. (1998). *Working with emotional intelligence*. New York, NY: Bantam Books.

Gordon, M. E., & Johnson, W. A. (1982). Seniority: A review of its legal and scientific standing. *Personnel Psychology*, *35*(2), 255-280.

Gordon, M. E., Cofer, J. L., & McCullough, P. M. (1986). Relationships among seniority, past performance, interjob similarity, and trainability. *Journal of Applied Psychology*, *71*(3), 518.

Gottfredson, M. R., & Hindelang, M. J. (1979). A study of the behavior of law. *American Sociological Review*, *44*(1), 3-18.

Greenwood, P.W., Chaiken, J. M., & Petersilia, J. (1977). *The criminal investigation process.* United States of America: The Rand Corporation.

Haberfeld, M. R. (2002). *Critical issues in police training*. Upper Saddle River, NJ: Prentice Hall.

Hails, J. (2013). *Criminal evidence*. Independence, KY: Cengage Learning.

Hale, C. (1996). Fear of crime: A review of the literature. *International Review of Victimology*, *4*(2), 79-150.

Hanson, R. A., Hewitt, W. E., Ostrom, B. J., & Lomvardias, C. (1992). *Indigent defenders: Get the job done and done well*. Williamsburg, VA: National Center for State Courts, State Justice Institute.

Hanson, R. K., & Bussiere, M. T. (1998). Predicting relapse: A meta-analysis of sexual offender recidivism studies. *Journal of Consulting and Clinical Psychology*, *66*(2), 348.

Hanzlick, R., & Gowitt, G. T. (1991). Cocaine metabolite detection in homicide victims. *Journal of the American Medical Association, 265*(6), 760-761.

Harris, K. D. (1997). *Serious violence: Patterns of homicide and assault in America*. (2nd ed.). Springfield, IL: Charles C. Thomas.

Harrison, D. W. (1980). Role strain and burnout in child-protective service workers. *The Social Service Review, 54*(1), 31-44.

Hartwig, M., Granhag, P. A., Strömwall, L. A., & Kronkvist, O. (2006). Strategic use of evidence during police interviews: When training to detect deception works. *Law and human behavior*, *30*(5), 603-619.

Hawk, S. R., & Dabney, D. A. (2014). Are all cases treated equal?: Using Goffman's frame analysis to understand how homicide detectives orient to their work. *British Journal of Criminology, 54*(6), 1129-1147.

Hawk-Tourtelot, S. R., & Bradley-Engen, M. S. (2012). The role of policing education in college student satisfaction with police. *Journal of Criminal Justice Education, 23*(2), 233-253.

Hawkins, D. F. (1999). African Americans and homicide. In M. D. Smith & M. A. Zahn (Eds.), *Studying and preventing homicide: Issues and challenges*, (pp. 143-158). Thousand Oaks, CA: Sage Publications.

He, N., Zhao, J., & Lovrich, N. (2005). Community policing: A preliminary assessment of environmental impact with panel data on program implementation in U.S. cities. *Crime & Delinquency, 51*(3), 295-317.

Henderson, M. L., Cullen, F. T., Cao, L., Browning, S. L., & Kopache, R. (1997). The impact of race on perceptions of criminal injustice. *Journal of Criminal Justice, 25*(6), 447-462.

Hepburn, J. R. (1978). Race and the decision to arrest: An analysis of warrants issued. *Journal of Research in Crime & Delinquency, 15*(1), 54-73.

Hindelang, M. J., Gottfredson, M. R., & Garofalo, J. (1978). Victims of personal crime: An empirical foundation for a theory of personal victimization. Cambridge, MA: Ballinger.

Hinds, L. (2009). Public satisfaction with police: The influence of general attitudes and police-citizen encounters. *International Journal of Police Science & Management, 11*(1), 54-66.

Hirschi, T., & Gottfredson, M. (1983). Age and the explanation of crime. *American Journal of Sociology*, 89(3), 552-584.

Hofmann, D. A., Jacobs, R., & Gerras, S. J. (1992). Mapping individual performance over time. *Journal of Applied Psychology, 77*(2), 185.

Hogan, R., & Kurtines, W. (1975). Personological correlates of police effectiveness. *The Journal of Psychology*, *91*(2), 289-295.

Horvath, F., & Meesig, R. (1996). The criminal investigation process and the role of forensic evidence: A review of empirical findings. *Journal of Forensic Sciences, 41*, 963-969.

Hosmer Jr., D. W., & Lemeshow, S. (2004). *Applied logistic regression*. Indianapolis, IN: John Wiley & Sons.

Huang, W., & Vanghn, M. S. (1996). Support and confidence: Public attitudes toward the police. In T. J. Flanagan & D. R. Longmire (Eds.), *Americans view crime and justice: A national public opinion survey* (pp. 31-45). Thousand Oaks, CA: Sage Publications.

Hunt, S. T. (1996). Generic work behavior: An investigation into the dimensions of entry-level, hourly job performance. *Personnel Psychology*, *49*(1), 51-83.

Hunter, J. E. (1983a). A causal analysis of cognitive ability, job knowledge, job performance, and supervisor ratings. In F. Landy, S. Zedeck, & J. Cleveland (Eds.), *Performance measurement and theory* (pp. 257– 266). Hillsdale, NJ: Erlbaum.

Hunter, J. E. (1983b). The prediction of job performance in the military using ability composites: The dominance of general cognitive ability over specific aptitudes. *Report for Research Applications in Partial Fulfillment of Department of Defense Contract* F41689-83-C-0025.

Hunter, J. E. (1986). Cognitive ability, cognitive aptitudes, job knowledge, and job performance. *Journal of Vocational Behavior*, *29*(3), 340–362.

Hunter, J. E., & Hunter, R. F. (1984). Validity and utility of alternative predictors of job performance. *Psychological Bulletin, 96*(1), 72–98.

Hunter, J. E., & Schmidt, F. L. (1996). Intelligence and job performance: Economic and social implications. *Psychology, Public Policy, and Law*, *2*(3-4), 447–472.

Inbau, F. E., Reid, J. E., & Buckley, J. P. (1986).*Criminal interrogation and confessions*. Baltimore, MD: Williams & Walkins Co.

Innes, M. (2002a). Organizational communication and the symbolic construction of police murder investigations. *British Journal of Sociology, 53*(1), 67-87.

Innes, M. (2002b). The "process structures" of police homicide investigations. *British Journal of Criminology, 42*(4), 669-688.

Innes, M. (2003). *Investigating murder: Detective work and the police response to criminal homicide*. Oxford, NY: Oxford University Press, Inc.

