ABSTRACT

Title of Document: Homicide Clearances: An Examination of Race and Police Investigative Effort

Thomas Stanley Alexander, Doctor of Philosophy, 2012

Directed By: Dr. Charles F. Wellford, Criminology/Criminal Justice

Violent crime saw a decrease from 1999 through 2008. Coupled with this decrease have been decreasing homicide clearance rates. Homicide clearance rates have declined from 91% in 1965 to a 64% in 2008 (U.S. Department of Justice, FBI, 1965 & 2008). Research interest is increasing on homicide clearances yet there is still paucity in the literature.

Racial disparity has been a concern throughout the criminal justice system and the effects of race on homicide clearances is an area of concern. Along with the extralegal variable of race, very little attention has been given to the role that the police investigator plays in clearing a homicide case. Investigators are key role players since they are responsible for investigating the crime and bringing it to a conclusion. Despite the emergence of additional research addressing homicide clearances, there has been little attention paid to police practices.

The two main hypotheses used to explain homicide clearance rates are the discretionary and non-discretionary hypothesis. The discretionary hypothesis focuses on the victim's characteristics stating that the amount of law applied in a case will depend on victim or offender status. The non-discretionary hypothesis states that the seriousness of the offense and the pressures to solve it, both within and outside the organization, will lead to maximum investigative effort no matter what the race, age, or gender of the victim or offender (Roberts and Lyons, 2009).

This dissertation is a secondary analysis of the Wellford and Cronin (1999) study which examined factors affecting the ability of police agencies to clear homicides. My research tests the effects race has on homicide case status when effort is considered and when the covariates of severity were also considered since severity can drive the effort used in working a case.

The results are supportive of the non-discretionary hypothesis where case characteristics and not the extra-legal factor of race have an effect on case status. Race dyad effects are spurious and results indicate that both effort and severity are significant in predicting homicide case closure. Future research should continue to explore investigative effort, intra-severity, as well as the race dyad effects.

HOMICIDE CLEARANCES: AN EXAMINATION OF RACE AND POLICE INVESTIGATIVE EFFORT

By

Thomas Stanley Alexander

Dissertation submitted to the Faculty of the Graduate School of the
University of Maryland, College Park, in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
2012

Advisory Committee:
Professor Charles F. Wellford, Chair
Dr. Brett Chapman
Professor Joseph Lengermann
Professor Jean McGloin
Professor Raymond Paternoster

Dedication

This Dissertation is dedicated to my entire family, some of whom have already departed this earth, for their love, understanding and patience through this long journey.

Acknowledgements

First and foremost, none of this would have been possible without the grace of Almighty God and my Lord and Savior Jesus Christ. I thank God for the family he has given me because I realize they have made a tremendous sacrifice along this long journey with me. To my wife Michelle, my sons Tim and Aaron, and daughter Sydney, thank you and I love you all. Your support has made this possible.

My journey has been a long one and from the initial contact through the final defense, Dr. Charles Wellford has been both a mentor and friend. Dr. Wellford has been a Godsend to me and his guidance through my journey cannot be explained in words. Through personal losses and other tough times, Dr. Wellford has been there with both support and guidance. Dr. Wellford, you are truly a great man.

I would also like to thank Dr. Raymond Paternoster. One of my first classes at Maryland was a theory in criminology course that he instructed. I was amazed at the knowledge and quality of instruction that I received. Dr. Paternoster is a true master of his craft. Little did I know at that time that Dr. Paternoster and I would again meet with him serving on my dissertation committee. The support he provided me statistically was not only a guiding light but became a continuing learning experience. When the stress was increasing he was always there to lend reassurance and support. Saying thank you just does not seem like it does justice to they way I feel but thank you.

I also need to thank the remaining members of my committee, Dr. Brett Chapman, Dr. Joseph Lengermann, and Dr. Jean McGloin. Their input and feedback

at both the proposal defense as well as the final dissertation defense were greatly appreciated and without them I could have never successfully completed my work.

I also need to thank friends along the way who stood by me in a supportive fashion with both advice and moral support. I give my heartfelt thanks to Dr. Tom Austin, Dr. Matt Fetzer and Dr. Laura Wycoff. I also need to recognize a former classmate, Dr. Dave Myers. As Dave and I parted ways and he left the University of Maryland and headed off into a career he told me "Don't give up the faith." I never did and I thank him for those words of encouragement. A heartfelt thanks also goes out to Dr. Steve Kowa who continued to give me confidence as well as moral support along the way. Finally, I want to thank all the students and faculty that offered study materials when a lightning strike destroyed my home and my study materials. I do apologize if I have left someone out who has helped me along the way since there have been many but my neglect has not been intentional.

People touch others in ways they never realize. My experience with the entire criminology department at the University of Maryland at College Park has left a lasting impression on me for life. I am proud to be a part of the "best" Doctoral program in Criminology and Criminal Justice in the world. As I leave to further pursue my academic interests, I can truly say, I am a "Terrapin for Life."

Finally, I pay tribute to my family for the love and support they have shown me throughout the years. My mom, Phyllis Alexander and my dad, Stanley Alexander instilled the value of education in me from my early years. I started my journey at Maryland with the encouragement of my mom but she could not finish the race with me since God called her home before I could finish. My son Tim has been on this

journey with me the longest and I say thanks for understanding. I did my best at trying to study and read while being there for you too through those early years of your life at home, school, and sports. I am proud of you for all you too have achieved and accomplished. To my wife Michelle, words cannot describe what you mean to me. You too have suffered through the stress of this accomplishment. Thank you for being the loving wife that you are and thank you for the pushes and prods to get out the door at times and to finish this paper. To my youngest two children, Sydney and Aaron, thank you for being there also. I wish I could take back all the "sorry I have to read for school" comments but rest assured, I tried to give you everything I could and more. I love you all more than words can convey.

Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction

"All roads in American criminology eventually lead to issues of race; the directness of the route varies, however."
LaFree and Russell (1993)

The United States experienced a substantial drop in the crime rate during the 1990s. Putting aside a slight increase in violent crime from 2005 to 2006, the U.S. has experienced an overall drop in violent crime rates from 1999 through 2008. Preliminary crime statistics for 2009 also show a 5.5% decrease in violent crime and a 4.9% decline in property crime when compared to 2008. Coupled with this overall decrease in crime rates is a decrease in the overall homicide clearance rates in the United States. This trend has shown a decline from a 91% clearance rate in 1965 to a 64% rate in 2008 (U.S. Department of Justice, FBI, 1965 & 2008). One emerging field of research in policing is in the area of homicide clearance. The decline of homicide clearances over the past several decades has compelled researchers to study factors that influence the homicide clearance rate. Race is just one extralegal variable that we find being tested within the homicide literature.

Homicide clearance research that focuses on the race variable usually tests for the effects of the victim's race. Along with the race of the offender, the role that the investigator plays in clearance rates is also overlooked. Investigators are key role players since they are responsible for investigating the crime and bringing it to a conclusion. Despite the emergence of additional research addressing homicide clearances, there has been little attention paid to either the offender's race or to police practices. The studies that do exist in the homicide clearance literature focus on extra

legal variables of the race of the victim, age, and gender as well as case specific variables such as weapons, location of offense and victim-offender relationships.

Statement of the Problem

When we turn to the homicide clearance literature there are two major approaches that have been used to explain the clearance rates for homicides. The first approach looks at extralegal characteristics of the victim. Often missing from the research explanation are offender characteristics. The research approach which focuses on the victim to explain crime clearances is based on Black's (1976) quantity of law hypothesis. Black explained that the amount of law that is applied to clear a case is dependent on the effort of the investigator. This effort can be measured in how long the case is "worked" as well as by how many resources are used in conducting the investigation. According to Black (1976), this quantity of law will vary by the status of the offender and victim. A case where a higher status victim is involved will result in more law being applied to the case and a greater likelihood of case clearance. There is some disagreement among the literature as to support for the devaluation hypothesis. The devaluation that may exist could be police devaluation as well as community devaluation (Keel et al., 2009). As reported by Roberts and Lyons (2009), there are studies that examined race and those studies reported clearances are less likely for non-White victims (Addington 2008; Alderden and Lavery 2007; Lee 2005; Marche' 1994). The one key to my research is the resources that are used in working a case. It is important to be able to identify which resources have an effect on clearance rates. Knowing which acts the investigator performs that have an effect on clearance rates is important from a strategic standpoint.

The second explanation that we see within the literature is the nondiscretionary approach. This hypothesis states that the seriousness of the offense and the pressures to solve it, both within the organization and from the public, will lead to maximum investigative effort no matter what the race, age, or gender of the victim or offender (Roberts and Lyons, 2009). This approach emphasizes those characteristics of the case that are present that may lead to an arrest. There are findings from the literature that support the effects of case characteristics. Case factors appear to influence case clearances more often than extralegal factors such as the race of the victim (Litwin, 2004; Roberts and Lyons, 2009; Puckett and Lundman, 2003; Regoeczi, Kennedy, and Silverman, 2000; Riedel and Rinehart, 1996).

An additional neglected research area in the homicide clearance literature is the role of the criminal investigator. Perhaps research has pushed criminal investigations to the rear of the research agenda since it has been reported that investigators only spend about 7% of their time performing tasks that help solve crimes (Chaiken, Greenwood, and Petersilia, 1976). In a RAND study regarding the Criminal Investigation Process, the authors (Chaiken et al., 1976) reported that clearances are based on the input that street officers as well as the public give the investigator rather than on any specific criminal investigative technique. This fact may explain the absence of the investigator's role from the research agenda. Even though criminal investigations are a very important part of policing very little is known about the investigator's effectiveness. Criminal investigators are key role players in the homicide investigation. Arrests hinge on criminal investigative decisions. Failing to follow up a lead or failing to gather physical evidence can prove

fatal to the success of case closure. According to the RAND report (Chaiken et al., 1976), 2.7% of all Part I case clearances can be attributed to special investigative techniques. Included within this 2.7% are the highly visible and publicized crimes of homicide and commercial burglaries. It is imperative to examine investigative effort since such a small percentage of difficult cases are solved. Chaiken et al. (1976) reported that the quality of the criminal investigator's effort affects the clearance rate more so in the three crimes of homicide, robbery and commercial theft. It becomes very important to place an emphasis on those tasks that are shown to increase case clearance. It only follows then, that knowing which investigator actions are more fruitful in attaining clearances will allow for a more efficient handling of homicide cases.

Proposed Study

The sample that is used for this study comes from previous research conducted by Wellford and Cronin (1999). A secondary analysis will be conducted using their data. In the piece by Wellford and Cronin (1999), the purpose of their study was to look at the factors affecting the ability of police agencies to clear homicides and compare those factors among both solved and unsolved cases. The Wellford and Cronin (1999) study examined four large U.S. cities between 1994 and 1995. In their study, Wellford and Cronin ended up examining a total of 798 homicides from these four cities. In selecting the cities for examination, the researchers were interested in looking at cities with varying rates of homicide clearances and overall clearances. The Wellford and Cronin (1999) study looked at 215 factors to see if they had any effect on homicide clearance rates. Their results

showed that 37 Police Practices and 14 Homicide Event Characteristics were associated with homicide clearances. A key finding was that law enforcement practices do make a difference in homicide clearances. It was discovered that specific factors are related to a police department's ability to clear a homicide case. The factors were police practices and police procedures as well as case characteristics. It is this finding that is the impetus for my study. The Wellford and Cronin study will be discussed in more detail in the research methods and strategies section of this paper.

Case characteristics are beyond the control of the police however; police practices and procedures are within the control of the police and a better understanding of this area may help further case clearances. If police practices are somehow related to homicide clearances as stated by Wellford and Cronin (1999, 2000) then perhaps the effort that is put into those practices is a key factor and not the practices alone. Effort would be defined as taking the time to perform a specific act that is a part of police investigative practice. It would theoretically follow that if practice "A" is associated with the clearances of homicides then failing to perform that act; i.e., put forth effort into one of the key practices, would result in a lower clearance. The next step would be looking for something that would either cause someone to put effort or less effort into a practice. Perhaps the race of the victim, the offender, or both may interact with the police practice.

Purpose of the Study

What my research is attempting to do is further examine the two competing hypotheses of discretionary versus nondiscretionary factors. This will be accomplished by testing the neglected variables of offender's race and investigative

effort. The race of the offender as well as the victim and offender coupled with investigative effort, will bring the research focus on the discretionary element of the investigation. Black's quantity of law is often used in looking at the victim yet very little attention has been given to the offender. Black's quantity of law hypothesis is not being tested however; it is being used as backdrop for the theoretical underpinnings of the current study. According to Black (1976), the quantity of law varies by the status of the offender and the victim. Social status affects decision-making and race has been used as a measure of social status in the literature (Swigert and Farrell, 1977). It would only seem fitting that the literature would include the offender in the analysis. With few exceptions, homicide clearance studies have ignored race of the offender as a possible causal variable and instead focused on the race of the victim. Instead of just looking to see if the race of the victim has an effect, I am also looking to see if there is any effect on clearance rates based on the offender's race as well as the combinations of victim-offender race which is for the most part ignored in the literature. My study will take the race variable and look at the effects a white offender has on clearance when the race of the victim is taken into account and also the effects on clearance when we look at a black offender and taken into account the race of the victim.

The second purpose of my study is to bring investigative effort to the forefront of the homicide clearance literature. The criminal investigation process is an area that has been ignored and if there are investigative actions that can be taken to improve a case clearance then not only policies but police practice can be improved upon. As pointed out by Wellford and Cronin (1999), very little research has helped police

agencies develop working procedures which might increase their homicide clearance rates. The main purpose of my research is to develop a working template regarding what practices are specifically within the investigators control which when not performed to lower case clearance. This will be accomplished by studying police effort coupled with any race effects.

Research Questions

The overall focus of this research is on whether the race of the offender as well as police investigative effort has an effect on a homicide clearance. When the limited literature on homicide clearances is examined, the question remains as to the role of extralegal factors. While the results of research on extralegal factors have varied as to their affect on homicide clearance, the important question still remains as to offender race effects as well as offender-victim race effects. I will address these effects, if any, as well as any effects that exist when we look at the intervening variables that make up police effort during their investigative process on case status. The research question becomes what effects the race dyad has on the specific effort that is put forth by criminal investigators in trying to clear a homicide case. In an effort to address this question, it is necessary to first examine several other issues. Each one of these individual questions is a very important, if not vital link, to the research. This study addresses the following issues:

1- Does such a concept as "police effort" exist?

2- Does the race of a homicide victim have any effect on the clearance of that crime? (this question has been visited within the literature with varied results)

3- Does the race of the offender or suspect in a homicide case have any effect on the clearance of that homicide that the offender is suspected or accused of committing?

4- Does the race of both the victim and the offender have an interactive effect on the clearance of the homicide? For example what effects do we find when we look at a white offender killing a white victim, a white offender killing a black offender, a black offender killing a white victim, and a black offender killing a black victim?

5- Does the concept of "police effort" have an intervening effect on the clearance of a case when taking the race of the victim into account?

6- Does the concept of "police effort" have an intervening effect on the clearance of a case when taking the race of the offender or suspect into account?

7- Does the concept of "police effort" have an intervening effect on the clearance of a case when taking the racial stratification of offender and victim into account?

The race of the victim as well as the offender in homicide cases has been examined by other researchers (Paternoster, 1983; Puckett and Lundman, 2003; Lee, 2005; Paternoster, 1984; LaFree, 1980; Garfinkel, 1949; Wolfgang and Riedel, 1973; and Radelet, 1981; Taylor et al. 2009). These findings are the impetus for the interest in whether there could be another variable, in this case, "police effort", that may have an intervening effect on the clearance rate. When we look at the application of conflict theory to crime, the literature suggests that both the victim as well as offender's race

does play a role in criminal justice outcomes (Roberts and Lyons, 2008, 2009). These results make it important to examine the race dyads to see if there is a combination of victim and offender race which has an effect on homicide clearance. The homicide literature appears to focus on either the victim's race or the offender's race with little research on the simultaneous or interacting impact of both variables. I hope to fill this void by examining not only the individual effects but their interactive effects of the race dyad.

Significance of the Study

Race and racial disparity are topics of concern in the criminal justice system. Race in the criminal justice system has also drawn considerable attention from researchers. With concerns of racial disparity usually focused on the black-white issue throughout the CJS, it only follows that more attention should be focused on these dyads. These concerns are reasonable when we consider that blacks account for 28.3% of the arrests as reported in 2008 (Federal Bureau of Investigation 2008) yet blacks make up 12.3% of the U.S. population (U.S. Census 2000). In this dissertation, I will build on the sparse literature that examines both the race of offender as well as victim. It is significant to examine all potential variables that may have an affect on case status if we are to advance the literature. Just as Bynum et al. (1982) suggested a need for future research to investigate the effect of extralegal characteristics of victims on police investigative effort, future research should also focus on the extralegal characteristics of the offender and the victim-offender dyads and their effect on investigative effort. Since racial disparity abounds throughout the criminal justice system race continues to be an important starting point even within homicide

research. Understanding the role that race plays in case clearance is important if we are to truly examine all the potential factors influencing homicide clearances.

The significance of examining the field of criminal investigation also runs parallel to the importance of race factors. There has been very little research conducted on the criminal investigation process. The existing research on investigations is primarily focused on the activities of the uniform patrol officer. A major work on the overall investigative process was written by Greenwood et al. (1977) however; other investigative research has been crime specific (Eck, 1992; Skolnick, 1966). Research on criminal investigators is lacking. The literature which does examine investigations reports that most crimes go unsolved and the activities of detectives are not related to case status (Bynum et al., 1982). Examining the effort of the criminal investigator is needed because the investigator is the person within the police department tasked with solving the most serious crimes. It is important to see if homicide is a chance event where the random circumstances of the crime determine its closure or whether the actual effort of the investigator plays a role. Improving on the existing literature will hopefully allow us to develop policies for law enforcement professionals that will improve their homicide clearance rates.

Summary and Outline

The current study will expand the homicide clearance research by examining the relationships between the race of the offender, the race dyads, and police investigative effort. My study is a secondary analysis of the Wellford and Cronin (1999) homicide clearance study which examined the relationships between investigative factors, case circumstances, as well as extralegal factors for their effects

on clearance rates. Current research has pointed to several areas of promise and taking these new unexplored areas of offender race and effort, I will use logistic regression analysis to test for any effects on homicide clearance rates to see if any relationships are present.

Chapter 2 of the dissertation contains a review of the relevant literature. First, an overall review is conducted of the homicide clearance literature as it relates to factors influencing clearance rates. This includes a more specific look at the literature for the effects of the victim's race on homicide clearances as well as a review of the relationship between the victim and offender race for effects of clearance rates. In conjunction with the review on factors affecting clearance rates, the literature will also be examined regarding criminal investigations and their effects on case clearance.

Chapter 3 will detail the research strategy and methods used in the analysis. This includes a discussion of the hypotheses, the independent variables, dependant variables, as well as the methodology used for the dissertation.

Chapter 4 will present the results of the analyses. Chapter 5 will revisit the questions addressed by my research, the limitations of the research, and both the future direction for research as well as the implications for both policy and practice.

Chapter 2: Literature Review

Introduction

This section will present the theoretical perspectives and research findings on homicide clearances. The primary purpose of this literature review is to summarize what is known about the determinants of homicide clearance rates with special emphasis on the role of race and police effort. Unfortunately, there is not a lot of research on homicide clearances, the effects of race on homicide clearances, or the role of the investigator. This review will examine the existing research in these areas.

In their article "An Analysis of Variables Affecting the Clearance of Homicide: A Multi-State Study", Wellford and Cronin (1999) noted the paucity of research on arrest clearances. At the time of the Wellford and Cronin study, it was noted that the International Association of Chiefs of Police Murder Summit (1995) and studies by Riedel and Rinehart (1994) as well as Cardarelli and Cavanagh (1992) had discussed the declining homicide rates as well as offered various reasons for the decline. These authors also pointed to specific methodological problems in the research. Although often ignored and hardly mentioned, the earliest study appears to have been done by Max Stern (1931) of 'unsolved murders' in Wisconsin from 1924–1928. The importance of exploring homicide clearances cannot be overstated. Results can have both policy as well as theoretical implications.

The literature review is organized as follows. The first section discusses the two theoretical perspectives that the homicide literature follows. The following section will present in chronological order the research that is based on those

perspectives. The variables of interest from those studies that will be reviewed are centered on the race of the offender as well as victim. The research that does take the race dyad under review is also examined. Next, due to the lack of research regarding the interactive effects of both victim and offender race within the homicide literature, a parallel will be drawn by looking at the death penalty research which examines the effects of victim and offender race on decisions to seek and impose the death sentence. Death penalty research is one area that addresses the race dyad. Finally, the arena of the criminal investigator will also be explored in the literature review. Police investigative effort is a variable of interest in my current study so it is necessary to examine the research which exists regarding the activities of the detective and any relationship with case handling or clearance.

Theoretical Perspectives on Homicide Clearance

The research literature on homicide clearances explores two conflicting perspectives (Addington 2008; Lee 2005; Litwin 2004; Litwin and Xu 2007; Puckett and Lundman 2003; Roberts 2007). These perspectives have been referred to as the discretionary and the nondiscretionary perspectives.