Innes, M. (2011). Doing less with more: The "new" politics of policing. *Public Policy Research, 18*(2), 73-80.

Innes, M., & Brookman, F. (2013). Helping police with their enquiries: International perspectives on homicide investigation. *Policing and Society, 23*(3), 285-291.

Jacobs, B. A., Topalli, V., & Wright, R. (2000). Managing retaliation: drug robbery and informal sanction threats. *Criminology, 38*(1), 171-198.

Jarvis, J. P., & Regoeczi, W. C. (2009). Homicide clearances: An analysis of arrest versus exceptional outcomes. *Homicide Studies, 13*(2), 174-188.

Jennings, W. G., Piquero, A. R., & Reingle, J. M. (2012). On the overlap between victimization and offending: A review of the literature. *Aggression and Violent Behavior, 17*(1), 16-26.

Jiao, A. Y. (2007). Explaining homicide clearance: An analysis of Chicago homicide data 1965–1995. *Criminal Justice Studies, 20*(1), 3-14.

Jick, T. D. (1979). Mixing qualitative and quantitative methods: Triangulation in action. *Administrative Science Quarterly*, 24(4), 602-611.

Judge, T. A., Thoresen, C. J., Bono, J. E., & Patton, G. K. (2001). The job satisfaction–job performance relationship: A qualitative and quantitative review. *Psychological Bulletin, 127*(3), 376-407.

Kane, R. J. (2002). The social ecology of police misconduct. *Criminology, 40*(4), 867-896.

Kane, R. J. (2005). Compromised police legitimacy as a predictor of violent crime in structurally disadvantaged communities. *Criminology, 43*(2), 469-498.

Kassin, S. M., & McNall, K. (1991). Police interrogations and confessions: Communicating promises and threats by pragmatic implication. *Law and Human Behavior, 15*(3), 233.

Keel, G. T., Jarvis, J. P., & Muirhead, Y. E. (2009). An exploratory analysis of factors affecting homicide investigations: Examining the dynamics of murder clearance rates. *Homicide Studies*, *13*(1), 50-68.

Keel, T. G. (2008). *Homicide investigations: Identifying best practice*. Washington, DC: Federal Bureau of Investigations.

Kennedy, D. M. (1997). Pulling levers: Chronic offenders, high-crime settings, and a theory of prevention. *Valparaiso University Law Review*, *34*, 449-84.

Kennedy, R. (1997). *Race, Crime, and the Law.* New York, NY: Pantheon Books.

Kennedy, L. W., Caplan, J. M., & Piza, E. (2011). Risk clusters, hotspots, and spatial intelligence: Risk terrain modeling as an algorithm for police resource allocation strategies. *Journal of Quantitative Criminology*, *27*(3), 339-362.

Keppel, R. D., & Weis, J. G. (1994). Time and distance as outcome factors in murder cases. *Journal of Forensic Sciences*, *39*, 386-386.

Kettunen, J. (1997). Education and unemployment duration. *Economics of Education Review*, *16*(2), 163-170.

Kidwell, R. E., & Bennett, N. (1993). Employee propensity to withhold effort: A conceptual model to intersect three avenues of research. *Academy of Management Review*, *18*(3), 429-456.

Kirkcaldy, B. D., Cooper, C. L., Furnham, A., & Brown, J. I. (1993). Personality, job satisfaction and well-being among public sector (police) managers. *European Review of Applied Psychology*, *43*(3), 241-248.

Klein, A. R. (1997). *Alternative sentencing, intermediate aanctions, and probation*. Cincinnati, OH: Anderson Publishing Company.

Klinger, D. A. (1997). Negotiating order in patrol work: An ecological theory of police response to deviance. *Criminology*, *35*(2), 277-306.

Korosec, L. M. (2009). *The changing nature of homicide and its impact on homicide clearance rates: A quantitative analysis of two trends from 1984-2009* (Doctoral dissertation, The University of Western Ontario London, London, Ontario, Canada).

Krug, E. G., Mercy, J. A., Dahlberg, L. L., & Zwi, A. B. (2002). The world report on violence and health. *The Lancet*, *360*(9339), 1083-1088
.

Kruger, D. J., Hutchison, P., Monroe, M. G., Reischl, T., & Morrel-Samuels, S. (2007). Assault injury rates, social capital, and fear of neighborhood crime. *Journal of*

Community Psychology, *35*(4), 483-496.

Kubrin, C. E., & Weitzer, R. (2003). Retaliatory homicide: Concentrated disadvantage and neighborhood culture. *Social Problems*, *50*(2), 157-180.

Kurz, R., & Bartram, D. (2002). Competency and individual performance: Modeling the world of work. In Robertson, I.T., Callinan, M., & Bartram, D. (Eds.). *Organizational effectiveness: The role of psychology*, (pp.227-255). New York, NY: John Wiley & Sons, Inc.

Kuykendall, J., & Unsinger, P. C. (1982). The leadership styles of police managers. *Journal of Criminal Justice*, *10*(4), 311-321.

Laurikkala, M. K. (2011). *Juvenile homicides: A social disorganization perspective*. El Paso, TX: LFB Scholarly Pub. LLC.

Lamberth, J. (1996). *A Report to the ACLU*. New York: American Civil Liberties Union.

Lattimore, P. K., Linster, R. L., & MacDonald, J. M. (1997). Risk of death among serious young offenders. *Journal of Research in Crime and Delinquency*, *34*(2), 187-209.

Lee, C. (2005). The value of life in death: Multiple regression and event history analyses of homicide clearance in Los Angeles County. *Journal of Criminal Justice, 33*(6), 527-534.

Lee, M. (2011). *Trafficking and global crime control*. Thousand Oaks, CA: Sage Publications.

Lee, M. R., Maume, M. O., & Ousey, G. C. (2003). Social isolation and lethal violence across the metro/nonmetro divide: The effects of socioeconomic disadvantage and poverty concentration on homicide. *Rural Sociology*, *68*(1), 107-131.

Lee, R. T., & Ashforth, B. E. (1996). A meta-analytic examination of the correlates of the three dimensions of job burnout. *Journal of Applied Psychology*, *81*(2), 123.

Leiken, L. S. (1970). Police interrogation in Colorado: The implementation of Miranda. *Denver Law Journal, 47*, 1-53.

Leo, R. A. (2008). *Police interrogation and American justice*. Boston, MA: Harvard University Press.

Leovy, J. (2015). *Ghettoside: A true story of murder in America*. New York, NY: Spiegel & Grau a division of Random House, LLC.

Lewis, D. A., & Salem, G. (1986). *Fear of crime: Incivility and the production of A social problem*. New Brunswick, NJ: Transaction Books.

Liska, A. E., Chamlin, M. B., & Reed, M. D. (1985). Testing the economic production and conflict models of crime control. *Social Forces*, *64*(1), 119-138.

Litwin, K. J. (2004). A multilevel multivariate analysis of factors affecting homicide clearances. *Journal of Research in Crime and Delinquency*, *41*(4), 327-351.

Litwin, K. J. & Xu, Y. (2007). The dynamic nature of homicide clearances: A multilevel model comparison of three time periods. *Homicide Studies*, *11*(2), 94-114.

Long, J. S., & Freese, J. (2006). *Regression models for categorical dependent variables using Stata*. College Station, TX: Stata press.

Lum, C., Koper, C. S., & Telep, C. W. (2011). The evidence-based policing matrix. *Journal of Experimental Criminology*, *7*(1), 3-26.

Lundman, R. J., & Myers, M. (2012). Explanations of homicide clearances: Do results vary dependent upon operationalization and initial (time 1) and updated (time 2) data? *Homicide Studies*, *16*(1), 23-40.

Lyman, M. D. (2001). *Criminal investigation: The art and the science*. Upper Saddle River, NJ: Prentice Hall.

Manning, P. K. (1992). Information technologies and the police. *Crime and Justice*, *15*, 349-398.

Marché, G. E. (1994). The production of homicide solutions: An empirical analysis. *The American Journal of Economics and Sociology*. *53*(4), 385-401.

Maruna, S. (2001). *Making good: How ex-convicts reform and rebuild their lives*. Washington, DC: American Psychological Association.

Mastrofski, S. D., Reisig, M. D., & McCluskey, J. D. (2002). Police disrespect toward the police: An encounter-based analysis. *Criminology, 40*, 519-551.

Matsueda, R. L., & Anderson, K. (1998). The dynamics of delinquent peers and delinquent behavior. *Criminology, 36*(2), 269-308.

Mauer, M. (2002). *Race to incarcerate.* New York, NY: New Press.

Mazerolle, L., Wickes, R., & McBroom, J. (2010). Community variations in violence: The role of social ties and collective efficacy in comparative context. *Journal of*

Research in Crime and Delinquency, *47*(1), 3-30.

McClelland, D. C. (1973). Testing for competence rather than for intelligence. *American Psychologist*, *28*(1), 1–14.

McCreedy, K. (1974). Selection practices and the police role. *Police Chief*, *41*(7), 41-3.

McDaniel, M. A., Schmidt, F. L., & Hunter, J. E. (1988). Job experience correlates of job performance. *Journal of Applied Psychology*, *73*(2), 327.

McDonald, J. M. (1975). *Armed robbery: Offenders and their victims*. Springfield, IL: Charles Thomas.

McEwen, T. (2013). *Volume II: Research analysis of the Phoenix Homicide Clearance Project*. Alexandria, VA: US Department of Justice, Office of Justice Programs, National Institute of Justice.

McFarland, S. G. (1981). Effect of question order on survey responses. *Public Opinion Quarterly, 45*(2), 208-215.

McFarlane, J., Parker, B., & Soeken, K. (1995). Abuse during pregnancy: Frequency, severity, perpetrator, and risk factors of homicide. *Public Health Nursing*, *12*(5), 284-289.

McGarrell, E. F., Chermak, S., Wilson, J. M., & Carsaro, N. (2006). Reducing homicide through a "lever-pulling" strategy. *Justice Quarterly*, *23*(2), 214-231.

Messner, S. F., & Tardiff, K. (1985). The social ecology of urban homicide: An application of the "routine activities" approach. *Criminology*, *23*(2), 241-267.

Messner, S., & Rosenfeld, R. (2012). *Crime and the American Dream*. Independence, KY: Cengage Learning.

Miethe, T. D., & Regoeczi, W. C. (2004). *Rethinking homicide: Exploring the structure and process underlying deadly situations*. Cambridge, MA: Cambridge University Press.

Miletich, J. J. (2003). *Homicide investigation: An introduction*. Lanham, MD: The Scarecrow Press, Inc.

Miller, J. (1998). Up it up: Gender and the accomplishment of street robbery. *Criminology*, *36*(1), 37-66.

Miller, J., & Decker, S. H. (2001). Young women and gang violence: Gender, street offending, and violent victimization in gangs. *Justice Quarterly, 18*(1), 115-140.

Miller, W. B. (1958). Lower class culture as a generating milieu of gang delinquency. *Journal of Social Issues, 14*(3), 5-19.

Milwaukee Homicide Review Commission. (2011). Homicides and nonfatal shootings. Data report for Milwaukee, WI.

Moffitt, T. E. (1993). Adolescence-limited and life-course-persistent antisocial behavior: A developmental taxonomy. *Psychological Review, 100*(4), 674-701.

Monkkonen, E. H. (2001). Estimating the accuracy of historic homicide rates: New York City and Los Angeles. *Social Science History, 25*(1), 53-66.

Morenoff, J. D., Sampson, R. J., & Raudenbush, S. W. (2001). Neighborhood inequality, collective efficacy, and the spatial dynamics of urban violence. *Criminology, 39*(3), 517-558.

Murphy, D., & Lutze, F. (2009). Police-probation partnerships: Professional identity and the sharing of coercive power. *Journal of Criminal Justice, 37*(1), 65-76.

Natapoff, A. (2004). Snitching: The institutional and communal consequences. *University of Cincinnati Law Review, 73*, 645.

Nickell, S. (1979). Education and lifetime patterns of unemployment. *The Journal of Political Economy, 87*(5), S117-S131.

Nisbett, R. E., & Cohen, D. (1996). *Culture of honor: The psychology of violence in the south*. Boulder, CO: Westview Press.

O'Hara, C. E., & O'Hara, G. L. (1988). *Fundamentals of criminal investigation*. Springfield, MO: Charles C. Thomas Publisher, LTD.

O'Leary-Kelly, A. M., & Griffin, R. W. (1995). Job satisfaction and organizational commitment. In Brewer, N., & Wilson, C. (Eds.) *Psychology and Policing*, (pp.367-393). Hillsdale, NJ: Lawrence Erlbaum Assoicates, Inc., Publishers.

O'Reilly, C. A. (1977). Personality—job fit: Implications for individual attitudes and performance. *Organizational Behavior and Human Performance, 18*(1), 36-46.

Ousey, G. C. (2000). Explaining regional and urban variation in crime: A review of research. *Criminal Justice, 1*, 261-308.