The first perspective is referred to by different terms; however, it is most commonly called the discretionary or extralegal perspective. What these different terms have in common is the view that criminal investigators engage in what has been referred to as "victim preferencing" (Riedel, 2008). This perspective states that victim characteristics related to race, gender, and age determine how vigorously and thoroughly cases are investigated (Black 1976; Paternoster 1984; Peterson and Hagan 1984). Puckett and Lundman (2003, 173) point to a quote from Black (1980):

"The murder of a prominent politician, businessman, or socialite is likely to be handled with greater diligence and fanfare, whereas that of a homeless man on 'skid row' is apt to be classified merely as a 'death by misadventure' (or some similar label) and accorded no investigation of any kind." (p.15)

While this paper is not an expose on Black's Theory, it is Black's Theory of Law which says that the police use discretion in clearing homicides based on the social characteristics of a victim as well as the area where the crime occurs. The underpinnings of the discretionary view are found in Black's theory of law (1976). Studies that have examined police activities have supported the idea that black victims are not treated the same way that white victims are treated (Smith and Visher, 1981; Smith, Visher, and Davidson, 1984; Smith, 1987). The discretionary perspective, like research in other areas, places an emphasis on the effect of the victim's race (Bowers and Pierce, 1980; LaFree, 1980; Spohn and Spears, 1996). The sentencing literature is one area in the criminal justice system where the race dyad has also been examined. In criminal sentencing a consistent finding appears to be cases involving white victims receiving more severe sentences when the defendant is black than when the defendant is white (Baldus et al., 1983; Bowers and Pierce, 1980; Garfinkel, 1949; Johnson, 1941; Paternoster, 1984; Spohn and Spears, 1996). Likewise, felony cases that involved white victims were more likely to result in a conviction when the defendant was black compared to a white defendant. If extralegal or discretionary factors are important in explaining variations in homicide clearances the possibility exists that we would find higher clearance rates in killings where the victim is white compared to black victim killings. Taking Black's Theory of Law a step further, a question could also be does the offender's race fit into the schema of devaluing? Based on the basic tenets of his Behavior of Law, the

offender's race could also play a part. We could expect to find that crimes where an offender's rank is lower than that of the victim the crime would be reported more often than when the offender's rank is higher than that of the victim. It would logically follow that offenders that are of a lower rank or who are devalued could be seen as a threat to those more vertically distant and handled with less effort when the victim is equal in status. Realistically, we must question whether any offender devaluation would impact case closure.

The opposing perspective has been referred to as the nondiscretionary or the solvability perspective. This approach states that police respond with maximum effort and are willing to clear every homicide. The police bureaucracy also values clearing them, although they may not do so with the same willingness and effort with other offenses (Gottfredson and Hindelang 1979; Klinger 1997; Wolfgang 1958). The nondiscretionary approach argues that homicides are the most serious crime that the police have to handle and as a result all police will work to clear each case with equal effort. Arrest research (Hindelang, 1974; Hagan, 1972; Goldman, 1963), prosecution (Hagan, 1974) and sentencing research (Green, 1964; Hagan, 1974; Chiricos and Waldo, 1975) also reports that the seriousness of the violation is a major factor in determining how much law is applied in a situation (Gottfredson and Hindelang, 1979). If we take the approach that the police investigator works equally hard at clearing homicides regardless of the victim's social or demographic characteristics then any factors we find affecting the closure rate will be nondiscretionary. Any effects will depend on case characteristics. As an example, clearance rates will be

higher for offenses where witnesses are available and weapons are used that provide forensic evidence. This finding would support the nondiscretionary perspective.

This perspective would also be supported by Sherman (1990) who argues that police agencies establish triage systems wherein resources are directed toward major crimes because they lack the capacity to respond with vigor to every instance of deviance. Klinger (1997) reports that police administrators demand that officers act vigorously when homicides occur (page 295). Since homicides are crimes of high visibility the actions of the investigators are open to scrutiny from both administrators and the public as well. Klinger further reports that taking everything case related into account the way that the case will get handled is the same every time—all homicides will get greater police action. Homicides and crimes that concern officer safety will receive vigorous police effort (Klinger (1997).

These two theoretical perspectives are useful in both classifying as well as discussing the existing research. The homicide research, while sparse, will be presented with these two perspectives in mind. Research which finds no effect for the variables of race falls in the category of the nondiscretionary perspective. Results which find any effect of the race variable that is in-line with the devaluing theme of Black will be categorized into the discretionary perspective. This dichotomy will be used for simplicity in presenting the research findings. The possibility does exist though that there could be findings supporting the effects of race where other factors influencing the results were not controlled for yet race is shown to have an effect on case closure.

Research

As previously discussed, the focus on race coupled with the homicide investigation for this literature review will be examined from the two theoretical perspectives. As far back as 1958, attention was focused on unsolved homicides in Patterns in Criminal Homicide (Wolfgang, 1958). Wolfgang reported that since it was estimated that many homicides go undetected as well as many homicides exist where the suspect is not detected, researchers should focus on the data from unsolved homicides. Wolfgang (1958) recognized that unsolved homicides may result from different factors. Unsolved homicides may reflect investigative incompetence or may be the result of inadequate manpower being available for adequately investigating all cases. Reasons outside of the police control may also be responsible.

In Wolfgang's Philadelphia data which examined 588 criminal killings from 1948 to 1952, only 6% of the homicides remained unsolved. A large percentage of the unsolved cases had white victims. White victims accounted for ¼ of all the solved homicides and over ½ of all the unsolved homicides. The research question becomes explaining the racial differential in victims. Wolfgang reported that homicides with non-white victims were more likely to be cleared when they are compared to homicides involving white victims. A large proportion of victims in unsolved cases were white. One possible reason the literature focuses on victims rather than on offenders is because the race of the victim is known at the time the homicide is reported. The race of the offender is not always known until some point later in the investigation and sometimes never is determined. Focusing on unsolved homicides is important because any consistency that is discovered between these unsolved cases

may help investigative efforts in clearing the case. The discretionary perspective would not expect a lower clearance rate where the victim was white.

In their study on Black's Behavior of Law, Gottfredson and Hindelang (1979) reported that extralegal victim characteristics do not affect homicide clearances. Their findings in testing Black's theory were inconsistent with Black's Behavior of Law. Their findings suggested that any examination of the criminal law and its application needs to take into account the severity of the infraction.

Researchers have asked the question about whether the police in an effort to meet their department's performance expectations are biased regarding the characteristics of crime victims. While the results have been mixed, Cardarelli and Cavanagh (1992) reported that homicides with Latino victims were less likely to be cleared when compared to homicides that had victims who were white. The highest percentage of uncleared homicides had Hispanic victims (30.5 percent). Whites accounted for 26.1 percent and blacks 23.3 percent on open cases. Other race victims accounted for 27.1 percent.

In an economic approach to homicide solutions, one factor that was examined was community preferences (Marché 1994). The variable of community preference was represented by two factors, the number of victims in the homicide and whether the victim was white. The idea is that as the numbers of victims increase, there will be more community interest in clearing the crime. Likewise, although the author reports this concept is more difficult to explain, the idea is that homicides involving white victims should receive more attention from police investigators. Results indicated that white victims and an increased number of victims resulted in greater

resource allocation to the homicide case. In looking at race, being a white victim increases the allocation of investigative resources as well as increases the clearance of the case. Nonwhite victims decrease the allocation of resources and the resulting case solution.

Riedel and Rinehart (1996) reported that while race has been studied within the context of homicide clearances, findings have indicated it to be a significant factor in whether the case got investigated further (Bynum, Cordner and Greene, 1982) as well as to have little effect on clearances (Waegel, 1981). This study examined both victims as well as event characteristics for their effects on homicide clearances. The data set came from 3,066 murder victims in Chicago, Illinois from 1987 through 1991. In testing their hypotheses, Riedel and Rinehart (1996) explored the idea that the victim's age, race, and gender as well as case circumstances and the type of weapon used could have an effect on case clearance. The researchers reported in their findings no relationship between victim race and clearance. As a result, they found no support for the hypothesis that investigators focus more of their resources on cases based on the race factor. Their key finding was that a concomitant felony was a key predictor to the homicide clearance. Their findings found no support for the hypothesis that police put forth more effort or resources on a case based on race (Waegel, 1981).

In their multi-site study of variables affecting the homicide clearance rate, Wellford and Cronin (1999) first conducted a bivariate analysis which looked at 215 factors which were related to the characteristics of the case and the investigation of those cases. As a result of this analysis, 51 factors were found to be statistically

significant. The 51 factors included 37 “Police Practices” and 14 “Homicide Event Characteristics”. Race of the offender and victim were included as case characteristics in the analysis. It is important to point out that the authors included both race of the victim as well as the race of the offender within their analysis but did not examine any interaction among victim and offender race for effects on homicide clearance. Findings from this bivariate analysis reported that the race of the victim did not have a significant effect on closing a case. In contrast, the results also reported that the race of the offender had a significant effect on closing the case. At the $p<.05$ level, the case was less likely to be solved if the offender was black compared to the offender being Hispanic. At the $p<.10$ level, the case was less likely to be solved if the offender was White rather than Hispanic. Thus, results from an examination of these 51 significant variables showed a case was more likely to be solved if the offender was Hispanic rather than Black.

The next step in the Wellford and Cronin analysis was to take these 51 factors that had been found to be statistically significant and conduct a multivariate analysis to see which factors remained significant. The researchers took these significant variables from the bivariate analysis and created eight models for a regression analysis. Since the race of the victim was not significant in the bivariate analysis, it is not a part of this second step. In the offender characteristics model, one variable that was included from the original bivariate results was the offender’s race. The offender’s model in this case actually had three models; African American, Hispanic, and White. These models results revealed that when the offender was African American there was a 90% chance the police would solve the case. Results also

indicated that when the offender was Hispanic, there was a 63% chance that the police would solve the crime. The eight model analysis revealed that the offender being either African American or Hispanic was statistically significant at the $p < .05$ level.

The final model consisted of the 15 variables that remained significant at the $p < .05$ level when placed in one of the previous eight models. Two of these 15 variables were the offender was African American and the offender was Hispanic. Since a person could not be both African American and Hispanic, the researchers had to run two separate models; one African American and one Hispanic. The significant variables from these two models were placed into a "trimmed down" model which only contained significant variables. In the African American "trimmed down" model, 10 variables were found to be significant. The offender being African American was not significant in this model. In the Hispanic trimmed down model, nine variables were found to be significant. The offender being Hispanic was found to be significant but only at the $p < .10$ level.

The Wellford and Cronin study focused on homicide events and investigative characteristics in hopes of a better understanding of homicide clearance rates. The emphasis of the Wellford and Cronin study is that they found the majority of characteristics that are associated with homicide clearances are related to police practice. It only follows that police policies and practices will play a major role in clearing cases. As a result, clearance rates can be improved with a better understanding of law enforcement investigative practices. The study did find variables that were outside of the control of law enforcement which were related to

case closure. The suspects being African American or Hispanic were among the top 15 factors that were found to be highly correlated in the multivariate analysis that Wellford and Cronin conducted. In a more trimmed down model, being an African American offender was not found to be significant and in a Hispanic offender model, being a Hispanic offender was significant but only at the p>.10 level. Such varying race results still leave the race question open to debate and further examination. The fact these factors are outside police control makes them easily ignorable since the investigator can do nothing about the race of the offender.

Debate could center around effort based on the offender's race.

A study by Baumer, Messner, and Felson (2000) examined the role that victim characteristics played in determining the disposition of a murder case. The authors examined prosecutor case files from 33 counties in the U.S. to test whether the victim's conduct or their demographic characteristics had any affect on murder cases. Baumer et al. (2000) reported that age and previous conduct did not influence the legal outcome in a case however the victim's race, gender, and conduct at the time of the murder did affect the legal outcome. While the findings varied at different stages throughout legal processing, they were consistent with the idea stigmatized victims were treated more leniently. Likewise, the influence of the victim's characteristics were influenced by the racial make-up of the county where disposition of the case was processed.

Regoeczi, Kennedy, and Silverman (2000) conducted a comparative analysis between U.S. and Canadian homicide data in order to see if any victim or offense characteristics would help predict homicide closure rates. The authors pointed out

several research hypotheses affecting homicide clearances. The existing research hypothesis relevant to my research states that homicides that are not cleared are more likely to involve white victims. This hypothesis is based on research which states whites are overrepresented in stranger homicides (Riedel et al.,1985; Silverman and Kennedy, 1993; Wilbanks, 1984). Riedel (1995) tells us that since white victims are found more often in stranger homicides and since stranger homicides are more difficult to solve, non-cleared homicide cases will likely have white victims.

The Regoeczi et al. (2000) model used gender, race, age, weapon, and circumstances surrounding the homicide to test if any of them had an effect on case closure. The authors found that the influence of victim characteristics on homicide clearances varies both cross nationally as well as regionally. Race as represented by non-white victims showed an increase in the probability a homicide was cleared in both the U.S. and Canada. When the data was examined at the regional level, in both Ontario and New York State, non-white victims had an insignificant effect on homicide clearances. Based on their results, the authors suggested the race variable should be investigated further.

While the focus of my research is to examine homicide clearances in the United States, Mouzos and Muller (2000), in their exploratory analysis, examined homicide clearances in Australia to see which factors were related to the solvability of homicide cases. Similar to research findings in the United States, a significant factor in whether a homicide was solved was whether the homicide took place while the offender was committing another crime; was has been referred to in other articles as a concomitant felony. Their comparative analysis reported several victim

characteristics that were related to whether or not a homicide case was solved or unsolved. Mouzos and Muller (2000) reported homicides were more likely to be solved when they involved indigenous (black) victims. It follows that cases were more likely to be unsolved with non-indigenous victims. Results were also consistent with the discretionary perspective in reporting that the labor force status of the victim was also an important factor in differentiating close and open homicide cases.

The research of Borg and Parker (2001) explored the utility of Black's theory of law for explaining differences in homicide clearance rates across large cities in the United States. Pulling from the theory of social disorganization, the authors examined homicide clearance rates along with measures of Black's theory of law concepts of stratification, morphology, culture, organization, and alternative social control. Findings supported the argument that the location of where the killing takes place affects the rate of homicide clearances. More specifically, Borg and Parker pointed out that the cities with higher clearance rates had greater racial disparities. These disparities were reported to be in the areas of education, income, employment, residence, greater residential stability, higher levels of educational attainment, higher expenditures for educational programs and lower rates of homicide (Borg and Parker, 2001). Black's theory of law posits that urban areas with more inequality will have more law. The results from this study support the hypothesis that certain factors of inequality in urban areas will influence the likelihood of police to clear homicide cases at the city level.

In their multivariate analysis of factors that may affect homicide clearances, Puckett and Lundman (2003) examined among other characteristics, extralegal victim

characteristics. Race was one of the factors that were examined. Results indicated strong support for the hypothesis that the high visibility of the crime of homicide as well as the importance placed on the clearance of these crimes, leads the homicide investigator to work diligently to clear the crime regardless of the victim's characteristics. Specific findings indicated that homicides that take place in African American neighborhoods have lower clearance rates. According to the authors, the idea is that there is more distrust and less information provided to police investigator. As reported, there was clearly no support for the race of the victim affecting the clearance of the case. This finding is opposite of the devaluing (Black 1980) hypothesis. A final question that is posed by the authors to consider is do those factors that have an affect on clearance change depending upon how easy the case is to clear?

A multivariate study by Litwin (2004) also took a look at the competing hypothesis of nondiscretionary factors affecting the clearance of homicides. It is important to note that Litwin does not include offense and investigation dimensions in detail. In his research, Litwin used the two different perspectives that were previously noted from which to approach the factors that affect homicide clearances. Like Lee (2005), Litwin in his first approach, examined Black's Theory of Law (1976) and the role it could potentially play in homicide clearances. The idea is basic and is based on the premise that the police use discretion during their investigation and their decisions are simply based on the victim's race and social characteristics. This examination also includes area characteristics and consists of a devaluing of specific people who will not be treated the same as others. The second perspective that is examined relates

to the idea that the more severe the crime, the harder the detective will work with no regard to the victim and the incident location (Wolfgang, 1958; Gottfredson & Hindelang, 1979; and Klinger, 1997). This is the nondiscretionary approach.

Drawing from this point, it is very important to know which investigative actions are related to homicide clearances. If an investigator works diligently on all cases then it becomes important to focus on those investigative actions that increase homicide clearance rates and not on those actions un-related to the clearance if the investigator is to be as efficient as possible. Simply stated, we need to know which investigative techniques provide the greatest benefit. The seriousness of the crime and the pressure to solve or clear the case will make the investigator work to close the case. Litwin (2004) however found support for the non-discretionary hypothesis. Factors that are unrelated to police discretionary decisions predicted case clearance. He did however, report that cases involving Latino victims were found related in some way to case closure. Results showed that homicides with black victims were no less likely to be cleared than white victim cases. Cases where the victim was Latino were found to be 2.5 times less likely to be cleared when compared to white victim cases. The connection between race and clearance may possibly be related to the availability, as well as a willingness of witnesses to provide case information, to investigators.

In a multiple regression and event history analyses of homicide clearances in California, Catherine Lee (2005) reported that the gender and race of the victim affect the likelihood that the homicide will be cleared. In an effort to examine the relationship that both extra-legal and legal variables have on homicide clearances,

Lee reported that the extralegal variables of gender and race, as well as the ethnicity of the victim, did affect the likelihood the crime would be cleared. These factors also had an affect on the time needed in solving the murder. These findings were in contrast to recent studies where it had been argued that legal factors did the best job at explaining homicide clearances. If as posited by the nondiscretionary perspective, it should follow that if all homicide cases are being treated equally thus there should not be any differences in the clearance rates when we examine the extralegal variables such as race and ethnicity as well as gender. While the results in Lee (2005) were not identical in both of her analyses, both findings did support Black's theory that some victims' crimes "get more law" than others. These results showed that homicide clearance varied by a number of extralegal factors (Lee, 2005). Just as Black's theory would predict, the cases that involved non-white victims as well as older victims were less likely to be solved. The results found in the Lee (2005) study were contrary to those findings of other researchers (Puckett and Lundman, 2003; and Riedel, 2002) which were that of no racial bias affecting clearance rates. One question that was raised by Lee (2005) was whether the results would vary if larger police agencies were included in the analysis. Perhaps victim characteristics would have significant effects on clearances when situational variables were controlled for. The Wellford and Cronin, 1999 data is a step in addressing the big city question since the data set is from four large U.S. cities.

As we have seen throughout the literature, one approach regarding homicide case closure takes the stance that the clearance is influenced by the characteristics of the victim. Roberts (2007) used an event history analysis to examine both the effects

of victim characteristics as well as situational characteristics. This study used 2002 NIBRS data from twenty-one states. Independent variables were victim characteristics such as age, gender, and race. Race was coded as White or non-White. Results from this analysis showed that as far as victim's characteristics, only gender, age, and criminal involvement had significant effects on the hazard rate for case closure of the homicide. The variable of non-White was insignificant. Since the purpose of an event history analysis is to explain why certain individuals are at a higher risk of being involved in an event than others would be, the findings point us in the direction of race being inconsequential to having the case closed.

In an effort to see if there was any consistency in the factors related to homicide clearances across time, Litwin and Xu (2007) reported that there was an increasing significance of the victim's race as well as firearm use which may have contributed to the decrease in homicide clearance rates.

In their multilevel model design, Litwin and Xu (2007) reported that in their study the relationship between the victim's race and clearance status varied across the three time periods that were examined. The time frames were 1966-1975, 1978-1985, and 1986-1995. In the most recent period, cases with African American or Latino victims significantly decreased the likelihood that the homicide was cleared. The authors point out that the long-term decline in homicide clearance rates may be due to increase of the African American and Latino populations which were the populations that were most at risk (Block and Block, 1992). While there was factor consistency in their effects on homicide clearance over the time periods, the victim's race was one factor which showed variability. This effect appeared to have both temporal and

spatial variability on homicide clearance rates. This was evidenced by the weak or non existent relationship in the two earlier time periods and the significant negative relationship in the most recent time period examined. While the community area characteristics played a role in understanding homicide clearances, victim and situational characteristics played an even greater role. Perhaps, as the authors posited, cases with African American or Latino victims where the crime was committed in poor areas are less likely to be cleared and are not easily solved.

In their exploratory study analyzing data from Chicago from 1988 through 1995, Riedel and Boulahanis (2007) focused on exceptional clearances of homicides. The primary focus was on those cases where a suspected offender was taken into custody but later released for failure to prosecute. Victim, offender, and offense variables were examined for their effects. As an independent variable, race was divided into African American, Hispanic, and White. The researchers reported that white offenders are less likely to have their cases barred for prosecution when they are compared to African American victims. The results are again important in that they point out the race of an offender plays a part in homicide case clearances.