Ousey, G. C. & Lee, M. R. (2010). To know the unknown: The decline in homicide clearance rates, 1980-2000. *Criminal Justice Review, 35*(2), 141-158.

Pallant, J. (2006). *SPSS survival manual*. (2nd ed.). McGraw-Hill International.

Palmer, S., & Humphrey, J. A. (1980). Offender-victim relationships in criminal homicide followed by offender's suicide, North Carolina, 1972–1977. *Suicide and Life-Threatening Behavior*, *10*(2), 106-118.

Paoline, E. A., & Terrill, W. (2007). Police education, experience, and the use of force. *Criminal Justice and Behavior*, *34*(2), 179-196.

Parker, B., & Peterson, J. L. (1972). *Physical evidence utilization in the administration of criminal justice*. US Department of Justice, Law Enforcement Assistance Administration, National Institute of Law Enforcement and Criminal Justice.

Parker, K. F., & Pruitt, M. V. (2000). How the west was one: Explaining the similarities in race-specific homicide rates in the west and south. *Social Forces*, *78*(4), 1483-1508.

Parker, P. A., & Kulik, J. A. (1995). Burnout, self-and supervisor-rated job performance, and absenteeism among nurses. *Journal of Behavioral Medicine*, *18*(6), 581-599.

Parker, R. N. (1989). Poverty, subculture of violence, and type of homicide. *Social Forces*, *67*(4), 983-1007.

Parker, R. N., & Smith, M. D. (1979). Deterrence, poverty, and type of homicide. *American Journal of Sociology*, *85*(3), 614-624.

Parry, B. (2006). Intelligence: The key to gang suppression. *Corrections Today*, *68*(2), 42.

Paternoster, R. (1984). Prosecutorial discretion in requesting the death penalty: A case of victim-based racial discrimination. *Law and Society Review*, 437-478.

Patterson, G. R. (1974). Interventions for boys with conduct problems: Multiple settings, treatments, and criteria. *Journal of Consulting and Clinical Psychology*, *42*(4), 471.

Pease, K. (1999). A review of street lighting evaluations: Crime reduction effects. *Crime Prevention* Studies, *10*, 47-76.

Pernanen, K. (1976). Alcohol and crimes of violence. *Social Aspects of Alcoholism*, *4*, 351-444.

Pernanen, K. (1981). Theoretical aspects of the relationship between alcohol use and crime. In J. J. Collins, Jr. (Ed.), *Drinking and crime: Perspectives on the relationship between alcohol consumption and criminal behavior* (pp. 1-69). London, England: Tavistock Publications

Pernanen, K. (1991). *Alcohol in human violence*. New York, NY: Guilford Press.

Peterson, M. (2005). *Intelligence-led policing: The new intelligence architecture*. Washington, DC: US Department of Justice, Office of Justice Programs.

Peterson, J. L., Mihajlovic, S., & Gilliland, M. (1984). *Forensic evidence and yhe police: The effects of scientific evidence on criminal investigations*. Washington, DC: US Department of Justice, National Institute of Justice.

Peterson, R. D., & Hagan, J. (1984). Changing conceptions of race: Towards an account of anomalous findings of sentencing research. *American Sociological Review*, 49(1), 56-70.

Peterson, R. D., & Krivo, L. J. (1993). Racial segregation and Black urban homicide. *Social Forces, 71*(4), 1001-1026.

Pizarro, J. M., Zgoba, K. M., & Jennings, W. G. (2011). Assessing the interaction between offender and victim criminal lifestyles & homicide type. *Journal of Criminal Justice, 39*(5), 367-377.

Pridemore, W. A. (2002). What we know about social structure and homicide: A review of the theoretical and empirical literature. *Violence and Victims, 17*(2), 127-156.

Puckett, J. L., & Lundman, R. J. (2003). Factors affecting homicide clearances: Multivariate analysis of a more complete conceptual framework. *Journal of Research in Crime and Delinquency, 40*(2), 171-193.

Putnam, R. (2000). *Bowling alone: The collapse and revival of American community.* New York, NY: Simon and Schuster.

Putnam, R. D. (2007). E pluribus unum: Diversity and community in the twenty-first century the 2006 Johan Skytte prize lecture. *Scandinavian Political Studies, 30*(2), 137-174.

Ramirez, I. L., & Straus, M. A. (2006). The effect of question order on disclosure of intimate partner violence: An experimental test using the conflict tactics scales. *Journal of Family Violence, 21*(1), 1-9.

Randall, B. (1997). *Death investigation: The basics*. Galen Press.

Ratcliffe, J. H. (2012). *Intelligence-led policing*. New York, NY: Routledge.

Rattner, A., Turjeman, H., & Fishman, G. (2008). Public versus private defense: Can money buy justice? *Journal of Criminal Justice*, 36(1), 43-49.

Reasons, C. E., Francis, T., & Kim, D. (2010). The ideology of homicide detectives: A cross-national study. *Homicide Studies*, *14*(4), 436-452.

Redmond, M., & Baveja, A. (2002). A data-driven software tool for enabling cooperative information sharing among police departments. *European Journal of Operational Research, 141*(3), 660-678.

Ree, M. J., Earles, J. A., & Teachout, M. S. (1994). Predicting job performance: Not much more than g. *Journal of Applied Psychology, 79*(4), 518-524.

Reed, B., Brown, B., & Bower, D. J. (2000). Perceptions of the police and fear of crime in a rural setting: Utility of a geographically focused survey for police services, planning and assessment. *Criminal Justice Policy Review, 11*(4), 275-298.

Regoeczi, W. C., & Jarvis, J. P. (2013). Beyond the social production of homicide rates: Extending social disorganization theory to explain homicide case outcomes. *Justice Quarterly, 30*(6), 983-1014.

Regoeczi, W. C., Jarvis, J., & Riedel, M. (2008). Clearing murders is it about time? *Journal of Research in Crime and Delinquency, 45*(2), 142-162.

Regoeczi, W. C., Kennedy, L. W., & Silverman, R. A. (2000). Uncleared homicides a Canada/United States comparison. *Homicide Studies*, *4*(2), 135-161.

Reisig, M. D., & Parks, R. B. (2000). Experience, quality of life, and neighborhood context: A hierarchical analysis of satisfaction with police. *Justice quarterly*, *17*(3), 607-630.

Reisig, M. & Parks, R. (2004). Can community policing help the truly disadvantaged? *Crime & Delinquency, 50*(2), 139

Reisig, M. D., & Parks, R. B. (2000). Experience, quality of life, and neighborhood context: A hierarchical analysis of satisfaction with police. *Justice Quarterly*, *17*(3), 607-630.

Reiss, A. J. (1971, 1972). *The police and the public.* New Haven, CT: Yale University Press

Richardson, D. A., & Kosa, R. (2001). *An examination of homicide clearance rates: Foundation for the development of a homicide clearance model*. Washington, DC:

Police Executive Research Forum.

Riedel, M. (1993). *Stranger violence: A theoretical inquiry*. New York: Garland.

Riedel, M. (1994). Violence homicide and clearances: Third parties as informants. Unpublished manuscript, Southern Illinois University, Carbondale.

Riedel, M. (1995). Getting away with murder: An examination of arrest clearances. *Trends, Risks, and Interventions in Lethal Violence: Proceedings of the Third Annual Spring Symposium of the Homicide Research Working Group.* Washington, DC: National Institute of Justice, 91-98.

Riedel, M. (1999). The decline of arrest clearances for criminal homicide: Causes, correlates, and third parties. *Criminal Justice Policy Review, 9*(3-4), 279-305.

Riedel, M. (2008). Homicide arrest clearances: A review of the literature. *Sociology Compass*, *2*(4), 1145-1164.

Riedel, M., & Boulahanis, J. G. (2007). Homicides exceptionally cleared and cleared by arrest an exploratory study of police/prosecutor outcomes. *Homicide Studies*, *11*(2), 151-164.

Riedel, M., & Jarvis, J. (1998). The decline of arrest clearances for criminal homicide: Causes, correlates, and third parties. *Criminal Justice Policy Review, 9*, 279–306.

Riedel, M., & Rinehart, A. (1994). Clearance, missing data, and murder. In *annual meeting of the Academy of Criminal Justice Sciences,* Chicago, IL.

Riedel, M., & Rinehart, T. A. (1996). Murder clearances and missing data. *Journal of Crime and Justice*, *19*(2), 83-102.

Riksheim, E. & Chermack, S. M. (1993). Causes of police behavior revisited. *Journal of Criminal Justice*, *21*(4), 353-382.

Rinehart, T. A. (1994). *An analysis of murder clearances in Chicago: 1981-1991*. Unpublished master's thesis, Southern Illinois University, Carbondale.

Robert, G., & Hockey, J. (1997). Compensatory control in the regulation of human performance under stress and high workload: A cognitive-energetical framework. *Biological psychology*, *45*(1), 73-93.

Roberts, A. (2007). Predictors of homicide clearance by arrest: An event history analysis of NIBRS incidents. *Homicide Studies*, *11*(2), 82-93.

Roberts, A., & Lyons, C. J. (2011). Hispanic victims and homicide clearance by arrest. *Homicide Studies, 15*(1), 48-73.

Rodriguez, D., Patel, R., Bright, A., Gregory, D., & Gowing, M. K. (2002). Developing competency models to promote integrated human resource practices. *Human Resource Management, 41*(3), 309-324.

Rosenfeld, R., & Messner, S. F. (1991). The social sources of homicide in different types of societies. *Sociological Forum, 6*(1), 51-70.

Rosenfeld, R., Jacobs, B. A., & Wright, R. (2003). Snitching and the code of the street. *British Journal of Criminology, 43*(2), 291-309.

Rossi, P. H., Wright, J.D., & Anderson, A. B. (Eds.) (1983). *Handbook of survey research*. San Diego, CA: Academic Press.

Rossmo, D. K. (2008). *Criminal investigative failures*. CRC Press.

Roycroft, M. (2007). What solves hard to solve murders. *Journal of Homicide and Major Incident Investigation, 3*(1), 93–107.

Russell, K. K. (1998). *The color of crime: Racial hoaxes, White fear, Black protectionism, police harassment, and other macroaggressions.* New York: New York University Press.

Rydberg, J., & Pizarro, J. M. (2014). Victim lifestyle as a correlate of homicide clearance. *Homicide Studies, 18*(4), 342-362.

Sampson, R., & Lauritsen, J. (1997). Racial and ethnic disparities in crime and criminal justice in the United States. In *Ethnicity, Crime, and Immigration* (pp. 311-374). Chicago: IL: University of Chicago.

Sampson, R. J. (1987). Urban Black violence: The effect of male joblessness and family disruption. *American Journal of Sociology*, 93(2), 348-382.

Sampson, R. J. (2012). *Great American city: Chicago and the enduring neighborhood effect*. Chicago, IL: University of Chicago Press.

Sampson, R. J., & Bartusch, D. J. (1998). Legal cynicism and (subcultural?) tolerance of deviance: The neighborhood context of racial differences. *Law and Society Review, 32*(4), 777-804.

Sampson, R. J., & Groves, W. B. (1989). Community structure and crime: Testing social-disorganization theory. *American Journal of Sociology*, 94(4), 774-802.

Sampson, R. J., & Wilson, W. J. (1995). Toward a theory of race, crime, and urban inequality. In S. L. Gabbidon & H. T. Greene (Eds.), *Race, crime, and justice: A reader*, Chapter 13, (pp. 177-190). New York: NY, Routledge.

Sampson, R. J., Raudenbush, S. W., & Earls, F. (1997). Neighborhoods and violent crime: A multilevel study of collective efficacy. *Science*, *277*(5328), 918-924.

Sanders, W. B. (1977). *Detective work: A study of criminal investigations.* New York, NY: A Division of Macmillan Publishing Co., Inc.

Scarborough, B. K., Like-Haislip, T. Z., Novak, K. J., Lucas, W. L., & Alarid, L. F. (2010). Assessing the relationship between individual characteristics, neighborhood context, and fear of crime. *Journal of Criminal Justice*, *38*(4), 819-826.

Schippmann, J. S., Ash, R. A., Battista, M., Carr, L., Eyde, L.D., Hesketh, B., Kehoe, J., … & Sanchez, J. I. (2000). The practice of competency modeling. *Personnel Psychology*, *53*(3), 703–740.

Schmidt, F. L., & Hunter, J. E. (1993). Tacit knowledge, practical intelligence, general mental ability, and job knowledge. *American Psychological Association*, *2*(1), 8-9.

Schroeder, D. A., & White, M. D. (2009). Exploring the use of DNA evidence in homicide investigations: Implications for detective work and case clearance. *Police Quarterly, 12*(3), 319-342.

Schuman, H., & Presser, S. (1996). *Questions & answers in attitude surveys: Experiments on question form, wording, and context*. Thousand Oaks, CA: Sage Publications Ltd.