Alderden and Lavery (2007) used Chicago homicide data from 1991-2002 to see which factors predicted homicide clearance. They examined victim and incident characteristics as potential predictor variables for homicide clearance. One of the independent variables that were examined under victim characteristics was the race of the homicide victim. In this research, the victim's race was recoded into dummy variables of African American and Hispanic. The dependent variable was all homicide clearances. Homicide clearances included cleared by arrest as well as cases

cleared by exceptional means. The Alderden and Lavery (2007) research examined five logistic models. They examined the interaction of the independent variables in an overall analysis of all homicides, an analysis of homicides that excluded quick clearances, and an analysis of expressive, instrumental, and gang-related circumstances. The overall findings related to the victim's race were that the odds of clearance decreased 36% for homicides involving a Hispanic victim compared to Caucasian victims. The researchers also found that there was no significant difference in the odds of clearing a homicide for African American victims compared to Caucasian victims. When examining cases with quick clearances, the Hispanic race variable was a significant predictor of clearance. Race had no significance in explaining clearances that involved expressive circumstances and no effect on homicides that involved instrumental circumstances. Finally, in their examination of gang-related homicides, the victim's race was significantly related to case clearance. The odds of clearing a homicide decreased significantly when the victim was African American (56%) compared to when the victim was Caucasian. Alderden and Lavery (2007) pointed out that some researchers argue that race plays a role in determining the extent to which investigators work on clearing the case (Black, 1980). It is also possible that certain racial groups may not be willing to report information to the police for various reasons. My research does intend to focus on investigative factors such as interviewing witnesses that have been reported to increase case clearance and then add the race factors of victims and offenders to see if there is any interaction which increases or decreases clearance. Examining the specific investigative effort

coupled with race may tell us which combinations the investigator can focus on to increase clearance for specific races.

Results from the study by Regoeczi, Jarvis, and Riedel (2008) were consistent with other research regarding clearing cases with very young victims but the study found the time that it took to identify a suspect had an influence on clearance. They examined the relationship between both victim-level and incident-level factors and the likelihood of homicide clearance. The study looked at whether police efficiency in handling a case could be influenced by certain homicide case characteristics such as the characteristics of the victim. If true, then knowing which characteristics are important in case clearance would allow investigators to focus on those specific characteristics and increase case investigative efficiency. Extralegal factors like social class as well as race were examined. The authors found that using a survival approach to their analysis resulted in different findings than are usually found in the traditional approach to homicide research. Regoeczi et al. (2008) found that white victim cases are more likely to be cleared overall, however if we look at how quickly a case is cleared, the closure is not associated with the victim's race. The authors have stated that if the time it takes to identify a suspect is a valid indicator of police effort then the resulting race and sex effects from their study are not indicative of a devaluing of victims with lower status by the police.

The literature that has examined the race factor and its influence on homicide clearances has not always reported the white-black differential. Based on a longitudinal study that examined homicide clearance rates in Chicago from 1966-1995, Xu (2008) reported that homicides with Latino victims were both significantly

and consistently related to decline in homicide clearances. The results indicated as the number of Latino victims increased the clearance rates for the homicide decreased. Xu's findings regarding Latino victims do not appear to be the result of any specific direct police action. Xu (2008) points out that if the police can increase their success in solving homicide cases involving Latino victims then the overall homicide clearance rate will show improvement.

The research by Jarvis and Regoeczi (2009) used NIBRS data to look at the effects of several factors on the outcome of homicide clearances depending on whether we are looking at clearance by arrest or clearance by exceptional means. They reported that there are different effects for the offender's race depending on whether we examine clearance of the homicide by arrest or clearance by exceptional means. In looking at the victim's race, the researchers categorized victim's race as white and nonwhite. Offender's race was categorized the same way. The researchers reported that three offender characteristics were found to influence the likelihood a case would be exceptionally cleared but not by arrest. One of these offender characteristics was the offender's race. White offenders were more likely to be exceptionally cleared than by arrest. The main focus of the Jarvis and Regoeczi (2009) study was to look for differences in clearance between those exceptionally cleared and those cleared by arrest. Their examination did point out that race had differing effects which were dependent upon the method of clearance. It is important to note that the data in this study did not include any detailed information on the investigative procedures used during the homicide investigation. This point is remedied in my study through the secondary analysis of a data set which includes

these variables. These are the variables which will be used in the effort construct which is described in the Methods section

The Roberts and Lyons (2009) study is one of the few research articles that focuses specifically on the interaction of the race of both the offender and the victim to see what effect they have on case clearances in both lethal and nonlethal assaults. The outcome variable of clearance is measured by arrest. The authors used NIBRS data and reported that homicides where the offender is nonwhite were more likely to be cleared by arrest than those cases with white offenders regardless of the victim's race. This finding would be supportive of Black (1976). The victim's race was found however, to have an effect when the crime of aggravated assault was examined.

While Roberts and Lyons (2009) have pointed to the importance of examining the victim-offender race dyad for two separate crimes, the literature can benefit from seeing what effect the dyad produces when they are considered with police practices for their interactive effects in closing a homicide case.

Roberts and Lyons (2009) show us the importance of the offender's race in homicide clearances. Since Black (1976) hypothesized that both the offender and victim were important, it is imperative to test both for the race effects of offender and victim on case clearance. Likewise, if a full test is to be conducted of the variable of race in a homicide case, it is important to investigate whether either variable interacts with investigative effort.

The literature contains numerous examples that support the idea that police treat crimes that involve minorities differently. Taylor, Holleran, and Topalli (2009) point out that while there are numerous studies that examine the role of the victim in

the criminal justice system, the majority of these cases involve the court system. More specifically, the examination takes place at the prosecutorial decision level and the sentencing of offenders. The victim's race has not received as much attention within the police clearance literature. Taylor et al. (2009) also pointed out that there is a lack of research on victim and offender interaction. In their study, the authors examined whether or not the effects of the victim's race on case clearance may also be influenced by the offender's race.

Part of the Taylor et al. (2009) article was focused on police legitimacy which is beyond the scope of my research. However, part of that focal point was an under enforcement approach based on race. We have previously referred to this as the discretionary perspective. This under enforcement approach would posit that cases involving minority victims would result in less energy and effort being expended in clearing or working a case (Corsianos, 2003).

As previously mentioned in this review and again discussed by Taylor et al. (2009), recent homicide studies which focused on factors affecting clearance have reported that the race of the victim has no significant effect on homicide clearances (Litwin, 2004; Marché, 1994; Puckett and Lundman, 2003; Roberts, 2007). When effects were reported, the homicide cases involving African American victims were found to be only slightly more likely than homicides with white victims to be cleared (Regoeczi, Kennedy, and Silverman, 2000). If previous research which placed an emphasis on offense seriousness affecting case clearance is accurate, we should find any difference in case clearance based on race to be smaller in homicide cases due to its serious nature when compared to the clearance of other cases.

According to the authors, an initial cross tabulation of police clearance by the victim's race and the type of offense revealed a very small difference for homicides. This would be expected since clearance for victims no matter their race should be uniform. In looking for any interactive effects between victim and offender race, the authors reported that all cases, with the exception of aggravated assaults, involving an African American offender and a white victim had the lowest clearance rates. All offenses where the offender was white and the victim was white showed the highest percentage for case clearance. When Taylor et al. (2009) conducted a binary logistic regression for case clearance they excluded homicide due to what they termed insufficient data representation and variability. Taylor et al. (2009) examined the effects of the race of the victim and the offender on case clearance; however a void still exists since homicides are not included in their analysis. The importance of the Taylor et al. (2009) findings of racial disparity in the clearance of violent offenses is groundwork for examining a more thorough homicide data set to see if similar results are found.

Race and the Death Penalty

It is important to briefly mention the death penalty literature. The parallel to my research lies in the examination of the race of an offender and the race of the victim in a homicide to see whether criminal justice decisions are based on the race factors and an interaction of offender and victim race. My research looks to see whether those factors interact or may have individual effects as well as interactive effects on the effort in clearing the case. The outcome variables differ, case closure

versus death sentence, however it is important to see what role race may play in another area of the homicide arena.

Research (Paternoster, 1983, 1984; Paternoster et al 2004) has examined the effects of the offender as well as the victim's race on the death penalty decision. Radelet (1981) examined whether or not race had any effect on an offender receiving the death sentence. When looking at the race of the offender, race alone did not appear to play a role in the imposition of receiving the death sentence or a first degree murder indictment. It appears that when prosecutorial decisions are being made, there is an interactive effect that emerges between the race of the offender and the race of the victim.

The race of the offender, as well as the race of the victim, was also examined by Paternoster (1984). The author examined the decisions a prosecutor makes when deciding whether an aggravating felony is cause to seek the death penalty. Results showed that the victim's race was significantly related to whether the prosecutor sought the death penalty. This was the case even when certain legal factors were also taken into account. A pattern of possible racial discrimination was revealed where black offenders who killed white victims were more likely to have the prosecutor request the death penalty. On the opposite side of the spectrum, black offenders who killed black victims were less likely to have the death penalty requested.

Recognizing problems with the implementation of the death penalty, the U.S. Supreme Court has attempted to address those issues in their guideline decisions. As pointed out by Jacoby and Paternoster (1982), discrimination has become more sophisticated and the result is partial discrimination. Jacoby and Paternoster (1982)

reported that in South Carolina, black and white defendants appeared to equally receive the death sentence until the race of the victim was factored in. They found that the probability of a death sentence being sought was three times higher for defendants who killed whites than for the defendants who killed blacks. The prosecutor was four times as likely to request the death penalty in cases involving a black defendant and a white victim than in those involving black victims.

Recent death penalty research is supportive of the findings that victim race does play a role in death penalty decision-making. Paternoster, Brame, Bacon, and Ditchfield (2004) reported that both the race of victims and offenders, as well as geography played an important role in the imposition of Maryland's death sentences.

The fact that the race of the victim appears to be an important factor in whether or not an offender received the death sentence is a finding that is often replicated. In their report to the Governor's Office of the State of Maryland, Paternoster and Brame (2008b) report that both the offender and victim's race play an important role in death penalty decision making. Results from their analysis report that black offenders who kill white victims are at greater risk of receiving a death sentence than other offenders. The primary reason reported by the authors is because the defendants were more likely to have been charged by the Prosecutor with an offense that made them eligible for the death sentence.

The death penalty research points us in the direction of the importance of examining offender and victim effects to see if not only individual effects are discovered but to look for any interactive effects. Lee (2005) questioned whether it was possible that the impetus for racial differences in death penalty sentencing has its

roots at an earlier stage of the criminal justice system (Lee, 2005). Perhaps the same can be said of any race effects regarding the clearance of homicide cases.

Summary of the Race-Homicide Research

A review of the literature examining the effects of race on homicide closure has revealed mixed results (Regoeczi, Jarvis, and Riedel, 2008). As we have seen from the literature, one argument is made that specific extralegal factors affect homicide clearances. The argument is made that criminal investigators use certain victim characteristics like social class, race, gender and age in deciding how much effort to put into a case (Black 1980; Paternoster 1984; Peterson and Hagan 1984). This approach is based on Black's theory of law and on conflict theory (Quinney, 1977; Turk, 1969). We have seen cases where results indicated non-White victims had higher rates of case clearance (Mouzos and Muller, 2001; Regoeczi et al., 2000). We have also seen results that reported the opposite (Litwin and Xu 2007). These opposing research findings reported that cases with African American or Latino victims were less likely to be cleared. Lee (2005) also reported that cases that involved non-white victims as well as older victims were less likely to be solved. Opponents of the discretionary perspective would point to these cases where Latino victim homicides were reported to be less likely to be cleared than homicide cases where the victim was white and argue that these effects are not because of a devaluing of the victim or due to misapplied discretion but possibly due to the fact there are more witnesses who can contribute valuable information in areas where the home ownership is high (Litwin, 2004). Others have found no difference in homicide clearances in regards to the race of the victim (Wellford and Cronin, 1999; Litwin,

2004; Puckett and Lundman, 2003; Riedel and Rinehart, 1996). Although limited in number, research has also revealed the race of the offender potentially having an affect on case closure (Wellford and Cronin, 1999; Jarvis and Regoeczi, 2009; Roberts and Lyons, 2009) as well as on case disposition such a prosecutorial decisions (Riedel and Boulahanis, 2007).

Contrary to the extralegal argument, research (Gottfredson and Hindelang, 1979; Klinger, 1997) has revealed that these extralegal factors do not affect homicide clearances. They posit that the criminal investigator works with the same effort to clear all cases. Physical evidence and witness information appear to be important factors for case clearance. The literature has also revealed that certain investigative characteristics are associated with homicide case clearance. Felony related killings have been found to be more difficult to close than homicides not related to concomitant crimes (Cardarelli and Cavanagh, 1992; Mouzos and Muller, 2001; Regoeczi et al., 2000; Riedel and Rinehart, 1996; Rinehart, 1994; Roberts, 2007). Other factors like weapons used and location of crime have been reported to affect closure. There does, however, appear to be consistent support for the nondiscretionary approach although the factors which are found to be significant do vary from study to study.

The question becomes where does the current literature leave us? The literature has revealed that when we look at the extralegal characteristics of victims the factors either do not have any effect or the effects are in the opposite direction of the devaluing hypothesis of Black (1980). Results have pointed us in the direction of the need for more as well as for consistent findings. The existing research does not

provide us with any clear evidence of a devaluing of victims but the research is still in its infancy. With mixed findings regarding race in different contexts, it becomes imperative to examine this factor further. One limiting factor appears to be the lack of any examination of the effect of the race of the offender as well as any examination of the race dyad effect of offender and victim. We need a clearer picture of the role that offender, victim and offense characteristics play in determining whether or not a homicide case is cleared or not. Investigative characteristics have emerged as possibly playing a key role in case clearance. Building upon race and case characteristics, an important area to examine is the role the investigator plays in case closure.

Criminal Investigation

In beginning an examination of the investigative factors that may have an effect on case clearances, it should be noted that factors that affect homicide case clearance may be different than for other crimes (Taylor et al, 2009). A possible nexus between race and the investigative process may be as Riedel (2002) points out in his discussion on the causes and correlates of arrest clearances for homicides. Riedel (2002) tells us that since clearances are used as a measuring stick for investigator success, the investigator uses their discretion to maximize their success (Waegel, 1981). It would logically follow that race may influence the investigative effort that the investigator puts forth in order to maximize the clearance rate. The question as pointed out becomes does the characteristics of a victim or offender influence investigative effort?

One of the hypotheses of my research relates to the investigative effort of detectives. It is important to see how detectives spend their time during investigations

and what factors have been shown to have an effect on clearances. My research interest lies in looking to see if there are specific actions taken by investigators which constitute "effort" and more importantly which factors indicative of effort lead to higher clearance rates or greater success in clearing a case. Garnering this knowledge will allow for a more focused approach in working to clear a homicide case. The major focus of this research review section is on the effort of the criminal investigator and the effectiveness of this effort in closing a criminal case.

The Criminal Investigation Division

The life of a detective is one of excitement and glamour. This is the message that we receive from the silver screen as well as from the news media. The emphasis that the media places on the role of the investigator is a distortion of the real field of criminal investigation. In reality, the criminal investigator leads a life that is filled with neither excitement nor glamour. Detective work has been described as superficial, routine and nonproductive (Greenwood et al., 1975). A major question becomes just how productive is the criminal investigator? How much effort does the investigator put forth and for the purposes of my research what role does effort play in the successful clearance of a homicide case? In looking at police investigative decisions in general, this section will examine investigative effort and common practices that have been reported that are related to successful investigations.

Since one of the factors in my research is the investigative effort of detectives, it is important to see how detectives spend their time during investigations and what investigative factors have been shown to have an effect on clearances. My research interest lies in looking to see if there are specific actions taken by investigators which

constitute “effort” and more importantly which factors indicative of effort lead to higher clearance rates or greater success in clearing a case.

Many seasoned investigators say their job is boring and mundane however the criminal investigative process is a very complex process. The complexity lies in the numerous and varied tasks that play a role in the investigatory process that is conducted during a criminal investigation. One objective of my research is to see which of these tasks plays a key role in case closure.

The actual investigation of a criminal act can be divided into two parts. First, we have the preliminary investigation. This is where the street officer responds to the initial call for service and it is here where most of the limited research on police investigations and activities can be found. This literature review is focused on the second category which is the criminal investigation. The criminal investigation is the follow-up investigation which in the majority of police organizations is done by the detective or criminal investigator when the crime is of a serious nature or when the initial responder cannot clear the case with the limited time they are involved in the offense.

There is a lack of research on the activities of the criminal investigator. The research which does exist on police investigations comes from the investigations of the street officer and their handling of cases. The literature which examines the workings of the criminal investigator finds its roots in the works of Greenwood, Chaiken, and Petersilia (1975). In their RAND Report, Greenwood et al. (1975) focused on investigative results and not on the specific practices which the criminal investigator is involved with in their handling of a case. Other researchers have

examined different aspects of the investigative process such as the activities of detectives in handling burglary and robbery cases (Eck, 1992) as well as the work of Skolnick (1966) regarding rape investigations. Skolnick's work also centers on the use of clearance rates and investigative efficacy. The lack of literature in the area of criminal investigation related to detective activities in working a case is a void that must be filled if we are to understand the role they play in affecting the clearance of not only homicides but other cases as well.

In their report, "The Criminal Investigation Process- The Rand Report", Chaiken, Greenwood, and Petersilia (1976) examined the criminal investigation process with one of their objectives being to describe how criminal investigation is organized as well as practiced in the U.S. It should be understood that this report did not focus specifically on the crime of homicide. The authors reported that criminal investigators only spend about 7% of their investigative time on activities that can lead to solving a case. If this is true then it becomes imperative to see if there are specific case related activities which may increase case solvability. Chaiken et al. (1976) found that the solving of a case depends more on the activities of the patrol officer, public involvement, and clerical processing instead of any specific investigative techniques. The researchers reported that 80% of serious crimes are not solved and that most cases were solved from using information that was gathered from witnesses at the scene or from the police officer who initially responded to the crime. These points are very important because if true, that would mean specific investigative activities may not have any significant effect on the homicide clearance rate. It may also mean that there is a small pool of activities that do affect clearance

rates and as a result investigative attention should be focused on those points of effort to maximize investigative time spent on a case. The authors reported that more than half of an investigator's activities were spent on activities after an arrest had been made. In regards to evidence gathering, they reported that collecting evidence did not help solve any crimes unless the evidence processing capabilities were adequate. This finding appears rather obvious since gathering evidence will not pay any dividends unless they are adequately processed.

In describing the criminal investigation process as a very important function of policing, the authors pointed out that departments know very little about their own investigative unit's effectiveness. Overall, investigators get assigned a large number of cases to work or follow-up on and most get only a cursory review at which time the majority of cases are suspended. Serious crimes, of which homicide is one, did result in some type of investigative activity. According to Chaiken et al. (1976), the average criminal investigator does not work on a large number of cases even if they were assigned a large number to handle. Relevant to my research is the fact that the authors reported investigators worked on homicide cases 100% of the time. Effort or activity of some kind is conducted in every case.

In their findings, Chaiken, Greenwood and Petersilia (1976) reported that in the majority of cases that were eventually cleared, the suspect was known from information that was available at the crime scene when the initial investigation started. When there was no initial suspect they key to solving the crime appeared to be the investigative steps taken by the investigator to convert an investigative task into routine activities. While the Chaiken, Greenwood, and Petersilia (1976) report on

criminal investigation was one of the first looks at the investigative process, its focus was on outcomes and not on specific investigative activities. The Chaiken et al. (1976) research did look at serious crimes such as homicide, rape, assault, and robbery however there was no focus on any specific crime. Each crime brings its own nuances and homicide cases would have a different level of importance placed on them when compared to an assault investigation.

Research by Waegel (1981) was a nine month participant observational study in a city police detective division which examined how detectives handle a case. Waegel's research stated that investigators look to see what a case has in common with typical case patterns. In criminal investigation divisions, investigators look for things that are typical in cases they've been assigned so that they can use that information to generalize how they will handle that particular case. This may not be the most efficient means of conducting an investigation.

If we follow the lead of Bittner (1967), Piliavin and Briar (1964), Skolnick (1967) and Steffensmeier and Terry (1973), we must consider that some investigations are not handled on individual case characteristics but are based on stereotypical offender templates. If research supports this investigative approach then refocusing on specific acts of investigative effort will take us in a different research direction. As Waegel (1981) points out, a theoretical implication would be investigators making case decisions based upon stereotypes and not based on case specific factors.

As previously mentioned, the question explored in Waegel (1981) was how a criminal investigator works a case. Understanding how investigators work cases is

important because depending on how a case is worked and how the decisions are made concerning the case they have been assigned, they may very well ignore potential case solving factors.

Investigators are faced with two problems which affect how they deal with a criminal case. Reports are a very necessary part of the activities of the investigator since they document their specific activities on each case. Detectives spend a great deal of time providing documentation and writing reports. Secondly, the detective is expected to make arrests. The specific level of arrests expected may vary from department to department however in the Waegel research, detectives reported that they felt they had to produce two to three arrests a week.

In an effort to address the previously mentioned problems, investigators' actions appeared to be based on the past track record of cases handled; if it worked before in a previous case then it very well could lead to success again. Investigators use a schema or template to shape their actions based on the information that they have on a victim, the offense, or the suspect(s). This type of investigative decision-making runs parallel to the literature on judicial decision making where cognitive templates are used in determining the threat an offender poses and thus the severity of sentence that follows.

Waegel reported that one major way to categorize investigations is to separate them into routine versus nonroutine investigations. A case becomes routine when the detective sees the same types of victim, offense, and suspect information in a case. This type of information brings with it a specific strategy for handling the case based on past practice. The result is the investigator looks for things that are typical and

commonly makes use of stereotypes. Nonroutine cases do not fit this same profile thus detectives energetically investigate the case focusing on case specific features. According to Waegel (1981) handling cases in a routine manner is found in such crimes as assault, robbery, rapes, and homicides. If investigators do perform as Waegel reports, investigators handle cases in such a way that they are literally stuck in an investigative rut. This could perhaps explain why clearances have not changed all that much. Investigators do not focus on investigative actions which have been shown to increase the probability of case clearance but merely attend to actions which they believe have led to success in cases they've investigated previously. Investigative effort needs to be redirected. Determining which actions or investigative efforts are effective in clearing a case have the same goal that is reported by Waegel. Investigators are interested in making arrests in the cases assigned to them. Knowing the actions to take which are scientifically based and not based on investigator intuition or past practice are the more sensible road to travel if the goal is increased case clearance.

If it is true as discussed in the work of Roth (1977), Scheff (1978), and Sudnow (1965) that case workload and the amount of information available to the investigator affect investigative effort, then knowing how to increase efficiency by targeting cases with certain investigative effort could possibly negate these other factors.

In research that examined police decision making (Bynum, Cordner, and Greene, 1982) examined the idea that victim or complainant characteristics affect police decision making. This is relevant because making decisions about what actions

to perform are indicative of effort. The authors discussed the ideas that the characteristics of victims may be important in explaining the decision to investigate by the police, thus the effort that they put forth. The authors cite the works of Denno and Cramer (1976) who discussed judicial decision making. In their research, Bynum et al. (1982) broke victim influences down into physical and situational characteristics. Physical characteristics included age, sex, and race. Situational factors included the relationships between offender, victim and the crime itself. A reference is also made to the just world theory (McDonald, 1976) where people view the positive and negative occurrences in the world as deserving on the recipients. When something does not appear to be justified, the injustice must be corrected. This would be the basis for a hypothesis that crime victims get treated differently in specific situations. In other words, not as much effort is exerted in all cases under investigation. The authors in this research examined property offenses as well as personal offenses. Victim characteristics had different effects on how extensively a case was investigated. There was weak evidence that minority victims of property crimes received what the authors refer to as "less favorable treatment." As far as personal offenses; it was reported that cases involving minority victims were more extensively investigated. Their results point to the need for future research to examine extra legal characteristics of the victim. It was apparent that certain victims of crime get more effort put into their case investigation. The relevance of this research lies in the effort that goes into the effort that is used in conducting a criminal investigation. The results reported by Bynum et al. (1982) are also consistent with those reported by Riedel (2002) and Riedel and Rinehart (1996). Investigators did not put too much

effort into 82% of the cases they were assigned to investigate. If this would be true, then it is very important to make sure that the remaining percentages of cases are worked with investigative effort directed at those activities shown to increase case clearance.

Common sense would dictate that investigator actions would be based on the evidence that confronts them but research has shown victim characteristics and complainant characteristics may affect investigative effort.

A study by Eck (1983) focused on the activities of the detective. The crimes that were examined were the crimes of burglary and robbery. An important finding from this study was that detectives did help solve cases. The activities that were reported to be highly related to solving a case were searching for witnesses, contacting informants, talking to other officers, and making use of police records.

Eck points out that attention has been directed into how productive investigators are and this focus can be divided into two hypotheses. The first hypothesis posits that random circumstances determine the results of a case investigation. There have been several studies that have supported this hypothesis (Isaacs, 1967; Greenwood, 1970; Greenwood et al., 1977; Eck, 1979; Gaines et al. 1983). This circumstances result hypothesis is the dominant hypothesis (Eck, 1983). If this is true, then the solvability of a case will depend upon the individual circumstances that surround each crime. What may be effective in solving one crime may not work in a second crime no matter what crime is under investigation. Eck pointed out the potential flaws in these studies and the primary culprit was the lack of

examining investigative effort. The circumstances hypothesis studies did not adequately describe investigative effectiveness.

In his study, Eck refers to the second hypothesis as the "effort-result" hypothesis. This hypothesis emphasizes the investigative work of both the patrol officer as well as the criminal investigator. Essentially, the activities that these two role players perform have an effect on the solvability of the crime. There is no denial that there are factors that are outside the control of the police however; police actions or police effort can contribute to case clearance. It is these contributing activities that my research is focused upon. The research which focuses specifically on these activities of police effort appears to be lacking within the literature.

In his experiment, Eck controlled for the efforts of the investigator and case characteristics and compared solved and unsolved crimes. Eck was looking to see if detective effort increased the probability of an arrest in a robbery or burglary case. Eck measured effort in two ways. First various actions that were taken by the investigator were defined as effort. Actions such as interviews, checking files, speaking to both informants and suspects were all defined as measures of effort. Secondly, he used the information that was obtained from the first actions as a measure of effort. This included learning the suspect's name, getting a suspect description, or a link to another crime. These appear to be different sides of the same coin. The first measure requires an investigator to commit an overt action. The second measure requires taking the result of some action and using it in some manner.

If the first hypothesis was correct, then the only significant factor in solving the crime would be the information gathered by the initial patrol officer. If the

circumstances dictated the results of solvability then actions by subsequent investigators would have little, if any affect. In finding contradictory results, Eck proposed creating a triage hypothesis.

Eck's findings show support for both the circumstance hypothesis where the preliminary investigation holds the key to solvability as well as support for the effort-results hypothesis which places an emphasis on follow-up actions. Eck proposes to combine both of these hypotheses into what he called the "triage hypothesis." In the "triage hypothesis" Eck divides the cases according to their solvability. He categorized cases in three ways. There were cases that could not be solved with a reasonable amount of effort, cases solved by circumstances, and cases that may be solved by a reasonable amount of effort otherwise they could not be solved.

The proposed triage hypothesis by Eck may appear on the surface to be a reasonable approach if homicides presented themselves to investigators making it obvious which one of the categories they were but homicide cases do not present themselves in such a manner. The problem becomes the investigator must try and determine which one of the categories the cases falls into when they are presented the case. Effort is a part of all three categories that Eck presents us with in his triage hypothesis since all three of them would require investigative action or effort. A question becomes is there anything to lose by just concentrating on those actions in general to see which are indicative of effort and are successful in clearing the homicide? I would offer the answer is no; there is nothing to lose. In reverse, if we are able to determine which investigative factors lead to clearing the homicide then those factors will allow us to place cases into one of his three categories. E.g., if

findings support case clearances where the investigator interviews witnesses, then knowing that there are witnesses to be interviewed in a case will allow us to categorize cases where the probability of clearing the case is increased over cases where that factor is not present. Eck pointed out that past as well as present research looked at cases by type of offense but did not focus on the case difficulty. Knowing which factors lead to clearance will allow us to look and see if these factors are present in a case and in turn further our knowledge regarding case difficulty. Knowing case difficulty opens up the door for use as a management tool regarding investigative performance as well as enabling investigators to make better use of their time focusing on those cases with factors of higher solvability.

Cordner (1989) examined the relationship between agency size and effectiveness. It was pointed out in the article that there had not been a lot of research which has focused on agency size and investigative effectiveness but the research that does exist seems to have maintained its focus on why some cases get cleared and others do not.

Greenwood et al. (1975) are credited with conducting one of the more thorough studies on the investigative process. One major finding of the Greenwood et al. (1975) study was that most cases solve themselves. Based on this finding, different police practices should not be expected to have any substantial effects on clearance rates. The importance of this research concerns police practices since they are one of the major variables of my research along with the variable of race.

While most of the previous research on investigative effectiveness examined organizational size and organizational elements such as caseload, Cordner (1989)

reported that effectiveness was strongly related to the agencies region within the state. Neither size nor workload was significantly related to investigative effectiveness. Research which supports the insignificance of investigative unit size and workload allows for attention to be directed to police practices.

The relevance of the Cordner research is in looking at factors which effect case clearance. This study looked at the relationship, first nationally and then in Maryland, between agency size and investigative effectiveness. A bivariate analysis of national data showed an inverse relationship between investigative size and investigative effectiveness. The multivariate analysis in Maryland showed that variables other than the size of the agency had an effect on clearance rates. These other variables included regions as well as a mix of crimes. A conclusion drawn by Cordner was that environmental factors had a greater effect on clearance rates than organizational factors.

As discussed in the Cordner study, the Rand study reported that most cases solve themselves (Greenwood and Petersilia, 1975). It was also reported that clearance rates cannot be expected to vary by how the criminal investigative unit is organized, by special units, by workload, or other variables (Greenwood and Petersilia, 1975). This information reported in the Rand study was consistent with the previous literature (Greenwood, 1970; Greenberg et al., 1972). We saw this same finding earlier in the Eck (1983) study where he referred to this as the circumstance-result hypothesis.

Keeping in mind that studies have also looked at the workload of the detective unit, Chaiken (1975) found that the clearance rate decreased with an increased

workload. This finding would be the opposite of the Rand results. As far as looking at police effort and effectiveness, this would tell us that increasing the workload may very well decrease the clearance rates. This becomes an important finding because if increased workloads affect clearances then a homicide investigator who faces a heavy or increasing workload will not be productive in clearing cases. It may be that the investigator facing a heavy workload does not have the time to thoroughly work a case however; if the investigator knew which factors increased the probability of closing the case perhaps any workload variable could becomes irrelevant.

The importance of the Cordner (1989) findings was that environmental factors had more influence on case clearance than organizational related variables. Cordner did not test all organizational variables thus leaving the question open for future research on other factors outside the case environment. An additional relevant finding was that as the number of property crimes increased the lower the clearance rates. This leaves open the idea that personal crimes such as homicide have a greater potential for case clearance than property crimes. Personal crimes usually involve a victim-perpetrator exchange or contact that will increase the potential evidence for case solvability. The availability of more eyewitness testimony and transfer evidence adds a greater potential evidence pool enabling investigators the opportunity to gather key evidence necessary for case closure.

As pointed out by Alderden and Lavery (2007), homicide investigators review the evidence they have been presented with and must identify potential witnesses as well as suspects. In addition, investigators need to know which factors are of greater importance or which ones are significant predictors of homicide clearance if the

investigators are to be efficient in their case handling. If Waegel's (1981) findings hold true then we may need a redirection of investigators using perceived routinization to a more evidence-based approach. If research can point us in the direction of factors that have been shown to effect clearance then the investigator can utilize these factors and more efficiently work a case.

An evaluation of homicide clearances was conducted by McEwen (2009) in Phoenix, Arizona. The primary purpose of the project was to see if assigning four crime scene specialists to the department's homicide unit increased the homicide clearance rate by increasing investigative time. Assigning these specialists to the homicide squad relieved some of the investigator workload. The addition of crime scene specialists could be a measure of increased effort. Prior to the assignment of the specialists to the homicide unit, investigators were responsible for collecting evidence at the crime scene. The Phoenix evaluation by McEwen was based on the investigation of 362 cases with 392 victims and the homicide cases were evenly divided between experimental and comparison squads. The outcome variable in this study was the clearance rates of the experimental squads in relation to the comparison squads. The goal was to shed some light on improving homicide investigations. The researcher was looking to see if the clearance rate for the experimental units would be better than the comparison group when compared to the division's performance from the previous year. The results showed that the clearance rates dropped for both the experimental group as well as the comparison group. The key point is that the drop experienced by the experimental group was not as great a drop as the drop for the comparison group. Ideally, it would have been desired to see an increase in clearances

for the experimental group that was greater than any increase that the comparison group experienced. Nonetheless, these results may be considered favorable since adding the extra effort through the addition of crime scene specialists allowed more attention to be devoted toward specific actions which are part of the investigatory process.

Summary of the Investigative Literature

Based on the idea that there are certain case characteristics that are better predictors of whether a case can be solved (Greenberg et al, 1977; Eck, 1979), it follows that investigative effort placed on addressing cases with these specific characteristics should increase the probability of case solvability. The mere existence of certain circumstances such as having a witness present will have no affect on solvability unless effort is made at gathering information from the witness and acting upon that information. It follows that it should not be just the presence of certain circumstances but the necessity for some type of investigative effort which acts upon those circumstances.

Case screening was also reported to have had some positive effects on case clearance in the literature. It is plausible that case screening may be valuable because it will allow an investigator to screen cases which contain certain factors that when acted upon, increase case closure and also screen out cases that possess factors which have no effect on homicide clearances. Keeping cases with known solvability factors in the pool of active investigations will increase the probability of solving a case.

In looking at the decline in homicide clearance rates, the clearance data from 1960 through 2005 showed two slight increases. The one point that is not clear is

whether the increase in clearances was due to police practice or due to the fact that some cities experienced declining homicide rates during that period (Riedel, 2002; Riedel and Boulahanis, 2007). We must continue to search for those factors within the investigators reach which when acted upon with effort lead to successful case closure.

Taking into account the current literature on homicide clearances, race, and criminal investigations, my research will improve on the current literature in three ways. First, my research takes us beyond routine police arrest encounters and into the specialized world of the criminal investigator. Secondly, the focus is on one specific crime, the crime of homicide. This allows us to see the trees in the forest instead of not seeing the forest for the trees. Finally, my research will pull from both the literature on homicide clearance, race, and in the often neglected area of the criminal investigator in hopes of finding factors which when acted upon with effort will lead to greater case solvability.

Summary of Literature Review

One goal of research as well as the foundation for evidence-based policing is to make improvements to existing police practices. In support of their grant funding, the National Institute of Justice states that the purpose of the National Institute of Justice Research, Evaluation, and Development Projects Grants program is to encourage and support research, development, and evaluation to improve criminal justice policy and practice in the United States. This purpose should be at the heart of all research in criminal justice. The goal of my research is to try and find strong predictors of homicide clearances. This way, police departments can focus on the

predictors within their control and not waste valuable investigative time on those factors that do not affect case closure. While the research focus appears to be increasing on homicide clearances there is little focus on specificity of investigator efficiency and as far as the race factor goes, we seem to have thrown the baby out with the bathwater. Research efforts need to refocus on what police practices increase clearance rates yet may also potentially interact with race. As we have seen, the literature regarding the effects of race on case clearance is inconclusive. Likewise, the path the detective takes in conducting their investigation is influenced by many organizational and outside factors.

A goal of this dissertation is to explore the issues of race, both offender and victim, combined with the investigative effort of the detective for any resulting effects on homicide clearances. This will be accomplished through a secondary analysis of a data set (Wellford and Cronin, 1999) which was one of the few attempts to examine these various factors simultaneously. The dissertation acknowledges that there is weak support for the discretionary hypothesis however the results of other studies that were outlined have reported varying effects for race that have been attributed to other factors. Most of the homicide research has looked at the nature of the offense and the characteristics of the victim. Some have also looked at the offender and very few have looked at the nature of the investigation. Almost none of the literature, with the exception of Wellford and Cronin (1999), has tried to look at them simultaneously. My study is focused on advancing this knowledge by expanding the examination of the effects of the race dyad on homicide clearances in combination with the nature of the investigation, more specifically any effect the criminal

investigative effort has on case clearance. The specifics of the models that will be tested will be discussed in the next Chapter on Methods.

Chapter 3: Research Strategies and Methods

Data Source

My research is a secondary analysis of a homicide data file collected by Wellford and Cronin (1999). The Wellford and Cronin study was chosen since it examined the nature of the offense of homicide, the characteristics of the victim and offender as well as the nature of the investigation and also tried to look at them simultaneously; something not found throughout the homicide literature.

In the original study, a data set was constructed by Wellford and Cronin which was a sample of cities selected using homicide data gathered from the F.B.I.'s Uniform Crime Report. The Wellford and Cronin (1999) study originally focused on 20 large U.S. cities examining variations in clearance rates as well as levels of homicide. While the cities examined were found to have relatively stable clearance rates over time, the cities varied from one another in their homicide clearance rates. They reported that generally speaking, cities that are high in total clearance and high in homicide rates remained consistent during this time period. As a result, Wellford and Cronin (1999) used a multisite design where they selected four large cities that had these stable patterns of crime clearance rates and high levels of homicide. In the cities selected, there was a city with a high total crime clearance rate and a high homicide clearance rate, a city with a high total crime clearance rate and a low homicide clearance rate, a city with a low total crime clearance rate and a high homicide clearance rate, and finally a city with a low total crime clearance rate and a low total homicide clearance rate.

Unique to their study was that the data were not simply numbers garnered from the U.C.R. but the data which was used for their analysis were gathered by researchers from the Statistical Analysis Centers from the states where each of the four cities were located. The data was retrieved from searches conducted through the open and closed homicide case files in each city to locate the information which answered the specific questions posed by two unique instruments which will be discussed shortly.

The Wellford and Cronin study examined 798 homicides between 1994 and 1995 that occurred in these four large U.S. cities. While the data examined is now 16-17 years old, this was and continues to be one of the more complete data sets of homicide clearance information in the literature to date. This data contains a full range of case characteristics to include investigative activities which cannot be found in other data sets.

A random sample of 200 homicides in 3 of the cities and 198 homicides in one city were collected for their analysis. In their research, Wellford and Cronin (1999) were interested in trying to discover why some departments have higher clearance rates than other departments. To Wellford and Cronin, the previously mentioned stability suggested that there were certain factors that had an effect on a department's ability to clear a homicide case. The purpose of their study was to look at the factors affecting agency clearances by comparing characteristics of both solved and unsolved homicides. A total of 215 factors relating to the characteristics of the homicide case and its investigation were examined. These factors were examined to

see if there was any relationship between those factors and the case status of open or closed.

An integral part of the data gathering involved the instruments that the authors used in collecting their data. Two instruments were used in collecting data that were used to describe the circumstances surrounding the homicide case as well as the investigation process. First, the Homicide Attribute Coding Instrument (HAC)[1] was used to collect data regarding the details of the circumstances surrounding the homicide and victim and offender characteristics. Specific parts of this instrument collected data on both offender and victim race. The race variable is one of the independent variables in my model.

The second data collection instrument was the Investigative Instrument. This instrument was used to collect data concerning the processes and activities used by the criminal investigator to investigate the homicide. The Investigative Instrument plays a major role in my analysis. The data gathered from this instrument will be used to examine what I propose is a latent concept of investigative effort. The Investigative Instrument also gathered the data that comprises the dependant variable of case status.

Both of these instruments have added to the study of homicide due to the fact they were used to look into individual case files to gather data. N.I.B.R.S.[2] is considered an alternative data source by some; however, even though it gathers more

[1] The Homicide Attribute Coding instrument was developed by Colin Loftin, Brian Wiersema, April Pattavina, Paul Mazerolle, and Adam Dobrin.

[2] N.I.B.R.S. is an incident-based reporting system in which agencies collect data on each single crime occurrence. For each of the offenses coming to the attention of law enforcement, specified types of facts about each crime are reported. N.I.B.R.S. goes into more detail than the summary-based UCR system.

case data than the U.C.R., it does not gather all of the specific information regarding a case. An additional point is the fact not all departments use N.I.B.R.S. in reporting their crimes. Having researchers actually examine individual case files produced data not readily available to most researchers. Data was gathered from all homicide cases in the four cities, both open and closed and it was the HAC and Investigative Instrument that were used to collect data from the homicide departments' case files.

Sample Selection

The data that was collected in the original research was gathered from a random sample of 200 homicide incidents in three cities and 198 in the fourth, for a total of 798 incidents. The cases from each city were chosen to ensure that the proportion of both open and closed homicide cases in the sample matched that of the entire homicide caseload for those years for that city. Using this design resulted in a total of 589 (74%) solved cases and 209 (26%) unsolved cases in the sample (Wellford and Cronin, 1999).

Open and closed case status is based on those definitions found in the U.C.R. Handbook which is a guide for data collection for the U.C.R. Report. In the FBI's Uniform Crime Reporting (UCR) Program, law enforcement agencies can clear, or "close," offenses in one of two ways: by arrest or by exceptional means. The UCR Program does not distinguish between offenses cleared by arrest and those cleared by exceptional means. The relevance of these definitions is discussed in the following section

Measures/ Variable Description

Before beginning my discussion of the methodology being proposed, it is necessary to discuss the specific variables under examination. The variables under examination within my study will be race, investigative effort, and case status. The variable of race includes the race of both the offender as well as the victim. The strategy to be used in my analysis will be discussed in a later section of this Chapter.

Independent Variables

The primary independent variables in my study are race of the victim and the race of the offender. The second independent variable under examination will be the observed variables that are indicators of the latent variable investigative effort.

Race

In the original study by Wellford and Cronin (1999) data were gathered relating to the race of both the victim and the offender. In gathering race data, the persons responsible for data entry were instructed that if case files were not available and the entry of the data had to rely on other sources of information concerning the data, once they were confident of the accuracy they were to leave it blank temporarily and an appropriate missing code would be filled in later. Race was coded in the original study as:

1- White (includes Mexican-Americans)

2- Black

3- American Indian or Alaskan Native

4- Asian or Pacific Islander

9- Missing

For the purposes of my analysis, I am recoding the race variables as Black (0) and White (1). The other races are not included in the research. Since the major disparity literature focuses on black and white, my attempts at examining the role of race in homicide clearances will also focus on the race variable of black and white. In the Wellford and Cronin (1999) dataset being used, 97.7% of all case victims were either black or white. The race categories of American Indian, Alaskan Native, and Asian or Pacific Islander and Missing are excluded. This coding was applied to both the race of the victim as well as offender since the original coding was the same in both instances. It should be noted that the terms offender and suspect will be used interchangeably throughout this study.