Shaffer, J. N. (2003). *The victim-offender overlap: Specifying the role of peer groups* (Doctoral dissertation, The Pennsylvania State University).

Shaffer, J. N., & Ruback, R. B. (2002). *The relationship between victimization and offending among juvenile*s. Washington, DC: Office of Juvenile Justice and Delinquency Prevention.

Shaw, C. R., McKay, H. D., & Hayner, N. S. (1942). *Juvenile delinquency and urban areas: A study of rates of delinquents in relation to differential characteristics of local communities in American cities*. Chicago: University of Chicago Press.

Schuck, A. M., Rosenbaum, D. P., & Hawkins, D. F. (2008). The influence of race/ethnicity, social class, and neighborhood context on residents' attitudes toward the police. *Police Quarterly*, *11*(4), 496-519.

Sheatsley, P. B. (1983). *Handbook of survey research*. San Diego, CA: Academic Press.

Sherman, L. W. (1997). *Evidence-based policing*. Washington, DC: Police Foundation.

Sherman, L. W., Gartin, P. R., & Buerger, M. E. (1989). Hot spots of predatory crime: Routine activities and the criminology of place. *Criminology, 27*(1), 27-56.

Sherman, L. W., Gottfredson, D. C., MacKenzie, D. L., Eck, J., Reuter, P., & Bushway, S. D. (1998). What Works?. In *What Doesn't, What's Promising: a report to the United States Congress, National Institute of Justice*.

Shields, M. A., & Ward, M. (2001). Improving nurse retention in the National Health Service in England: The impact of job satisfaction on intentions to quit. *Journal of Health Economics, 20*(5), 677-701.

Shihadeh, E. S., & Steffensmeier, D. J. (1994). Economic inequality, family disruption, and urban black violence: Cities as units of stratification and social control. *Social Forces, 73*(2), 729-751.

Shulman, L. S. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard Educational Review, 57*(1), 1-23.

Siedentop, D., & Eldar, E. (1989). Expertise, experience, and effectiveness. *Journal of Teaching in Physical Education, 8*(3), 254-260.

Silverman, E. B. (1999). *NYPD battles crime: Innovative strategies in policing*. Boston, MA: Northeastern University Press, UPNE.

Silverman, I. J., Vega, M., & Danner, T. A. (1993). The female murderer. In A. V. Wilson (Ed.), *Homicide: The Victim/Offender Connection,* (pp. 175-190). Cincinnati, OH: Anderson.

Silverman, R. A., & Kennedy, L. W. (1987). Relational distance and homicide: The role of the stranger. *Journal of Criminal Law and Criminology, 78*(2), 272-308.

Simon, David. (1991, 2001). *Homicide: A year on the killing streets*. Boston: Houghton Mifflin.

Skogan, W. G. (1994). The impact of community policing on neighborhood residents. In Dennis Resenbaum (Ed.), *The Challenge of Community Policing.* Thousand Oaks: Sage Publications.

Smith, D. A., Visher, C. A., & Davidson, L. A. (1984). Equity and discretionary justice: The influence of race on police arrest decisions. *Journal of Criminal Law and Criminology, 75*(1), 234-249.

Smith, D. A., Visher, C. A., & Davidson, L. A. (1984). Equity and discretionary justice: The influence of race on police arrest decisions. *Journal of Law and Criminology, 75*(1), 234-249.

Smith, E. L., & Cooper, A. (2013). *Homicide in the U.S. known to law enforcement, 2011*. Washington, DC: US Department of Justice, Office of Justice Programs, Bureau of Justice Statistics, NCJ 243035.

Smith, M. D., & Zahn, M. A. (Eds.). (1999). *Homicide studies: A sourcebook of social research* (pp. 195-210). Thousand Oaks, CA: Sage Publication, Inc.

Smith, M. R., & Alpert, G. P. (2002). Searching for direction: Courts, social science, and the adjudication of racial profiling claims. *Justice Quarterly, 19*(4), 673-703.

Snyder, H. N. (2008*). Juvenile arrests 2005*. Washington, DC: Office of Juvenile Justice and Delinquency Prevention.

Snyder, H. N. (2011). *Arrest in the United States, 1980-2009*. US Department of Justice, Office of Justice Programs, Bureau of Justice Statistics.

Snyder, H. N., & Sickmund, M. (2006). *Juvenile offenders and victims: 2006 national report.* Washington, DC: US Office of Juvenile Justice and Delinquency Prevention.

Snyder, L. (1967). *Homicide investigation: Practical information for coroners, police officers, and other investigators.* Springfield, IL: Charles C. Thomas.

Spohn, C. C. (2000). Thirty years of sentencing reform: The quest for a racially neutral sentencing process. *Criminal Justice, 3*, 427-501.

Spunt, B., Goldstein, P., Brownstein, H., & Fendrich, M. (1994). Alcohol and homicide: Interviews with prison inmates. *Journal of Drug Issues, 24*(1-2), 143-163.

Spunt, B., Lesieur, H., Hunt, D., & Cahill, L. (1995). Gambling among methadone patients. *Substance Use & Misuse*, *30*(8), 929-962.

Steffensmeier, D., & Allan, E. (2000). Looking for patterns: Gender, age, and crime. In Belmont, S. J. (Ed), *Criminology: A contemporary handbook*, (pp. 85-128). Independence, KY: Wadsworth.

Stewart, E. A., Schreck, C. J., & Simons, R. L. (2006). "I ain't gonna let no one disrespect me:" Does the code of the street reduce or increase violent victimization among African American adolescents? *Journal of Research in Crime and Delinquency*, *43*(4), 427-458.

Stoutland, S. E. (2001). The multiple dimensions of trust in resident-police relations in Boston. *Journal of Research in Crime and Delinquency, 38*(3), 226-256.

Sunshine, J., & Tyler, T. R. (2003). The role of procedural justice and legitimacy in shaping public support for policing. *Law & Society Review*, *37*(3), 513-548.

Swider, B. W., & Zimmerman, R. D. (2010). Born to burnout: A meta-analytic path model of personality, job burnout, and work outcomes. *Journal of Vocational Behavior*, *76*(3), 487-506.

Tabachnick, B. G., & Fidell, L. S. (2001). *Using multivariate statistics (4th ed.).* Needham Heights, MA: Allyn & Bacon.

Taylor, J., Twigg, L., & Mohan, J. (2010). Investigating perceptions of antisocial behaviour and neighbourhood ethnic heterogeneity in the British Crime Survey. *Transactions of the Institute of British Geographers*, *35*(1), 59-75.