It is important to mention missing data with the offender or suspect variable. It would be plausible that there will always be missing or unknown data in regards to the race of an offender (or victim) in any crime. Generally speaking, one would likely expect to find more data on a suspect in a personal crime versus a property crime since there is contact between the offender and victim in all personal crimes; however, descriptive data on the offender would not always be as readily available in homicide cases since the victim in the majority of instances has died prior to being able to disseminate information regarding their perpetrator to anyone else. Suspect or offender information in a homicide case is often developed at a later point in an investigation as the result of the investigative process and comes from witnesses or through the gathering of other pertinent case information. This point is supported by 129 missing offender race variables in the original Wellford and Cronin (1999) data. Of course, data on the race of the victim should be available. Case records indicated

8 missing cases of victim's race. Even if a body is burned or mutilated beyond recognition, the coroner would be able to supply the race data although these types of cases are rare. Missing data would be indicative of inefficient report writing or cases where the investigator neglected to include the information thus it was missing from the report.

Police Investigative Effort

The second variable for my research is the latent variable, police investigative effort. The construct of investigative effort will be an independent variable, intervening variable, as well as dependent variable at different points throughout the analysis. In defining the construct of investigative effort, I am attempting to find all the variables listed in the study which indicates that some effort was being put forth by the criminal investigators or detectives in conducting their homicide investigation. The concept of effort is used to designate any overt action that is performed by the person that the specific question is addressing. It is acknowledged that there can be degrees of effort. However, in the original research the questions concerning investigator actions and other role player activity simply asked whether or not the activity took place. While this is a basic approach, the data is limiting in that degrees of effort cannot be determined. I hypothesize that a latent concept of investigative effort does exist. These observable variables, represented by the actions performed by investigators are indicators of the latent concept of investigative effort. In order to determine whether a specific investigative variable of effort exists, it is important to determine if an overall variable of effort may exist along with other subtypes of

effort**.** I will use a Confirmatory Factor Analysis to test for the latent concept and this will be discussed in the Methods Section.

The data used to test for the latent concept of effort comes from the Wellford and Cronin Investigative Instrument which gathered information relating to the way the homicide investigation was conducted. This information comes from actual case files as well as from interviews with persons that were within the homicide unit and had knowledge concerning the specific nature of the homicide investigation.

The variable of police effort plays two roles in this study. Since I want to examine the role that those specific variables that make up investigative effort have on case status, it first becomes necessary to determine what variables make up the latent construct of investigative effort. In an effort to determine this latent construct, I will examine all those variables that were part of the investigative instrument which measured the actual effort that was put forth during the homicide investigation. This effort includes investigative as well as any other effort that is put forth by others involved. These will be variables where someone involved in the investigation had either performed or did not perform some overt act of which choosing to act would be a measure of effort. While I am primarily interested in the variable of criminal investigative effort it is important to see empirically if there is an overall effort concept. There could emerge an effort construct which subsumes not only investigative or detective effort but all effort.

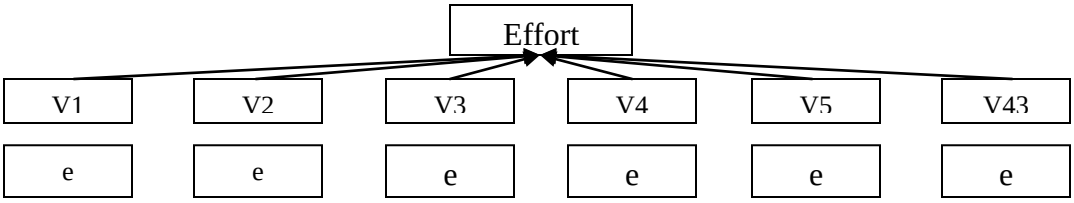

Figure 3.1: Latent Variable of Effort

In an effort to develop the latent concept I examined all 98 variables that were included in the codebook used by Wellford and Cronin to capture data in their Investigative Instrument. Out of the 98 factors included in the Investigative Instrument, 43 where chosen for testing to see if they did indeed seem to measure the same underlying concept. Selection was based on whether any of the questions was related to actions that were taken by the focus of that specific question. The factors that I considered in the analysis are listed in Table 3.1 and the method for constructing this latent variable of effort will be discussed further in the specific methods section of this chapter. The factors which are found to measure this concept will comprise investigative effort for analytical purposes. It should also be noted that I included all factors that appear to be measuring effort and not just those variables that had been found to be significant in the Wellford and Cronin study. The reason that all the variables are included and not just the significant ones is that a variable may not have had an effect on case status but may still be a part of the concept of effort.

The original coding of most of the variables that are included in the factor analysis followed the schema of:

1=Yes

2=No

3=No mention

4=Suspected but uncertain

9= Missing

In an effort to measure any effort, a dichotomous variable was created for each proposed dimension of effort as measured by the individually selected observable variables. I measured each response as 0=No and 1=Yes. Having a response of yes indicated an effort was made. This includes any degree of effort. Answering yes would mean the act was performed and in some instances more of an effort could have been performed. For example, there are crime scene sketches that are done which are roughed out and then are redone for presentation which consume a great deal of time. There are also crime scene sketches done with a computerized program which can be completed very quickly. Investigators may check with a neighbor to see if they know anything about the crime yet other investigators may go to lengths to check the neighborhood by conducting a neighborhood canvass. All of these examples would simply have been coded yes in the study. If there was a response of no mention or even a slight chance of an act as was evidenced by the response of suspected but uncertain, then the results were excluded. Missing data was also excluded. There were responses that did not follow this format and they will be discussed in conjunction with that specific question under the included variable section that follows.

The goal in developing the latent concept of effort is to include all those actions that are gathered by the Investigative Instrument and are performed by persons during the course of working on a case. Since the data set being examined were drawn from 4 major cities, resources and departmental organizational make-up should be such that the tasks included in the latent variable should be similarly

performed and if not, any variation in practice will be captured by the Investigative Instrument.

Variables included in the Confirmatory Factor Analysis

Table 3.1: Hypothesized Investigative Effort Variables

Variable #	Observed indicator variable
1	Total number of homicide detectives assigned to the case
2	Were other law enforcement agencies involved in the investigation
3	Did the assigned homicide detective go to the crime scene during the initial phase of the investigation
4	Was a search warrant necessary for the crime scene?
5	Were search warrants necessary for any other locations where perpetrator or evidence may have been?
6	Was the crime scene secured by the first officer on the scene
7	Were evidence technicians at the crime scene
8	How many evidence technicians were on the scene
9	As a search made for fingerprints and physical evidence
10	Were photographs of the crime scene taken?
11	Was a sketch of the crime scene made?
12	Was the crime scene measured?
13	Did the homicide detectives describe the scene in their notes?
14	Were witnesses found at the crime scene interviewed
15	Was a neighborhood survey conducted to locate additional witnesses or gather relevant information?
16	How many officers conducted the neighborhood survey?
17	Who else (other than witnesses) was interviewed during the investigation
18	Was a computer check conducted on the decedent

Table 3.1 continued

Table 3.1: Hypothesized Investigative Effort Variables continued

Variable #	Observed indicator variable
19	Was a computer check conducted on any suspects?
20	Was a computer check conducted on any witnesses?
21	Was a computer check conducted on any guns?
22	Was a computer check conducted on any shells or casings?
23	Was a computer check conducted on any vehicles?
24	Was a computer check conducted on the crime scene location?
25	Which of the following information systems were used? (Local CJIS, State CJIS, NCIC, ATF, Drug Fire, MVA, Warrants, Other)
26	Did an officer or detective collect the decedent's belongings from the hospital/morgue?
27	Was a body chart of the decedent made?
28	Was the attending physician or other medical personnel at the hospital interviewed?
29	If witnesses were found at the hospital were they interviewed?
30	Was the person who transported the decedent to the hospital interviewed?
31	Was homicide detective present at the post-mortem examination?
32	Were specimens (blood, hair, fibers, fingernail scrapings, or seminal fluid) collected for analysis?
33	If a gun or guns were used in the homicide, were projectiles recovered?
34	Did the homicide detective prepare a detailed body chart (one showing all wounds, abrasions, etc) including the medical examiner's findings
35	Were confidential informants used?
36	Did other police officers provide information?
37	Was surveillance used?

Table 3.1 continued

Table 3.1: Hypothesized Investigative Effort Variables continued

Variable #	Observed indicator variable
38	Were any witnesses placed in protection?
39	Detective followed up on witness information
40	Was a warrant requested for a suspect?
41	Was a likely suspect identified but a warrant not requested?
42	Was a warrant issued for the arrest of the suspect?
43	Was the warrant served and a suspect arrested?

The individual variables that were chosen for the analysis of the hypothesized latent variable were selected because they allow the opportunity for any of the actors involved in the homicide investigation to take action.

The first variable included in the confirmatory factor analysis is the total number of homicide detectives assigned to the case. Greater effort is evidenced by an increased number of officers assigned to the case.

A second variable included in an attempt to construct the concept of effort is the number of other law enforcement agencies involved in the investigation. Increased participation in the investigation is evidence of greater effort.

Next, the fact the detective responded to the crime scene during the initial phase of the investigation is also indicative of effort. The question of whether or not a detective is on the scene of the homicide during the initial investigation is more or less a moot point. For the majority of cases and with rare exception, it is a given that the criminal investigator is at the initial crime scene. Responding to the crime scene does take effort.

The fact that a search warrant was necessary for the crime scene indicates that effort was produced since someone had to apply for the search warrant. The "Search warrant necessary for scene" variable was chosen because the fact that a search warrant was necessary for the scene shows investigative effort. It does take effort to at least apply for a search warrant and to initiate the process. Applying for a search warrant could be ignored but in doing so the case could be placed in jeopardy. It is the investigator who initiates the search warrant process and who in the great majority of cases becomes the affiant. Applying for and receiving a search warrant can be an arduous task. The 4th Amendment of the U.S. Constitution protects individuals against unreasonable search and seizure. It states, "The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated, and no Warrants shall issue, but upon probable cause, supported by Oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized." Generally speaking, the procedures for obtaining a search warrant start with getting supervisory approval and having a prosecutor decide if the request for a search warrant is valid. Once approved, the requesting officer or investigator must prepare an affidavit and search warrant. The affiant for the warrant must include background material on themselves which shows their qualifications allowing them to apply for the search warrant. The warrant is specific as to who or what can be searched as well as what specific item(s) the police will be looking for when they execute the warrant. The paperwork then has to be submitted to a judge or similarly proscribed individual who has the authority under law to sign and approve the warrant. This alone requires some effort because warrants

are not always signed during business hours. Often times the officers must present their application to the judge at their home. Once executed, officers must keep a detailed list of all property seized and have to leave a copy of the warrant as well as the property seized with the owner of the property. The same justification for including whether or not a search warrant was necessary at any other location where the perpetrator or evidence may have been also applies. Having to obtain a search warrant for any location takes effort.

Actions that are performed by the criminal investigator as well as by the uniform patrol officer or the first arriving officer upon the scene should be indicative of police investigative effort. The original responding officer(s) plays an initial role in the investigation and although the importance of their role should not be understated, their responsibilities are prior to the investigators arrival and are supportive to the criminal investigation.[3] For example, securing the crime scene is an example of effort and it is usually a task that is performed by responding officers and not by investigators. As such, there will be certain factors that are routinely performed by those other than the investigator that will be included in the development of the latent construct of effort. Securing the crime scene takes effort. Officers who first arrive on the scene must take steps to protect evidence from destruction and protect the integrity of the crime scene. Decisions are made concerning who can and cannot enter the scene and actual physical effort is

[3] Chaiken et al. (1976) reported that the solution to criminal case closure depended more on the activities of the patrol officer, public involvement, and clerical processing instead of any specific investigative techniques. The researchers reported that 80% of serious crimes are not solved and that most cases were solved using information that was gathered from witnesses at the scene or from the police officer who initially responded to the crime.

sometimes taken to set up physical barriers such as crime scene tape or the blockage of street access through the use of police cruisers. Whatever method is used to protect the scene, it is effort nonetheless.

Some crime scenes require evidence technicians to respond to the scene. While duties and responsibilities as well as actions at the scene vary from scene to scene and from department to department, this requires effort.

Hand-in hand with crime scene technicians responding to the scene goes the number of technicians on the scene. Increases in the number of technicians who are on the scene means more effort. If the technicians search for fingerprints or other physical evidence they have exerted effort.

The variables of "searched for fingerprints and physical evidence", "photographed the crime scene", "sketched the crime scene" and "measured the crime scene" are examples of tasks that may at times be performed by specialists depending upon the manpower of the specific department. While departmental resources and protocols may differ, the search, photography, sketch, and measurement of the scene are at least usually done at the direction of or at least in consultation with the investigator. Some larger departments have specific personnel who serve as crime scene technicians and evidence technicians and they may be the personnel who perform these tasks. Even if they do exist within the department and are part of the crime scene evidence collection unit, it is a common practice for these specialists to be briefed by the detective or investigator regarding the crime scene in order for the evidence collection tasks to have some specific direction and purpose.

In an interview with a former high ranking official from one of the departments included in the original study, I learned that at homicide scenes within that official's department there were crime scene evidence personnel who did respond to the scene for the collection of evidence; however, they operated at the specific direction of the homicide investigator. This information would support the idea that the investigator does put forth some effort as it is related to the search for evidence and other evidence related activities such as sketches and photographs. If photographs were taken of the crime scene and a sketch was made of the crime scene, then effort has taken place. Speaking from the overall effort perspective, it does not matter who performed these specific acts in evidence gathering. The fact it occurred or an attempt was made is evidence of effort. It follows that the crime scene being measured would also be an example of effort no matter who did the sketch. No matter which approach an individual uses in examining these variables, there is effort on the part of someone. The results of the latent variable formation may shed some further light on the grouping of these variables.

If the homicide detectives described the scene in their notes they have exerted effort. Taking notes can be related to the investigator's efficiency and it takes effort or overt action to compile investigative notes.

Effort is also exerted when witnesses found at the crime scene are interviewed. Conducting a neighborhood survey in order to locate additional witnesses or to gather relevant information requires some effort on the part of either the police officer or criminal investigator. The Investigative Instrument also gathered data on how many officers took part in conducting the neighborhood survey. The

more officers there are that take part in the neighborhood survey the more effort there is being expended in this activity. Any question in the Investigative Instrument that gathered data on persons being interviewed also looks at effort since it takes effort to gather information from interviews that are being conducted. Even if someone is interviewed and no pertinent case information is revealed, that was effort on the part of the interviewer.

There were numerous questions in the Investigative Instrument which inquired as to whether certain computer checks were conducted as a part of the investigation. These checks were done on the homicide victim, any suspects, any witnesses, any guns involved, any shells or casings, any vehicles involved, on the crime scene location. These checks are conducted in hopes that information that is obtained from the check can lead to case closure. Additional leads in a case are often times developed from information sources such as the object of these computer checks. The Investigative Instrument also gathered data on all the different information sources that were used in the computer checks. These sources included the local Criminal Justice Information System (CJIS) database that was relevant to the location of the homicide. It also included the State CJIS, the National Crime Information Center (NCIC) database, the Alcohol Tobacco and Firearms (ATF) database, the Drug Fire database, the relevant Motor Vehicle Administration, any Warrant database, and any other database which may hold information that the investigator feels may hold information important to the case. Conducting these different computer checks takes time and not just in gathering any information but also in disseminating that information to the appropriate person in furtherance of the

criminal investigation. These computer check variables are either performed by the investigator or prompted by or at the investigator's direction. These variables do include certain situations where a normal no response could be possible without a specific event occurring. For example, in coding whether a check was run on a gun, if no guns were used in the crime a "no" coding would appear to be indicative of no effort when in fact neither response would be applicable as far as effort is concerned. The Wellford and Cronin data included the code of no gun involved for weapons related checks and no vehicles involved for checks on vehicles in case the question was not applicable. This will allow for the elimination of cases where the items were not involved and examining only those cases where the question is applicable. This will allow for the coding of cases as 0=No and 1=Yes. Responses of "No mention, suspected but uncertain and missing" will be excluded. This will allow for a definitive yes response to be noted and without a clear yes response, the only alternative response will be those coded as no. While the responding officer does gather information on their initial arrival and preliminary response, the investigator has to seek additional information from various sources during the course of the investigation.

Once the body arrives at the hospital or morgue there are numerous actions that take place which are reflective of effort. Collecting the decedent's belongings from the hospital or morgue takes effort. Likewise, making a body chart of the decedent takes effort. The body chart is done to document wounds to the body and other relevant data that the investigator or medical personnel find. Interviewing persons at the hospital also takes some degree of effort. The investigator interviews

the medical personnel, the attending physician and the persons responsible for transporting the decedent to the hospital.

The basic fact that the homicide investigator was present at the post-mortem examination takes effort. It would be easy for an investigator to merely wait for the medical examiner's report to be sent to them in order to review the results. Attending the post-mortem exam is going a step further and requires effort.

Attending the post-mortem will make the investigator available to collect specimens such as but not limited to blood, hair, fibers, fingernail scrapings or seminal fluids. Once again, no matter who would be present, the mere collection of these pieces of evidence takes effort. Any type of evidence collecting such as projectiles or casings is an example of effort.

Trying to develop any information source in the investigation requires effort. The Investigative Instrument used in the original study asked if confidential informants were used. This requires effort. The investigator must locate the informant and see if they have any information regarding the homicide. The investigator can also use the informant to try and see if they can gather information for the investigator which may aid them in the investigation. Cultivating informants is a key activity for an investigator and is valuable for the investigative tool belt that often comes in handy for solving many crimes.

Some final areas that show effort are whether there were any other police officers who were able to provide information, was surveillance used, were witnesses placed into protection, and did the detective follow-up on witness information. Generally speaking, the criminal investigator calls the shots concerning the homicide

investigations that they are assigned to investigate. Making the decision to conduct surveillance is another example of investigative effort. The variable "Detective followed up on witness information" is also an example of investigative effort. Investigators juggle a lot of different tasks when confronted with a crime scene and the ensuing investigation and tracking down witnesses for interviews can be time consuming and often leads to an investigative dead-end. Following up on a case is a good example of effort and thorough police work. This would be an easy task to ignore. Since it sometimes requires repeated effort to follow-up on witness information, the fact an investigator does so is an example of investigative effort. When investigators are faced with a heavy caseload, it is very difficult to leave no stone unturned or cover all bases.

Activities that are related to the location or identification of a suspect which require effort are: was a warrant requested for the suspect, was a likely suspect identified but a warrant was not requested, was a warrant issued for the suspect's arrest, and was the warrant served and the suspect arrested.

The areas discussed in this section of questions that were included in the confirmatory factor analysis all focus on responses taken from the Investigative Instrument. The idea behind including specific responses is to choose those which appear to measure effort no matter from whom the effort comes from. The factor analysis will hopefully allow these observable variables to be reduced to concepts that can be attributed to either a general effort concept or specific effort concepts within the responses.

Variables excluded from the Factor Analysis

As previously mentioned, 43 variables out of 98 will be included in the factor analysis. The remaining 56 variables were not included because they were not related to the effort of anyone. Some of these variables are administrative and others are result oriented. I will explain the context of variables that will not be included in the factor analysis. Specifically, this instrument gathers information such as agency identifier codes and the specific case number for each homicide. There is also a group of variables that are the result of specific effort, investigative or otherwise.

In order to explain the context of variables that will not be included in the factor analysis I will present some examples. Table A.1 in the Appendix will list all the variables in the Investigative Instrument and whether they were included in the confirmatory factor analysis. Additional information in Table A.1 will show the original coding of the specific variable and if the variable was included, then the recoded value will also be listed.

The current status of the case is not related to any effort that is involved in conducting the case so it was eliminated from the factor analysis. The reason the status was not included is because a great deal of effort can be put forth and the case still remains open.

A second excluded variable is related to the time it took the investigator to arrive on the scene. The time it takes to arrive on the scene of a homicide may appear to be indicative of effort; however, any delays could be due to the time lag in the criminal investigator being notified or could also be due to the physical distance the investigator must travel just to get to the scene. Not all crime scenes are equidistant from the responding investigator's location. In some departments the investigators

must first respond to headquarters and in others they respond directly to the scene. Some departments do not assign vehicles to their investigators and they must come to headquarters to get a police vehicle and all needed equipment for their investigation. The time of day may also affect the response time, e.g., nighttime when the investigator is sleeping versus daytime with heavy traffic or during regular work hours. Taking all of this into consideration, this variable was not included in the factor analysis.

The date the detective is informed of the homicide is not relevant to the concept of effort. As previously discussed whether or not other law enforcement agencies are involved in the investigation could be indicative of more effort however the specifics of which agencies they are and what they did in the investigation are specific components of any effort and not the effort itself.

While a search warrant being necessary leads to effort, how quickly the search warrant was issued for the crime scene can depend on other factors beyond the investigator's control. A search warrant cannot be issued without probable cause. Probable cause in laymen's terms would be a set of circumstances which would lead a reasonable person to believe that a crime has been, is being or about to be committed. There could be enough probable cause fairly close in proximity to the crime and in other instances the probable cause for the search warrant could take more time to develop. Another problem in obtaining a search warrant quickly could be the difficulty in locating a judge to review the application for the actual warrant. Judges must approve the warrant and during regular hours the judge may be tied up with regular hearings or just unavailable. After hours, judges must be located and they are

not always available. The same issue exists with how quickly the search warrant is executed after its issuance. There are at times logistical reasons as to when and how quickly the search warrant is executed.

There are numerous questions where the response is secondary to any effort. Location data such as where something took place would be secondary to any effort. The location of the homicide such as in a bar, commercial establishment, residence, etc. have nothing to do with any effort that would be involved in the investigation. These location responses are secondary in the sense that they are discussing actions that were taken in response to effort. A clearer example of such a secondary response which would not be measuring effort would be the question which asks "what did the officer do to secure the crime scene? This question is asked in response to a yes response for "was the crime scene secured by the first officer on the scene?" Securing the crime scene is an example of effort. Action that is taken to secure the scene is merely the substantive response to that effort. The person who secures the scene is merely the conduit of that effort and his actions are secondary to whether effort existed.

A final example of a variable that was not included in the factor analysis is the response to "were fingerprints or other physical evidence found?" This question is a follow-up to "was a search made for fingerprints or other physical evidence?" If the response was yes then we have effort. Responding yes or no to whether fingerprints or other physical evidence was found could be because none existed. Searching is effort and the result is not. The result is the fruit of the effort.

Table A.1 in Appendix A lists all the variables in the Investigative Instrument. In an attempt to help clarify any variable included or excluded in the factor analysis the rationale is presented there. If the variable was included in the factor analysis the recoding scheme is also presented.

While there is no clear cut yes or no as to whether an observable variable measures investigative effort, the methodology is focused on this question. The purpose of the factor analysis is to see how well the measured variables represent the number of latent constructs. As we shall see in the methods section, we will try and pare down the variables to see if specific observables appear to be measuring the same construct of investigative effort or whether there is an overall construct of effort. If it is found that there are several dimensions of effort, I hypothesize that one latent variable will be police investigative effort and that is the construct I am interested in examining within my model.

Dependent Variable

The dependent variable in my study is the status of the homicide case; whether the case is open or closed[4]. In data that is collected by the F.B.I.'s Uniform Crime Report (U.C.R.), the offenses in these reports are listed as cleared by arrest or by exceptional means. Simply being coded as cleared does not indicate an arrest was made or that any specific effort was put forth by investigators. According to the U.C.R., an offense is cleared by arrest when at least one person is arrested, charged with that specific offense, and turned over for prosecution. This definition can mean a

[4] For the purposes of this study, a cleared or closed case means the case was closed by an arrest. Cases that were coded in the original Wellford and Cronin (1999) study as active, active cold case and inactive were considered open cases. This does not include arrests exceptionally cleared as defined in the U.C.R Handbook. See http://www.fbi.gov/about-us/cjis/ucr/additional-ucr-publications/ucr_handbook.pdf .

variety of things. It can be the traditional arrest that most people think of when they hear that an arrest was made. It can also apply to those situations where there was no physical arrest such as those cases where a juvenile is charged but not physically taken into custody. Police agencies refer to this as a "paper arrest." What can be further confusing is the fact that a crime can be cleared by the arrest of one person but arresting many people for the same crime is only one clearance. If other persons get arrested later for the crime then there is not another clearance since the crime was cleared already. To complicate case status further, a case can be cleared by what is term "exceptional means." Law enforcement can clear a case by exceptional means when their investigation has established who the offender was in the homicide and there is enough information to charge that person however there is a reason outside the control of law enforcement the keeps the police from making the arrest. Some examples of the exceptional clearance are where the offender has committed suicide or where the offender is killed by the police. A deathbed confession and double murder where two people have killed each other are also examples of where the homicide was cleared by exceptional means. If the offender dies before he can be charged this is also an example of a clearance by exceptional means.

The Wellford and Cronin data avoided this problem with what defines clearance by eliminating homicide cases that were cleared by exceptional means. This meant that when considering all the homicide cases, the case was either closed by arrest or still open. In the Wellford and Cronin (1999) study, the number of exceptional clearances found in the original case samples was very small. The few that did appear were dropped from the samples.

In the original Wellford and Cronin data set, the current status of the case was coded as closed, active with regular homicide detectives, active with "cold case" investigators and inactive. The original data was recoded as either cleared or open (1=case cleared; 0=case open or classified as inactive). Those cases listed as active with regular homicide detectives, active with "cold case" investigators and inactive will all be categorized as open cases.

Wellford and Cronin (1999) examined 790 homicide cases. Cases cleared by exceptional means were eliminated from the analysis based on the previous discussion. 73.7% of the homicide cases were cleared and 26.3% remained open.

Table 3.2: Table of Homicide Case Clearance (Cleared, Open)

	Frequency
Homicide Case Clearance Status	
Cleared	582
Open	208
Total	790

Control Variables

There are three variables which I intend to control for in the overall model. In this overall model, I intend to control for case severity, city, and age of the victim. Since there are obviously other variables which could have an effect on case status, it becomes necessary to control for their effects. The severity of the individual homicide may have an effect on the effort the investigator puts forth. Regional variation as evidenced through different size cities as well as departments may also account for some variation in clearance rates (Taylor et al., 2009). The age of the victim has also found some support in the literature for affecting police actions.

In the original Wellford and Cronin research there are certain factors that made the case more heinous. The severity of the case will be considered in my research for any effect it may have on whether the case is open or closed. Sentencing guidelines are based on the idea that serious crimes and repeat offenders deserve more punishment than less severe crimes. In Maryland for example, voluntary sentencing guidelines are displayed in three separate matrices, one for person offenses, one for property offenses, and one for drug offenses. The sentence recommendation is determined by the intersection of a defendant's criminal history score and offense seriousness score on each two-variable matrix. The basic concept is that severity is determined by certain qualifying characteristics. If the offense falls into a certain category then a specific severity level is assigned with a maximum term specified by statute. While my handling of the seriousness of the offense is not quite as detailed, the same basic concept is followed. A note of caution should be mentioned regarding the classification that is assigned according to case severity. Homicides are the most serious case encountered in law enforcement. The death of an individual should never be trivialized even in discourse.

For the purposes of this analysis the control variable of case severity will be dichotomized into most severe and severe. Controlling for the type of homicide takes out any intra-severity issue. It is highly plausible that investigators may work harder to clear a case where the victim was killed in a most heinous manner. A person shot once may have their case handled very differently from a case where the victim was hacked up with a meat cleaver and strewn about the crime scene. Likewise, a young female beaten to death on a college campus may have her case handled differently

from a case where an older homeless person was found murdered in the back alley of a major metropolitan city. Cases likely to be looked at as severe would be those cases involving more than one victim, sexual assault cases involving vulnerable victims[5], cases where the victim was killed with either a firearm or knife, cases where there was more than one wound inflicted on the victim, cases where the victim was sexually assaulted, cases with more than one victim, cases with more than one offender, cases where there was gang or drug involvement, and cases where the victim was mutilated or tortured.. This is not an all inclusive list however it has limitations based on the data gathered in the original study. Severity of homicides categorized according to vulnerable victims includes victims of sexual assault with diminished mental capacity or possessing vulnerability due to age. The study does not gather data regarding the vulnerability of the homicide victim in general. The weapon used as a measure of severity was divided into firearms and knives and others. The fact that there are consistent findings in the literature for high homicide clearance for killings involving child victims points to the important role that age may play in solving homicides (Jarvis and Regoeczi, 2007). Sentencing guidelines also add the age of vulnerable victims to criteria to use when considering the imposition of a criminal sentence. The severity of a case was judged by several variables of interest (See Table 3.3).

Table 3.3: Variables of Case Seriousness

Most Severe Variables	Severe Variables
Number of victims > 1	One victim

Table 3.3: Variables of Case Seriousness continued

[5] Vulnerable sexual assault victims will be defined based upon the codebook question of whether the victim was sexually penetrated and being incapable of consent such as being a child or being a mentally retarded individual.

Table 3.3: Variables of Case Seriousness Continued

Gun or knife was used by the offender to inflict death	Asphyxiation, fire, blunt object, personal weapon (e.g., hands or feet), other, or missing used by the offender to inflict death
Number of wounds > 1	One wound or missing data
The homicide was gang or drug related	The homicide was not gang or drug related
Victim was sexually assaulted	Victim was not sexually assaulted
Sexual assault victim was mentally deficient or of diminished capacity	Sexual assault victim was not mentally deficient or of diminished capacity.
Decedent mutilated/tortured	Decedent not mutilated/tortured

For the purposes of analysis, a response in any of the most severe categories would indicate a more severe or more serious homicide. Relevant literature would hypothesize that race would have no effect due to the seriousness or more severe nature of the offense and the increased severity of offense would lead to more investigative effort.

The previous literature has suggested that the size of the police department was one of the variables related to homicide clearance. Likewise, a homicide that takes place in a large city may very well be handled differently than a case from another large urban department. Whether differences are bureaucratic, due to resource availability, cultural, or due to community perceptions of procedural fairness (Taylor et al., 2009) remain to be determined. Other factors unique to the city such as a high number of drug markets versus a highly concentrated business or tourist district may also play a role. It will be necessary to control for the city where the homicide occurred to make sure factors unique to the location of the department, i.e., the size of the police department, does not affect any research findings. The "Control#" in the original Codebook will be used to identify each city (1, 2, 3, and 4). The departments

in the original study had varying clearance rates. City "A" had a high total crime clearance rate and a high homicide clearance rate. City "B" had a low total crime clearance rate and a low homicide clearance rate. City "C" had a high total crime clearance rate and a low homicide clearance rate. City "D" had a low total crime clearance rate yet a high homicide clearance rate. Since the cities providing the data in this study had such varying total and homicide clearance rates it is necessary to control for the city to make sure the specific city itself is not influencing any findings.

Finally, the victim's age may very well be an important factor to consider. As noted in the literature review, some scholars have argued that extralegal victim characteristics affect clearance rates because investigators use the characteristics of the victim to decide how much effort to put into a case. There has been both support for age having an affect on homicide clearance (Litwin and Xu, 2007; Riedel and Rinehart, 1996; Jarvis and Regoeczi, 2009) and little supportive evidence (Puckett and Lundman, 2003; Riedel and Bouhlanis, 2007) for the influence of the age factor. The age of the victim will be computed from the data using the year of the victim's date of birth and the age of the victim at death. The grouping of this control variable is based on recent Bureau of Justice homicide victim statistics listing the ages of low and high risk victims for homicide.

Overall Model

All the variables in this research are examined to see what effect if any, they have on whether a homicide case is closed (cleared) or still open (active). The complete model in my research is looking to see if race (offender, victim, or

interaction of both) has any effect on investigative effort which in turn will affect homicide case closure.

During the preliminary analysis, I will look to see what affect the race variables of offender and victim have on homicide case status. In the second step, I will examine the interaction of the race dyads using dummy variables to see if the race combination of offenders and victims has any effect on homicide clearances. In the third step, I will use a confirmatory factor to test for the latent concept of investigative effort. In step four, once the indicators of the latent variable are determined, I will see what effects the latent concept has on case closure. In the fifth step, I will repeat the second step using the dyads however, this time I will look at the race of the offender with investigative effort as determined by the factor analysis and compare it to the results I found in the preliminary analysis. The sixth step repeats the previous one this time using the race of the victim coupled with investigative effort and comparing those results with the original bivariate victim race and clearance results found in the preliminary analysis. I will conclude with a logistic regression where I will repeat the analysis using dummy variables described in step two adding the concept of investigative effort to see the effects on homicide clearance. This final step will allow me to see what role race and effort play in determining homicide case clearance.

Methodology

The variables that I am using throughout my research are nominal variables. There are some minor exceptions and these can be found in the control variables (age) and in the factor analysis. Keeping this in mind, they do have certain methodological

limitations. Since the variables of interest (race and case status) are categorical and more specifically nominal, there are limits as to which methods are available for use. Dichotomous variables were used for the race of the victim, the race of the offender, in measuring investigative effort, and for case status. The main variable of focus in my study is race and the effects of the race dyad. As previously discussed, racial disparity is a topic of interest throughout the criminal justice literature. What makes my research differ from other racial disparity inquiries is the addition of the concept of investigative effort and any simultaneous effects of the race dyad on homicide case clearance.

Step 1 : Logit Analysis: Race and Homicide Case Status

Logistic regression will be used to test for the effect of race on homicide clearance. The initial part of my research will include two separate models that will examine the effect of race. I will conduct a bivariate analysis with the variable of victim's race and homicide case status.

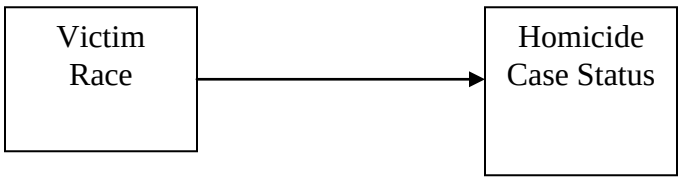

Figure 3.2: Bivariate analysis of victim's race on case status

Table 3.4: Frequencies: Race of all Victims

Statistics

Race of Victim

N	Valid	790
	Missing	8

Table continued

Table 3.4 Continued
Race of Victim

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	210	26.3	26.6	26.6
	2.00	562	70.4	71.1	97.7
	3.00	4	.5	.5	98.2
	4.00	14	1.8	1.8	100.0
	Total	790	99.0	100.0	
Missing	System	8	1.0		
Total		798	100.0		

Table 3.5: Frequencies: Recoded Variable- Race of Victim
Statistics
BlackWhiteVictim

N	Valid	772
	Missing	26

BlackWhiteVictim

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Black	562	70.4	72.8	72.8
	White	210	26.3	27.2	100.0
	Total	772	96.7	100.0	
Missing	System	26	3.3		
Total		798	100.0		

The bivariate analysis will be conducted with a logit regression model. During this step, I will conduct a logit analysis with the race of the victim to see if there is any effect on whether a case is cleared or open. The logistic regression model is the method of choice since the dependent variable binary. The logistic model will give me a coefficient which measures the effect of one or more independent variables on a

dichotomous dependent variable. Using this model will allow me to also test for the statistical significance of the estimated logistical regression coefficient to see how well my model fits the data. The H_0 is there is no relationship between the race of a homicide victim and whether or not the case is open or cleared. The alternative hypothesis (H_1) would be that there is a relationship between the variables. Simply stated, H_1 is the race of the victim will have an effect on whether a case is cleared or remains open. The previously cited literature has seen support for both hypotheses. Following the devaluing of victim research related to minorities, I would hypothesize that more emphasis would be placed by investigators on homicides with white victims than on nonwhite. This idea parallels the thinking in the death penalty research where prosecutors were significantly more likely to seek the death sentence when the victim was white. The nondiscretionary literature findings have found mixed support for the effects of race on case status. Using logistical regression will allow me to estimate the probability of an event occurring.

$$\text{Probability (Event)} = \frac{1}{1+ e^{-(b_0+b_1{}^{x}{}_1)}}$$

B_0 =constant for the model that is estimated from the data
B_1= the slope coefficient estimated from the data
x = the independent variable
e = the base of the natural logarithm, approximately 2.718

Maximum likelihood estimation (MLE) will be estimated to maximize the likelihood that we would get the observed data.

Taking this model to the next step and examining the relationship further, I plan on estimating a logistic regression model. In my model the dependent variable is homicide case status and as previously discussed in the variables section will be

coded 0 for open and 1 for cleared or closed. My research interest lies in the black and white race variable. The race of the victim is my independent variable and is coded 0 for black and 1 for white. The estimated logistic regression model will be:

$$\ln:\frac{\text{Probability of Cleared case}}{\text{Probability of Open case}}$$

The odds of the event are equal to the ratio that the event will occur divided by the probability that the event will not occur. Using the logistic regression results will allow me to tell that for a one unit change in the victim's race; going from 0 (nonwhite) to 1 (white), the log odds of an open homicide case by the resulting beta coefficient reported for the victim's race. Next, I can test the significance of the regression coefficient for the race of the victim by using the t test. This is accomplished by taking the ratio of the victim's race coefficient to its estimated standard error. Comparing the critical t value will allow me to either reject the H_0 that the race of the victim equals zero or fail to reject the H_0 that the race of the victim equals zero. It should also be mentioned that I could test the hypothesis using the Wald statistic since it is merely the square of my obtained t statistic. If the Wald statistic is greater than the critical chi square from the table I would reject the hypothesis that $B_{\text{victim's race}}$ equals zero.

At the conclusion of the bivariate analysis of race of the victim and homicide case clearance, the second step will be to conduct a bivariate analysis using the race of the offender and the homicide case status.

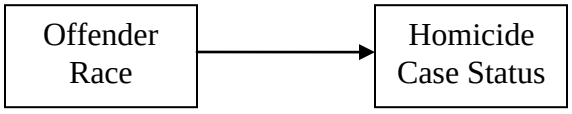

Figure 3.3: Bivarate analysis of offender's race on case status

Other than the substitution of the race variable of the offender, the methodology will be the same as the testing of the victim's race variable. Initial data entry coded white offenders as 1, black as 2, American Indian or Alaskan Native as 3, Asian or Pacific Islander as 4 and 9 as Missing. Since my attention is focused on the black and white race variable, the race of the offender will be recoded as 0=Black and 1=White in the same manner that the victim's race was coded. The full descriptive data for the race of the offender is listed in Table 6 with the recoded data following that table.

Table 3.6: Frequencies: Race of the Offender

Statistics

Race of Offender

	Valid	669
	Missing	129

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	153	19.2	22.9	22.9
	2.00	505	63.3	75.5	98.4
	3.00	3	.4	.4	98.8
	4.00	8	1.0	1.2	100.0
	Total	669	83.8	100.0	

Table 3.6 Race of the Offender continued

Missing	System	129	16.2
Total		798	100.0

Table 3.7: Frequencies: Recoded Variable- Race of Offender

Statistics

BlackWhiteOffenders

N	Valid	658
	Missing	140

Table 3.7 Continued

BlackWhiteOffenders

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Black	505	63.3	76.7	76.7
	White	153	19.2	23.3	100.0
	Total	658	82.5	100.0	
Missing	System	140	17.5		
Total		798	100.0		

Both of the bivariate models will also be run separately adding in the control variables to see if these additional covariates change the bivariate results.

Up until this point, we have seen a one variable model being used to try and explain the dependent variable of homicide case clearance. The one independent variable model is a very straightforward model. Real world policing does not take place in such a simplistic manner. In the real world, policing operates with many others factors influencing police conduct.

Step 2: Two-variable logit analysis

Prior to examining any interaction effects of victim and offender race I will examine the overall race of both victims and offenders in a two variable regression model. The two-variable regression model is:

$$\text{Ln}\ \frac{p}{1-p} = B_0 + B_1x_1 + B_2X_2$$

$$= b_0 + b_{1(\text{race of victim})} + b_{2(\text{race of offender})}$$

The model will tell me the log odds of case status being related to both the race of the homicide victim and the race of the homicide offender. The three variables in my model are estimated in the same way they were in for any effects that were reported

in my bivariate analysis which is the maximum likelihood estimate. The results of my two variable logistical regressions for the race of both victim and offender on homicide case status will tell me whether the log odds of a closed homicide case is negatively or positively related to the race of a homicide victim and negatively or positively related to the race of a homicide offender. In essence, what the two variable model will allow me to do is measure the effect of one of my independent variables while holding the effect of the second independent variable constant. For example, I will be able to tell if by holding the race of the offender constant then a one unit increase in the race of the victim lowers or raises the log of the odds of homicide case status. It will only follow that using the percent change formula I will be able to report whether a one unit change in the race of the victim will increase or reduce the odds of a closed/cleared homicide case by a certain percentage. The two independent variable model will also allow me to estimate the probability of the case status in situations where white victim cases have white offenders, nonwhite victim cases have white offenders, white victim cases have nonwhite offenders, and nonwhite victim cases have nonwhite offenders. Estimating these probabilities will allow me to get a clearer picture of the relationship between the homicide victim's race, the homicide offender's race, and the status of the homicide case. As in the single variable analysis I will also test the significance of my coefficients for the race of the homicide victim and the race of the homicide offender with the t test statistic. The H_0 for one of the hypotheses would be the coefficient for the victim's race equals zero when the race of the homicide offender is held constant. The second hypothesis would be that the coefficient for the race of the homicide offender is zero when the

race of the homicide victim is held constant. The test for significance will allow me to either reject or fail to reject the corresponding H_0. Finally, I propose examining the overall goodness of fit for my two independent variable model. This would be accomplished by looking at any difference in the likelihood ratio of the model with only the constant and the model that includes both of the independent variables (race of the victim and the race of offender). In addition, the model can be examined for the effect of removing each variable by looking at the likelihood ratios for the situation when each variable is removed. This will show me if one variable has a stronger influence over case status. This will allow me to reject or fail to reject the H_0 that both the race of the victim and the race of the offender are equal to zero depending on the obtained chi square value.