Taylor, S. P., & Leonard, K. E. (1983). Alcohol and human physical aggression. *Aggression: Theoretical and Empirical Reviews, 2*, 77-101.

Terkel, S. (Ed.). (1974). Working: People talk about what they do all day and how they feel about what they do. The New Press.

Tesluk, P. E., & Jacobs, R. R. (1998). Toward an integrated model of work experience. *Personnel Psychology*, *51*(2), 321-355.

Tett, R. P., & Burnett, D. D. (2003). A personality trait-based interactionist model of job performance. *Journal of Applied Psychology*, *88*(3), 500.

Thornberry, T. P. (1998). Membership in youth gangs and involvement in serious and violent offending. In R. Loeber & D. P. Farrington (Eds.), *Serious and violent juvenile offenders: Risk factors and successful interventions*. Thousand Oaks, CA: Sage Publications.

Tompson, L., & Townsley, M. (2010). (Looking) back to the future: Using space-time patterns to better predict the location of street crime. *International Journal of Police Science & Management*, *12*(1), 23-40.

Tonry, M. (1995). *Malign neglect: Race, crime, and punishment in America*. New York, NY: Oxford University Press.

Topalli, V., Wright, R., & Fornango, R. (2002). Drug dealers, robbery and retaliation. vulnerability, deterrence and the contagion of violence. *British Journal of Criminology*, *42*(2), 337-351.

Trussler, T. (2010). Explaining the changing nature of homicide clearance in Canada. *International Criminal Justice Review*, *20*(4), 366-383.

Tuch, S. A., & Weitzer, R. (1997). Trends: Racial differences in attitudes toward the police. *Public Opinion Quarterly*, 61(4), 642-663.

Twigg, L., Taylor, J., & Mohan, J. (2010). Diversity or disadvantage? Putnam, Goodhart, ethnic heterogeneity, and collective efficacy. *Environment and Planning A*, *42*(6), 1421-1438.

Tyler, T. R. (2004). Enhancing police legitimacy. *The Annals of the American Academy of Political and Social Science*, *593*(1), 84-99.

Tyler, T. R. (2006). Psychological perspectives on legitimacy and legitimation. *Annual Review of Psychology*, *57*, 375-400.

Tyler, T. R., & Fagan, J. (2008). Legitimacy and cooperation: Why do people help the police fight crime in their communities? *Ohio State Journal of Criminal Law*, *6*, 231.

Tyler, T. R., & Huo, Y. (2002). *Trust in the law: Encouraging public cooperation with the police and Courts*. New York, NY: Russell Sage Foundation.

Uniform Crime Report. (2012). *Crime in the United States, 2011*. Washington, DC: US Department of Justice, Federal Bureau of Investigations.

US Census Bureau. (2012). Largest US metropolitan areas by population, 1990-2010. *In* Janssen, S. (Ed.), *World Almanac and Book of Facts 2012*, 612. New York, NY: World Almanac Books.

Van Maanen, J. (1978). *Policing: A view from the street*. Tucson, AZ: Goodyear Publishing Company, Inc.

Vaughn, M. G., DeLisi, M., Beaver, K. M., & Howard, M. O. (2009). Multiple murder and criminal careers: A latent class analysis of multiple homicide offenders. *Forensic Science International*, *183*(1-3), 67–73.

Viswesvaran, C., & Ones, D. S. (2002). Examining the construct of organizational justice: A meta-analytic evaluation of relations with work attitudes and behaviors. *Journal of Business Ethics*, *38*(3), 193-203.

Vito, G. F., Walsh, W. F., & Kunselman, J. (2005). Community policing: The middle manager's perspective. *Police Quarterly*, 8(4), 490-511.

Waegel, W. B. (1981). Case routinization in investigative police work. *Social Problems*, *28*(3), 263-275.

Walker, S., Spohn, C., & DeLone, M. (2011). *The color of justice: Race, ethnicity, and crime In America*. Independence, KY: Cengage Learning.

Walker, Samuel. (1992). *The police in America: An introduction*. New York: McGraw-Hill.

Walsh, W. F. (2001). Compstat: An analysis of an emerging police managerial paradigm. *Policing: An International Journal of Police Strategies & Management*, *24*(3), 347-362.

Walters, G. D. (1990). *The criminal lifestyle: Patterns of serious criminal conduct*. Thousand Oaks, CA: Sage Publications.

Wang, G., Chen, H., & Atabakhsh, H. (2004). Criminal identity deception and deception detection in law enforcement. *Group Decision and Negotiation*, *13*(2), 111-127.

Warner, B. D., Swartz, K., & Hawk, S. R. (2015). Racially homophilous social ties and informal social control. *Criminology*, *53*(2), 204-230.

Warner, B. D. (2007). Directly intervene or call the authorities? A study of forms of neighborhood social control within a social disorganization framework. *Criminology*, *45*(1), 99-129.

Watson, D. R. (1983). The presentation of a victim and motive in discourse: The case of police interrogations and interviews. *Victimology*. *8*(1-2), 31-52.

Weinberg, S. L., & Abramowitz, S. K. (2008). *Statistics using SPSS: An integrative approach*. Cambridge University Press.

Weisburd, D., & Baraga, A. A. (Eds.). (2006). *Police innovation: Contrasting perspectives*. New York, NY: Cambridge University Press.

Weisburd, D. L., Groff, E. R., & Yang, S. M. (2012). *The criminology of place: Street segments and our understanding of the crime problem*. Oxford: Oxford University Press.

Weisburd, D., & Britt, C. (2007). *Statistics in criminal justice*. New York, NY: Springer Science & Business Media.

Weisburd, D., & Mazerolle, L. G. (2000). Crime and disorder in drug hot spots: Implications for theory and practice in policing. *Police Quarterly*, *3*(3), 331-349.

Weisburd, D., & Telep, C. W. (2012). Spatial displacement and diffusion of crime control benefits revisited: New evidence on why crime doesn't just move around the corner. In Tilley, N., & Farrell, G. (eds.), *The reasoning criminologist: Essays in honor of Ronald V. Clarke*, (pp.142-159). New York, NY: Routledge.

Weisburd, D., McElroy, J., & Hardyman, P. (1988). Challenges to supervision in community policing: Observations on a pilot project. *American Journal of Police, 7*(2), 29-50.

Weisburd, D., Morris, N. A., & Groff, E. R. (2009). Hot spots of juvenile crime: A longitudinal study of arrest incidents at street segments in Seattle, Washington. *Journal of Quantitative Criminology*, *25*(4), 443-467.

Weiss, A., & Chermak, S. M. (1998). The news value of African-American victims: An examination of the media's presentation of homicide. *Journal of Crime and Justice, 21*(2), 71-88.

Weitzer, R., & Tuch, S. A. (2005). Determinants of public satisfaction with the police. *Police Quarterly, 8*(3), 279-297.

Weitzer, R., Tuch, S. A., & Skogan, W. G. (2008). Police–community relations in a majority-Black city. *Journal of Research in Crime and Delinquency, 45*(4), 398-428.

Wellford, C., & Cronin, J. (1999, 2000). *An analysis of variables affecting the clearance of homicides: A multisite study*. Washington, DC: National Institute of Justice, Justice Research and Statistics Association.

Welsh, B. C., & Farrington, D. P. (2009). Public area CCTV and crime prevention: An updated systematic review and meta-analysis. *Justice Quarterly*, *26*(4), 716-745.

Welsh, W. N., & Harris, P. W. (2008). *Criminal justice: Policy & planning*. (3rd ed). Newark, NJ: Matthew Bender & Company, Inc.

Weston, P. B., & Wells, K. M. (2003). *Criminal investigation: Basic perspectives*. Upper Saddle River, NJ: Prentice Hall.

Wikstrom, P. H., & Sampson, R. J. (Eds.). (2006). *The explanation of crime: Contexts, mechanisms and development*. Cambridge, U.K.: Cambridge University Press.

Williams, K., & Flewelling, R. L. (1987). Family, acquaintance, and stranger homicide: Alternative procedures for rate calculations. Criminology, *25*(3), 543-560.

Williams, K. R., & Flewelling, R. L. (1988). The social production of criminal homicide: A comparative study of disaggregated rates in American cities. *American*

Sociological Review, *5*(3), 421–431.

Wilson, J. M., Hiromoto, S., Fain, T., Tita, G., & Riley, K. J. (2004). *Homicide in San Diego*. Washington, DC: Office of Justice Programs, WR-142-OJP.

Wilson, M., Johnson, H., & Daly, M. (1995). Lethal and nonlethal violence against wives. *Canadian Journal of Criminology*, *37*, 331-361.

Wilson, J. Q. (1983). *Thinking about crime.* New York: Vintage.

Wilson, J. Q., & Boland, B. (1976). Crime. In William Gorham and Nathan Glazer (Eds.), *The urban predicament.* Washington, D.C.: The Urban Institute.

Wilson, J. Q., & Kelling, G. L. (1982). Broken windows. *Atlantic Monthly*, *249*(3), 29-38.

Witkin, G., Creighton, L. L., & Guttman, M. (1994). More murder mysteries. *US News and World Report*, 28-34.

Wolfgang, M., & Ferracuti, F. (1967). *The subculture of violence: Towards an integrated theory in criminology.* New York, NY: Tavistock.

Wolfgang, M. E. (1958). *Patterns in criminal homicide.* Philadelphia, PA: University of Pennsylvania Press.

Wolfgang, M. E., Figlio, R. M., & Sellin, T. (1972). *Delinquency in a birth cohort*. Chicago, IL: University of Chicago Press.

Wolfgang, M. F. (1957). Victim precipitated criminal homicide. *Journal of Criminal Law, Criminology & Police Science*, *48*(1), 1-11.

Wright, R. E. (1995). Logistic regression. In L. G. Grimm & P. R. Yarnold (Eds.), *Reading and understanding multivariate statistics* (pp. 217-244). Washington, DC, US: American Psychological Association

Wright, R., Topalli, V., & Jacques, S. (2014). Crime in motion: Predation, retaliation, and the spread of urban violence. In B. Turner & G. Schlee (Eds.), *On retaliation: toward an interdisciplinary understanding of a basic human condition*. New York, NY: Berghahn Books.

Wright, T. A., & Cropanzano, R. (1998). Emotional exhaustion as a predictor of job performance and voluntary turnover. *Journal of Applied Psychology*, *83*(3), 486.

Wyant, B. R. (2008). Multilevel impacts of perceived incivilities and perceptions of crime risk on fear of crime: Isolating endogenous impacts. *Journal of Research on*

Crime and Delinquency, 45(1), 39-64.

Xu, Y. (2008). Characteristics of homicide events and the decline in homicide clearance: A longitudinal approach to the dynamic relationship, Chicago 1966-1995. *Criminal Justice Review, 33*(4), 453-479.

Zahn, M. A. (1989). Homicide in the twentieth century: Trends, types, and causes. *Violence in America, 1*, 216-34.

Zahn, M. A., & McCall, P. L. (1999). Trends and patterns of homicide in the 20th-century United States. In M. D. Smith & M. A. Zahn (Eds.), *Homicide: A sourcebook sf social research*, Chapter 1 (pp. 9-23). Thousand Oaks, CA: Sage Publications.

Zhao, J. S., Scheider, M. C., & Thurman, Q. (2003). A national evaluation of the effect of COPS grants on police productivity (arrests) 1995-1999. *Police Quarterly, 6*(4), 387-409.

Zhao, J. S., Scheider, M. C., & Thurman, Q. (2002). Funding COPS to reduce crime: Have COPS grants made a difference? *Criminology & Public Policy, 2*(1), 7-32.

Zimring, F. E., & Zuehl, J. (1986). Victim injury and death in urban robbery: A Chicago study. *The Journal of Legal Studies*, 15(1), 1-40.

Vita

Shila René Hawk was born in Springfield, Missouri in 1984. She received Bachelor's degrees in Sociology and Criminal Justice (2008) and a Masters in Sociology (2010) from the University of Arkansas. Her thesis was entitled "*College Students' Perceptions of the Police: The role of Justice Education*." Shila's research interests are focused on evidence-based policy and practice development. This dissertation completes the requirements for her Doctorate of Philosophy in Criminal Justice and Criminology from Georgia State University.

Shila has experience conducting research throughout the criminal justice system and collaborating on scholarly articles. She has participated in and managed data collection efforts, using a variety of methods and worked on a range of secondary dataset types. She has also been involved in over a dozen presentations at universities and at national and international conferences. Her work appears in several outlets, including *Criminology*, *The British Journal of Criminology*, *Justice Quarterly*, *The Journal of Criminal Justice Education,* and *The American Journal of Criminal Justice*. She has received multiple awards for her efforts as both a graduate student and researcher. Other honors include serving as an Urban Fellow and Graduate School Ambassador. Currently, Shila works at Applied Research Services, Inc. where she participates in numerous projects. Her permanent address is 1425 S. Charing Ave. Springfield, MO 65809.