Step 3: Logistic Analysis using Dummy Variables

In an effort to get a clearer picture of the race variable, I will examine the interaction of the race dyads using dummy variables to see if the race combination of offenders and victims has any effect on homicide clearances. In this model, I will be examining the race of the victim and the offender for their interacting effects on homicide clearances. I will be looking to see what effect, if any, the race of the victim and the race of the offender have on the case status of a homicide investigation when the race factors are considered simultaneously.

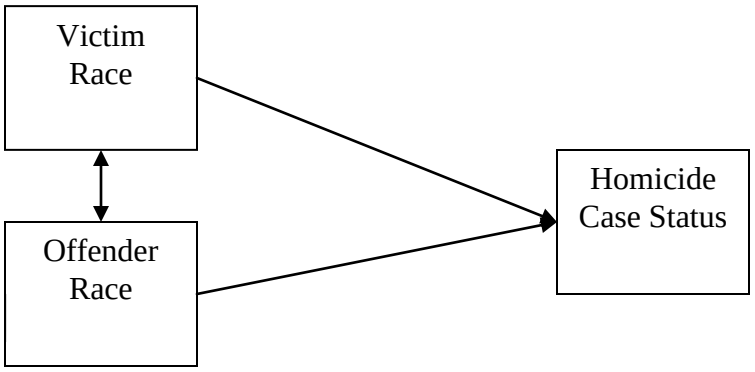

Figure 3.4: Two variable race model effects on case status

These two variables were chosen since there is the potential interactive effect and they both fit in with the discretionary hypothesis that has been discussed in the literature along with a possible disparity hypothesis. The death penalty literature has shown some support for this interactive effect and its influence on certain actions. Both the race of the victim and of the offender has a sound theoretical base when it comes to their possible influence on police behavior. Theoretically the effects of these variables are thought of as being separate. If the two race variables are too strongly related to each other there could be a problem of multicollinearity. The two variable model will use both the race of the victim and the race of the offender as its independent variables. As performed previously in my research, race is again dummy coded for both variables. The race of the both the victim and the offender is coded 0 for black and 1 for white victims. Case status is code 0 for open and 1 for cleared or closed.

In examining the race dyad of black and white, I constructed 3 Dummy variables. First the reference variables will be Whites Killing Whites (WKW). Dummy variable 1 will be Whites Killing Blacks (WKB). Dummy 2 will be Blacks

Killing Blacks (BKB). Dummy 3 will be Blacks Killing Whites (BKW). The Dummy analysis will allow me to take the resulting coefficients for each one telling me whether or not the dummy variables make a difference compared to whites killing whites (WKW). So if e.g., I would find a significant coefficient for BKW that would tell me the clearance rates for homicides involving Blacks killing Whites is different than the reference Whites Killing Whites.

Step 4: Confirmatory Factor Analysis

While race is the initial variable of interest in my study, the introduction of the concept of investigative effort is unique in that previous studies have not examined whether or not investigative effort is influenced by the race variable in a homicide investigation. It is at this juncture in my research where I need to construct the variable of investigative effort. Many concepts are not directly observable in our world and the world of social sciences is no different. If we were to ask what defines police investigative effort and how to measure police investigative effort, we will get different answers from everyone we ask. Individuals may state they know what investigative effort is and they know it when they see it however, this variable is not directly observable.

The concept of investigative effort will be introduced through the use of a Confirmatory Factor Analysis (CFA). Since the latent variable of investigative effort cannot be observed directly, it is measured indirectly through several observed variables. While the latent variable is error-free, the observed variables are subject to error (Collins and Lanza, 2010). In the current study, the latent variable is the construct of effort. The observed variables are referred to as indicator variables. The

causes of the observed indicator variables are both the latent variable of effort, as well as the error variable. In other words, the indicator variables that we can observe measure the latent construct.

In the Wellford and Cronin (1999) study, there were numerous variables that were gathered by the "Investigative Instrument." These observed variables were designed to capture the way in which the homicide investigation was conducted. These variables in the original study detailed actions taken by the "players" or participants in the investigation. This included not only the actions taken by investigators but also medical examiners as well as first responding officers. This set of data contains the observable indicator variables that will be used in the CFA. Since the goal is to test for the latent construct of investigative effort, I am looking for actions taken by all the parties involved in the investigation where a participant had the option to act or not act. Taking action is indicative of effort and taking no action is not. As previously discussed, I chose those variables which I hypothesize make up the concept of effort. It will be during the factor analysis where I hypothesize a concept of investigative effort will be found. It is at this stage of the research where I need to confirm my variables of choice. Confirmatory factor analysis (CFA) is the method of choice since it is a technique for measuring relationships between observed measures and latent variables that is hypothesis driven. CFA will allow me to empirically identify discrete latent variables from two or more discrete observed variables (Green 1951, 1952). Factor analysis allow**s** the researcher to explore the latent structures between a set of observed variables (exploratory analysis) and to test hypotheses about the latent structures that exist between a set of observed variables

(confirmatory analysis) (McCutcheon, 1987). In the CFA there is a greater emphasis placed on theory and hypothesis testing. There are numerous observable indicators that are caused by the latent construct. The idea is that there is covariation among the observable variables and what I propose to do is examine the patterns of the relationships of these observables to help understand as well as define the latent construct. The objective of this step is to empirically define the latent concept of effort.

Step 5: Analysis of the Investigative Effort variables and Case Status

In this step I will be taking the results from the factor analysis to see what effects the latent concept has on homicide case status. It is important to see if any of the individual effort variables have any effect on case closure prior to the interjection of the race variables or the race dyads.

Step 6: Analysis of Race and Investigative Effort

Once the concepts that make up investigative effort are determined, I will conduct another logistical regression analysis using the race variable of the victim and each of the variables that have been found to make up the latent construct. E.g., the idea is to examine whether the race of the victim has any influence on whether an investigator described the crime scene in notes, a search warrant was deemed necessary for the scene, a detective followed up on witness information, searched for fingerprints and other physical evidence, etc. The purpose is to see empirically if the race of the victim and offender influence those variables that have been found to represent investigative effort and the resulting case status. This analysis will be conducted along the lines of the initial bivariate analyses. The race variable will be

the independent variable and those manifest variables that were determined to make up investigative effort through the CFA will be the dependent variable. The results of the analysis of the race of the victim combined with effort will be compared with the race of victim and case status in the 1st logit analysis. This process will be repeated using the race of the offender combined with effort for their effects on case status. These results will be compared with the race of offender and case status results from the initial logistical analysis to see if there are differing race effects.

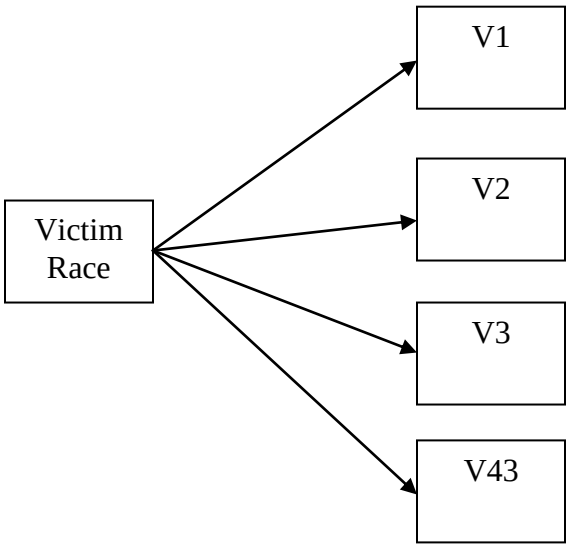

Figure 3.5: Victim Race effects on Manifest Variables making up Latent Concept. *Note- the number of manifest variables used in the bivariate analysis will depend upon the CFA that is conducted with a maximum of 43 manifest variables.

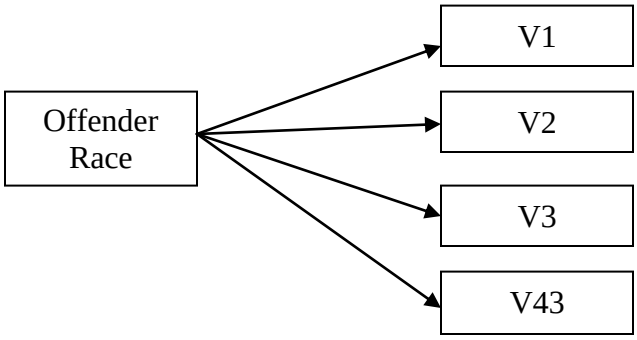

Figure 3.6: Offender Race effects on Manifest Variables making up Latent Concept. *Note- the number of manifest variables used in the bivariate analysis will depend upon the CFA that is conducted with a maximum of 43 manifest variables.

Step 7: Race Dyad Comparison using Investigative Effort for effects on Case Status

In the fifth step of the analysis I will repeat the second step once again using the race dyads. Step 6 however, will examine the role investigative effort plays with the dyads and case status.

The final logistical regression will be to repeat the previous analysis which used the dummy variable of whites killings whites for a reference (WKW), the dummy variables of Whites Killing Blacks (WKB), Blacks Killing Blacks (BKB), and the dummy variable of Blacks Killing Whites (BKW) and combine the effort variable for their effects on homicide clearance. These results will be compared with the results previously reported where I looked at victim's race and effort (the 4^{th} logit analysis) and the analysis which looked at the offender's race and effort (5^{th} logit analysis).

Summary

This research is aimed at improving our understanding of the factors that increase homicide clearances. The focus is on the variables of victim and offender race and their interaction with investigative effort. The effects of race are well documented in the criminal justice literature and while not as exhaustive, have been examined within the homicide field with inconclusive results. The methods used in this research have been chosen in order to try and shed some light on the involvement of race with the actual effort that is put forth by the case investigator in trying to close the homicide case. Specifically, logit regression will be used to test the separate bivariate analyses in the model and a confirmatory factor analysis will be used in the

construction of the latent variable of investigative effort. The resulting effort variable will then be examined in a logistical model using the race of both victim and offender as well as in a dummy variable model which examines the race dyad of black and white. The following chapter will present the analysis and the results for the effects of race on homicide case clearance taking the effort of investigators into account.

Chapter 4: Analysis

This chapter outlines the relationships between the various variables and the outcome variable, case status. After an examination of the control variables, the individual steps of the analysis will be discussed. First, there is a discussion of the control variables and their relationship with status. The separate analytical steps will follow. These include an examination of the relationship between the race of the victim and offender with case status, the race dyads, and the development of the latent construct of effort. The chapter ends with a presentation of the results of the full model.

Control Variables

Control 1- City of the Offense/Police Department Investigating the homicide

The control variables that were discussed in the methods section are not the main focus of this research however, their role is of extreme importance. Prior to the separate analytical steps that I am taking in this research I will be examining the relationships between the controls and the dependent variables. This is important since the controls are used later on in the separate analyses to either check for any suppression effects or determine if any significant effects are still present when the controls are entered into the relationship.

The first control variable examined is the city where the homicide occurred.[6] The original coding contained a variable listing each of the four cities or police departments where the homicide occurred. The analysis of the city variable was

[6] In the original study (Wellford and Cronin, 1999), the choice of cases within the city was a sampling decision. Cases were not randomly selected but were stratified based on case status and then sampled based on 75% closed and 25% open cases.

undertaken by recoding the variable into a dichotomous variable where one city is compared against the other three cities.

In the first cross tabs, City 1 and all other cities in combination were examined for any relationship with case clearance. A review of City 1 data revealed the percentages of open cases were very similar to the average number of other open cases within City 2, 3, and 4. City 1 had 27.5% of the cases open and the other three had 25.8% of their cases open. City 1 had 72.5% of their cases closed compared to the average of 74.2% of the other 3 cities. The Pearson's chi-square for City 1 was .237. Since the critical value for 1 degree of freedom is 3.84 at the $p<.05$ level, and the observed chi-square is less than the critical value, it is not significant so I fail to reject H_0 that there is no relationship between City 1 and case status.

A second cross tabs was run to see if City 2 had any effect on case status. The city or police department variable was broken down into City 2 comparing it to a variable consisting of City 1, 3, and 4. City 2 had slightly more open cases (30.5% versus 24.7%) and slightly less closed cases (69.5% versus 75.3%) than the other 3 cities combined. The Pearson's chi-square for City 2 was 2.564. Since the critical value for 1 degree of freedom is 3.84 at the $p<.05$ level, and the observed chi-square is less than the critical value, it is not significant so I fail to reject H_0 that there is no relationship between City 2 and case status.

City 3 is the one city of the four that had less than 200 homicide cases examined. City 3 had 198 cases selected for this analysis. City 3 had slightly more cases open (31.8%) than the other 3 combined (24.3%) and slightly less cases closed (68.2%) when compared to the other three cities combined which averaged 75.7%.

The obtained value of chi-square was 4.314. This value exceeds the critical value of 3.84 at the $p<.05$ level that is necessary to reject H_0. There is a significant relationship between City 3 and case closure. The outcome of the chi-square test of independence indicated that the city/department where the homicide had taken place was significantly related to case status, $\chi^2= 4.314$, df=1, N=798, $p<.05$). The significance level of chi-square was found to be moderately significant at 0.038. The question then becomes how strong a relationship is there? The value for phi ($\varphi=.074$) indicates the relationship is weak. Since φ^2 is .005, only 0.5% of the variance in case status can be explained by knowledge of the city where the homicide was investigated.

The final city in the control variable is City 4. City 4 had a substantially lower percentage of cases open (15%) when compared to the other three cities which had 29.9% of their cases classified as open. City 4 also had a larger percentage of cases closed (85%) compared to the other three cities (70.1%). The outcome of a chi-square test of independence indicated that the city/department where the homicide had taken place was significantly related to case status, ($\chi^2= 17.289$, df=1, N=798, $p<.05$). The significance of the chi-square value was reported at .000 which is highly significant. The value for phi indicates a small effect ($\varphi=.147$). Since φ^2 is .022, only 2.2% of the variance in case status can be explained by knowledge of the city where the homicide was investigated which in this case is City 4. The obtained chi-square was 17.289 which allowed for the rejection of the H_0.

In the next step for the control variable of City or police department, I conducted a cross tabulation taking all 4 cities separately for their effects on case status. In this step of the analysis, I used the original city variables and not the

recoded variables where I compared an individual city against the remaining three In looking at all cities together, the findings were significant but looking at the cells there was one city which stood out from the rest and may possibly account for this significance. An examination of the cross tabulations individual cells shows that when the cities are looked at individually and not collapsed together, it is City 4 that has substantially more closed cases and fewer open cases than the other three cities. City 4 had 30 open cases compared to 55 for City 1, 61 for City 2, and 63 for City 3. Closed cases also show similar patterns of difference where City 4 has a moderate difference in closed cases. City 4 had 170 of its cases closed compared to only 145 for City 1, 139 for City 2, and 135 for City 3. Percentage-wise, City 4 only had 3.8% of its cases open. The city with the closest percentage of open cases was City 1 which had 6.9% followed by City 2 with 7.6% and finally City 3 with 7.9% of its cases open. Similar rankings existed for closed cases. City 4 had 85.0% of its cases closed compared to 72.5% for City 1, 69.5% for City 2, and 68.2% for City 3. The critical chi-square for 3 degrees of freedom at $p < .05$ is 7.815. The obtained chi-square is18.299 and this value will allow us to reject H_0 that there is no relationship between the city that the homicide took place in and the case status of the killing. The significance level of chi-square was reported to be .000 or highly significant. Since the marginals of the cross tabulation table are not approximately equal, Lambda is not the measure of association of choice however; Goodman and Kruskal's tau will be used as the appropriate PRE measure. While both Lambda and Goodman and Kruskal's tau are appropriate measures of association for contingency tables larger than 2 x 2 with nominal level data, when the table marginals are not approximately

the same, lambda may end up with a value near zero when in fact; the two variables being compared are not totally independent. The value of tau for the City variable was found to be .008 which tells me it is still a rather weak association. This tells me that the proportionate reduction in prediction errors when using the city of the offense to predict the homicide case status. The results report that I can reduce case status prediction errors by .8% based on knowledge about the city. The city of the offense and the case status are weakly related. Based upon the individual cell percentages which revealed that City 4 had significantly more closed cases than cities 1, 2, and 3, City 4 will be used as the control variable.

Control 2- Age of the Victim

The next control variable to be considered is the variable age of the victim. The age of the victim was recoded into a dichotomous variable of low risk and high risk. Based on data from the Bureau of Justice Statistics regarding the age of homicide victims from 1999 through 2005, the low risk group were ages 0 through 13 years and greater than 35 years. The high risk group for being a homicide victim was 14 through 34 years of age.

In looking at the age groupings, 253 of the homicide victims (31.7%) were low risk victims and 525 (65.8%) were categorized as high risk. The age of twenty of the victims was not recorded or missing and accounted for 2.5% of all the homicide victims. When looking within individual cells, the percentage of both open and closed cases is within tenths of percentages with actual counts for both high and low risk victims. A chi-square test of independence indicated the relationship between the ages of victims and case status was not significant, ($\chi^2 = .033$, df=1, N=778, $p > .05$).

Control 3- Severity of the Offense

The final control variable is the severity of the offense. This variable consists of eight individual variables, all of which are hypothesized to measure some degree of severity of the homicide.

The first variable is how many wounds the victim received. This severity variable was recoded into those victims with one wound and those with greater than one wound. There were 326 cases (40.9%) where the victim suffered just one wound. There were 407 cases (51.0%) where the homicide victim suffered more than one wound. Sixty five cases (8.1%) were missing. Looking at where the number of wounds suffered was one, there were 21.8% open cases and 78.2% closed. When looking at cases where there were 2 or more wounds, 28.7% were open and 71.3% were closed. The outcome of a chi-square test of independence indicated that the number of wounds was significantly related to case status, (χ^2=4.608, df= 1, N=733, p<.05). The value for phi (φ=.079) indicates that the relationship is very weak. Since φ^2 is .006, only 0.6% of the variance in case status can be explained by knowledge of the city where the homicide was investigated.

A second severity variable is the weapon used in the killing. The original means of killing also referred to as the cause of the death included twelve actual categories. The severity of method was collapsed into two categories. These categories were defined as severe and most severe. The most severe methods of death mechanisms included five categories of firearms and two areas of knives or stabbing. The remaining areas were blunt instruments, personal weapons, suffocation, fire, and

other means. The majority of death causing mechanisms were firearm related (86.2%). Only 2.1% of the data was missing.

Table 4.1: Primary Cause of Death by Severity Table
PrimaryCauseofDeath

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Severe	93	11.7	11.9	11.9
	MostSevere	688	86.2	88.1	100.0
	Total	781	97.9	100.0	
Missing	System	17	2.1		
Total		798	100.0		

Out of all the cases where the mechanism of death was other than a firearm (severe), 20.4% were open. Closed cases within this mechanism area were 79.6%. When looking at firearm and stabbing deaths, slightly more cases were open (26.7%) and less (73.3%) were closed. A chi-square test of independence indicated the relationship between the mechanisms of death and case status was not significant, (χ^2= 1.698 df=1, N=781, p> .05).

Table 4.2: Primary Cause of Death Cross Tabulation Table
Status of Case * PrimaryCauseofDeath Crosstabulation

			PrimaryCauseofDeath		
			Severe	MostSevere	Total
Status of Case	Open	Count	19	184	203
		% within PrimaryCauseofDeath	20.4%	26.7%	26.0%
	Closed	Count	74	504	578
		% within PrimaryCauseofDeath	79.6%	73.3%	74.0%
Total		Count	93	688	781
		% within PrimaryCauseofDeath	100.0%	100.0%	100.0%

Table 4.3: Cause of Death Chi Square Tests Table

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.698[a]	1	.193		
Continuity Correction[b]	1.386	1	.239		
Likelihood Ratio	1.776	1	.183		
Fisher's Exact Test				.210	.118
Linear-by-Linear Association	1.696	1	.193		
N of Valid Cases	781				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 24.17.

b. Computed only for a 2x2 table

Cases were also hypothesized to be more severe if the offender had sexually assaulted the victim. Only two cases (0.3%) did not report whether or not the victim in the killing had been sexually assaulted. Descriptive data shows that in 98% of the homicides, the victim had not been sexually assaulted and in 1.8% of the cases the victim had been sexually assaulted. A chi-square test indicated the relationship between whether the victim was sexually assaulted and case status was not significant, (χ^2=.678, df=1, N=796, p> .05).

An increased number of victims are also thought to classify the case as more severe. Multiple victims in any crime appear on the surface to make the crime more serious. Out of 798 cases, there were 764 cases (95.7%) where there was only one

homicide victim. Taking into account the number of victims, the majority of cases were closed. 73.6% of one victim cases were closed compared to 79.4% of cases with more than one decedent. A chi-square test of independence indicated the relationship between the number of victims and case status was not significant, χ^2 =.577, df=1, N=798, p> .05).

In contrast to the number of victims, the number of offenders is also hypothesized to make the homicide case more severe. As previously discussed in the methods section, the number of offenders will not always be known in a homicide case. The data in this research is no exception. There are 741 cases with offender information and 57 cases with missing offender data. Looking at the specific number of offender data, there were 454 cases where there was one offender, 149 cases with 2 offenders, 116 cases with three offenders, 21 cases with four offenders and one case where there were thirty three offenders listed. There were 77 open cases with one offender and 77 cases with more than one offender. The outcome of a chi-square test of independence indicated that the whether there was one offender or more than one offender was significantly related to case status, χ^2=10.402, df=1, N=741, p<.05). The value for phi (φ=.118) indicates there is a small effect. Since φ^2 is .014, only 1.4% of the variance in case status can be explained by knowledge of whether there was one offender versus more than one offender.

An additional variable which is hypothesized to classify a homicide as more severe than another homicide is whether or not the victim was mutilated or tortured. Only one case had missing data. In 781 (97.9%) of the homicides the victim was not mutilated or tortured. Only 2% of the cases reported the victim was tortured or

mutilated. Caution must be used in interpreting chi-square since one of the cells (25%) has an expected cell count of less than 5. One of the assumptions of the chi-square test is the sample size n must be large enough so that the expected count in each cell is greater than or equal to 5. A second assumption which becomes difficult to verify is that the sampling distribution of deviations of the actual and expected frequency counts is normal in form. In order to satisfy this assumption, it is generally required that the sample size be sufficiently large (Stern, 2010). Cochran's (1954) rule addresses this requirement. The rule is that there should be no expected frequency values under 1 and that no more than 20% of the expected frequency values should be under 5. Others have suggested that this rule is too conservative. Camilli and Hopkins (1978) stated that in a 2 by 2 table, as long as the total sample size exceeded 20, expected values as low as one or two in up to two cells produced acceptable results in terms of Type I errors. A general rule (Wickens, 1989) suggested that total sample size should be at least four or five times the number of cells.. A chi-square test of independence indicated the relationship between whether or not a victim was mutilated and tortured or not and case status was not significant (χ^2 =.225, df=1, N=797, p> .05).

Gang members contribute disproportionately to the crime of homicide (Decker and Curry, 2002). They also are responsible for a large amount of violence. The drug culture and more specifically drug dealing also bring with it the perception of guns and violence. Gang- related and drug-related homicides are also listed as more severe types of homicides. Descriptive data for the involvement of gangs and drug dealing for my homicide data analysis revealed 597 (74.8%) of the cases were

classified as not being gang or drug related. The data also revealed 198 cases (24.8%) as being gang or drug-related. Only 3 cases (.4%) were missing data. In looking at the cell frequencies in a cross tabulation, the disparity in cases appears to be in the gang or drug related cases where a higher percentage of cases are open (33.8%) compared to cases where they were not classified as gang or drug related (23.5%). 10% fewer cases were closed when the case was gang or drug-related. The outcome of a chi-square test of independence indicated that whether or not a case was gang or drug-related was significantly related to case status, χ^2=8.331, df=1, N=795, p<.05). The value for phi (φ=.102) indicates there is a small effect. Since φ^2 is .010, only 1.0% of the variance in case status can be explained by knowledge of whether or not the case was gang or drug-related.

Finally, a case would be considered more serious if the homicide victim who was retarded or under the age of being able to consent was the victim of a sexual assault where they were penetrated. The current data only captured information on 25 cases. There are 773 or 96.9% of the cases missing data for this variable therefore it was excluded from consideration as a control variable.

In summary, when considering the original control variables that were hypothesized to possibly have an effect on the relationship between race of the offender and/or victim and case status, two of the cities were found to have significant effects with case clearance. When all four cities were looked at simultaneously, there were still significant effects although when looking at individual cell data it was apparent there was one city that was responsible for the effect. The variable of age was not significant. It did not appear to matter whether a

victim was in a low age risk group or a high age risk group. In looking at case severity, there initially were eight variables hypothesized to make up case severity. Only three of those variables were found to have a significant relationship with case status. The significant relationships came from the number of wounds a victim had, the number of offenders involved in the homicide, and whether or not the homicide was gang or drug-related as to case status of open or closed.

Final Control Variables

The selection of the control variables for my research is theoretically based as well as based on the results of previous criminal justice research. It is important that the control variables that I am entering into the model be independent of the other covariates in my model. Making sure these variables are independent presents what is referred to as the problem of multicollinearity. I addressed this issue through the use of multicollinearity diagnostic statistics produced by linear regression analysis. I examined the collinearity statistics reported for the four control variables which were the number of wounds, the number of offenders in the homicide, whether or not the killing was gang or drug related, and whether or not the city the crime occurred in was city 4. The statistics of concern are the tolerance and variance inflation factor (VIF) statistics. The tolerance level is the $1\text{-}R^2$ value when each of the independent variables is regressed on the other independent variables. Low tolerance levels indicate high levels of multicollinearity. Tolerance levels of less than .40 may indicate a problem (Vartanian 2011). The Variance inflation factor (VIF) is simply the reciprocal of the tolerance level (1/tolerance level). VIFs greater than 2.5 start to indicate high levels of multicollinearity. Taking the square root of the VIF tells me

how much of the standard error is when it is compared to what it would be if that variable were uncorrelated (r=0) with the other independent variables. I took the square root of the largest VIF of 1.063 and the result of 1.031 means that the standard error for the variable of number of offenders in the incident is 10.31% higher than it would be if the number of offenders involved were completely uncorrelated with the independent variable. A VIF of 1.0 indicates no relationship between that variable and the other independent variables. Since the VIFs for all the control variables are reported slightly over 1.0 and the tolerance statistics for all of the variables are slightly greater than .9, there does not appear to be any multicollinearity between the control variables I am using in the analysis. The tolerance and VIF statistics are reported in Appendix B.

Step 1: Race and Homicide Clearance

The initial analysis examines the relationship between the race of the victim and the race of the offender for any effects on homicide case status. The initial concern that will be examined is the elementary questions of whether the race of the victim and offender has any effect on whether or not a homicide case has been cleared or is still open. As was previously discussed in the methods section, the variables of victim race and offender race are both categorical and nominal. The initial presentation of these relationships will be their joint frequency in a contingency table.

Race of the Victim on Case Status

The original Wellford and Cronin (1999) data reported 798 victims. Excluding those victims who were not black or white along with the 8 system missing

variables leaves 772 victim variables for analysis. Missing cases are not a concern since the race of the victim is known at the time of the investigation unlike the race of an offender.

Table 4.4: Original Race of Victim Variables (Wellford and Cronin (1999)

Race of the Victim

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	210	26.3	26.6	26.6
	2.00	562	70.4	71.1	97.7
	3.00	4	.5	.5	98.2
	4.00	14	1.8	1.8	100.0
	Total	790	99.0	100.0	
Missing	System	8	1.0		
Total		798	100.0		

Table 4.4 shows the distribution of the two categorical variable of victim's race relative to homicide case status. There are 772 cases of homicide involving black or white victims. 204 of the homicide cases remained open and 568 of the cases were closed. 562 of the homicide victims were black and 210 victims were white. Looking more closely, I want to examine what percent of the cases with black victims were open and what percent closed. 144 open cases involved black victims compared to 60 open cases with white victims. When examining closed or cleared cases we see 418 cases with black victims were closed with 150 of white victim cases being closed. As previously stated, I am interested in testing to see if the homicide case status is influenced or affected by the race of the victim in the homicide. The H_0 is that there is no relationship between the homicide case status and the victim's race thus they are independent of each other. In other words, whether or not a homicide case is closed or

open has nothing to do with the race of the victim. Based on the idea of racial disparity within the criminal justice system and in line with Black's Theory of Law, we would state the alternative hypothesis to be that the race of the victim will have an effect on whether a case is open or closed. We also see similar support in the literature on sentencing departures as well as in the death penalty literature. Looking at the idea of status, the killing of a white victim would be seen as more serious than the killing of a black victim and the effort expended by investigators at closing the white victim killing should result in more case closures. The resulting H_1 would be that cases with black victims would carry less importance and be more likely to be open cases compared to white victim cases where there would be more importance placed and thus more clearances.

Table 4.5: Contingency Table of Homicide Case Status (Open, Closed) by Race of the Homicide Victim

Homicide Case Status	
Open	204
Closed	568
Total	772
Race of the victim	
Black victim	562
White victim	210
Total	772

Homicide Case Status	Black	White	Total
Open	144	60	204
	(25.6%)	(28.6%)	(26.4%)
Closed	418	150	568
	(74.4%)	(71.4%)	(73.6%)
Total	562	210	772
	(100%)	(100%)	(100%)

Hypotheses:

H_0: There is no relationship between the homicide case status (open or closed) and the race of the victim. $\chi^2=0$

H_1: The homicide case is more likely to be cleared if the victim is white. $\chi^2>0$

Looking at the contingency table I can observe the joint frequency of the relationship between the variables of interest of the homicide victims. This examination of the joint distribution shows how the two variables are distributed when they are considered simultaneously. To test these hypotheses I tested to see if a homicide's case status was influenced by the race of the victim. The H_0 tells me that the variables are independent of each other. In context with the variables of interest this means homicide case status is not affected by the race of the homicide victim.

Looking at the percentages in Contingency Table 4.5 we can see if a greater percentage of black victim cases end up with their case status being open versus cleared. We can also compare these percentages to the cases with white victims. 25.6% of the black victim cases are found to be open compared to 28.6% of the white victim cases. The table reveals that open cases are found to be similar in percentages based on the victim's race. Naturally, the closed or cleared cases will follow a similar pattern. 74.4% cleared for black victims and 71.4% for white victims. While these percentages may be somewhat informative they do not allow me to accept or reject the H_0. I will rely on the chi-square test for independence which will allow for the testing of the H_0 that that the two variables are independent of each other.

In looking at the output for victim's race on case status, the sample size requirement for the chi-square test of independence has been satisfied since zero cells have been reported having an expected count of less than 5 and the minimum

expected count as reported was 55.49. Chi-square was reported to be .684. The chi-square distribution for 1 degree of freedom at the .05 level is 3.841 and at the .01 level it is 6.635. Since chi-square (.684) is less than the critical chi-square of 3.841, I would fail to reject the H_0 that the victim's race and case status are independent of each other. Yates's continuity corrected chi-square was reported at .540 thus confirming the main results from the chi-square test.[7] Seeing that the output reported no expected frequencies below 5, chi-square should be accurate. Failing to reject the H_0 tells me that the proportion of the two race categories of victims (black and white) that is related to case status is not statistically different. The phi value of .030 also confirms that the results are likely to have happened by chance. In summary, there was not a significant relationship between the race of the homicide victim and whether or not the homicide case was open or closed (χ^2 = .684, df=1, n=772, $p<.05$.)

Race of the Victim and Control Variables

After finding no significant effect for the race of the victim on case status, the question becomes what other variables could possibly be suppressing an effect for the race of the victim on case status. The control variables are of interest for their possible suppression effects. The significant results of the crosstabs of each control variable with case status will be used as controls in a logistic regression analysis which looks at whether the race of the victim has any effect of each control on homicide clearance.

[7] Yates's Continuity corrected chi square is used to prevent the overestimation of statistical significance for small data and is used to reduce the error in approximation. This formula is chiefly used when at least one cell of the table has an expected count smaller than 5. Unfortunately, Yates's correction may tend to overcorrect. It was merely noted as a check on the original chi-square results.

There are two general control variables to be tested for any interacting effects. They are the city of the homicide and the severity of the offense. The city variable is represented by the variable City/PD4 which is one of the three departments where homicide data was gathered. The severity of the homicide is represented by the variables of the number of wounds, the number of offenders, and whether the killing was gang or drug involved. The control variable examination revealed that only City 4 had a significant effect from the City variables and the number of wounds on the victim, the number of offenders involved in the case, and whether or not the killing was gang or drug involved had significant effects from the Case Severity variable. These control variables will be used in a five variable logistic regression model. The model that will be estimated is:

$$p = \frac{e^{b0 + b1(\text{victim race}) + b2(\text{\# wounds}) + b3(\text{\# offenders}) + b4(\text{gang/drug involved}) + b5(\text{City 4})}}{1 + e^{b0 + b1(\text{victim race}) + b2(\text{\# wounds}) + b3(\text{\# offenders}) + b4(\text{gang/drug involved}) + b5(\text{City 4})}}$$

In this logistic regression, there were 658 (82.5%) total cases analyzed since 140 (17.5%) were missing. In the initial classification table for the logistic regression, there were 134 cases that were open and 524 cases closed therefore if we were to predict every case would be closed, we would be correct 524 times out of 658 cases (79.6%). However, if the model predicted every case was open they would only be correct 134 times out of 658 (20.4%). Looking at these results, the best option would be to predict that all cases are closed because this results in a greater number of correct predictions. This information is based on predictions without the independent variables. Overall, the model would correctly classify 79.6% of the cases.

The overall model that is estimated for the five variable logistic regression:

$$\ln \frac{p}{1-p} = 1.576 + .106(\text{victim race}) - .184(\text{\#wounds}) - .569(\text{\#offenders}) - .381(\text{gang/drug}) + 1.531(\text{City4})$$

Table 4.6: Race of Victim and Control Variable Classification Table
Classification Table

			Predicted		
			Status of Case		Percentage
	Observed		Open	Closed	Correct
Step 0	Status of Case	Open	0	134	.0
		Closed	0	524	100.0
	Overall Percentage				79.6

In examining the variables not in the equation table, we can see how many variables are individually, significant predictors of whether a case is closed. Looking more closely at the variables not in the equation (See Table 4.7 below) Roa's efficiency score statistic reports the residual χ^2 statistic as 33.514. The model has 5 degrees of freedom which will have a critical χ^2 of 11.071 at $p < .05$. The residual chi-square of 33.514 tells us that the coefficients for the variables not in the model are significantly different from zero. This in interpreted as the addition of one or more of these variables to the model will significantly affect its predictive power. The resulting significance values also show that the number of offenders involved, whether of not the homicide was gang or drug-related, and whether or not the killing took place in City 4 are each separately significantly related to the case status.

Table 4.7: Race of Victim and Control Variables Not in the Equation Table
Variables Not in the Equation

			Score	df	Sig.
Step 0	Variables	BlkWhiVictim	.140	1	.708
		Wounds	2.239	1	.135
		OffendersInvolved	7.816	1	.005
		GangorDrugKilling	6.588	1	.010

Table continued

Table 4.7 Continued:
Variables Not in the Equation

		Score	df	Sig.
	PD4	19.327	1	.000
	Constant	33.514	5	.000

These three variables (number of offenders, gang or drug involved, and City 4) could potentially make a contribution to the model however, the number of wounds and race of the victim do not appear to be a good predictor since their score statistic is non significant at $p<.05$. Once all five of the independent variables are entered into the model the overall model is found to be significant as reported in the Omnibus Tests of Model Coefficients table below.

Table 4.8: Race of Victim and Control Variable Omnibus Tests of Model Coefficients
Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	37.707	5	.000
	Block	37.707	5	.000
	Model	37.707	5	.000

The Model Summary Table also estimates the percentage of variance that is accounted for by the variables. Since the Cox and Snell R^2 is usually an underestimate, I see from the Nagelkerke's R^2 that the amount of variance that is accounted for by the variables is only 8.8%.

The Variables in the Equation table indicates how well these specific combinations of variables predict case status. A final look at the variables in the equation show us that the number of offenders involved, and whether the City of the homicide is City 4, are significant predictors when all five variables are considered together even though gang or drug involved killings were significant predictors when

used alone. The results show that when the five predictor variables of race of the victim, the number of wounds on the decedent, the number of offenders involved in the incident, whether the killing was gang or drug related, and whether the killing took place in City 4, were considered together, they significantly predict whether a case is close versus open (χ^2=37.707, df=5, N=658, p<.05). The numbers of offenders involved were significant at .006 with an odds ratio of .566. The odds of a closed case are 43.4% less based on the number of offenders involved in the incident. The other significant predictor was the City (PD4) where the killing took place. This variable was significant at .000. With the odds ratio being reported as 4.624 we can report that the odds of a closed homicide case are increased by a factor of 4.6 if the City of the killing is PD4.

Table 4.9: Race of Victim and Control Variables in the Equation Table

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1	BlkWhiVictim	.106	.224	.224	1	.636	1.112
	Wounds	-.184	.203	.823	1	.364	.832
	OffendersInvolved	-.569	.206	7.635	1	.006	.566
	GangorDrugKilling	-.381	.223	2.934	1	.087	.683
	PD4	1.531	.365	17.605	1	.000	4.624
	Constant	1.576	.190	68.670	1	.000	4.835

The main objective of this step of my logistic regression with control variables was to see if the race of the victim had any different effect on case status than it did when considered by itself. When tested without controls and when tested with controls, the race of the victim did not have any significant effect on case status.

Race of the Offender on Case Status

In turning my attention to the race of the offender for any potential effects on homicide case clearance, Table 4.10 shows the distribution of all the race variables for homicide offenders as reported in the original data (Wellford and Cronin, 1999). The original data reported 669 known offenders. As previously discussed, in homicide cases there are times when the race of the offender is not known. Taking this fact and coupling it with the fact that there will be missing data the original offender file reported 129 missing offender race cases. Approximately 16% of the cases of offender race were missing.

Table 4.10: Original Race of Offender Variables (Wellford and Cronin (1999)

Race of the Offender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	153	19.2	22.9	22.9
	2.00	505	63.3	75.5	98.4
	3.00	3	.4	.4	98.8
	4.00	8	1.0	1.2	100.0
	Total	669	83.8	100.0	
Missing	System	129	16.2		
Total		798	100.0		

Since I am interested in examining only the black and white offenders, I combined the other reported race categories into the system missing category. This only added 11 more cases. 17.5% or 140 of the total offender cases were excluded from the analysis. This left 82.5% of the cases where an offender was identified as black or white to be examined. Missing cases are always a concern in data analysis. The race of a homicide offender is often times not known at the initial stages of an

investigation and sometimes is not discovered until later on in the investigation. There are cases where the race of the offender is never known. The cases which are missing during these preliminary analytical steps are due to a combination of having the data either unknown or not reported coupled with the fact that the American Indian/Alaskan Native and Asian/Pacific Islander were collapsed into the missing category. The missing data for offenders is addressed at a later stage of the analyses, specifically in the final logistic model.

Table 4.11 shows the distribution of the two categorical variables of the homicide offender's race and homicide case status. I observe that there are 658 cases where the offender is either black or white. There are 505 (76.7%) black offenders versus 153 (23.3%) white offenders. 57 open cases involved black offenders compared to 29 open cases with white offenders. There were also 448 closed cases with black offenders and 124 cases closed where the offender was white.

Table 4.11: Contingency Table of Homicide Case Status (Open, Closed) by Race of the Homicide Offender

Status of Case * BlackWhiteOffenders Crosstabulation

			BlackWhiteOffenders		
			Black	White	Total
Status of Case	Open	Count	57	29	86
		Expected Count	66	20	86
		% within BlkWhi	11.3%	19%	13.1%
	Closed	Count	448	124	572
		Expected Count	439	133	572
		% within BlkWhi	88.7%	81.0%	86.9%
Total		Count	505	153	658
		Expected Count	505	153	658
		% within BlkWhi	100.0%	100.0%	100.0%

In looking at a cross tabulation for the actual offender race on case status output zero cells have been reported to have an expected count less than 5. The minimum count expected as reported is 20. Chi-square was reported to be 6.075 and the critical χ^2 distribution for 1 degree of freedom at the alpha level of .05 is 3.841. The critical χ^2 distribution at the .01 level is 6.635. Since a χ^2 of 6.075 is greater than the significant value of χ^2 of 3.841, then χ^2 is significant at the $p < .05$ level but not at the $p < .01$ level. This allows me to reject H_0 that the variables are independent and indicates that the race of the offender has an effect on case status. Yate's continuity corrected χ^2 is reported as 5.519 and confirms the results from the main χ^2 test.

These results point to the patterns of offender racial make-up having an effect on case status. I found 11% of black offenders had open cases compared to 19% of white offenders. Black offenders had a higher percentage of cases closed (89%) than white offenders who only had 81% of their cases closed. In looking at the total number of cases with black or white offenders, 13% of the total homicide cases were still open compared to 87% which were closed. In taking a closer look at open homicide cases, 57 of the 86 (66%) involved a black offender. Based on the raw counts of the offenders in open cases, actual counts for white offenders were higher than expected counts and black offender counts were lower than expected counts. Based on the raw counts of the offenders in closed cases, actual counts for white offenders were lower than the expected counts and black offender counts were higher than the expected counts.

Since χ^2 has indicated a significant effect between the race of the offender and case status, it is necessary to check for the degree of the association. The phi (φ)

coefficient for this analysis is .096. This would indicate a very weak association between the race of the offender and case status.

I can take χ^2 one step further and break it down with standardized residuals. In order to break down the association and determine what contributes to the overall association that χ^2 has measured, the individual standardized residuals will be examined since they have a direct relationship with the test statistic that has been used. Looking at the standardized residuals in the output there are 4 reported. There would be a residual for black offender/open case, black offender/closed case, white offender/open case, and white offender/closed case. When the race of the offender was black and the case open, the standardized residual was -1.1. The standardized residual is not significant since the resulting value was less than 1.96. Looking at all of the reported standardized residuals, the only significant standardized residual is for white offenders and open cases with a reported value of 2.0. This value tells me that white offenders have significantly more open cases than would be expected by chance. The race of the offender is not significant when the offender is black no matter which case status or when the offender is white and the case status is closed. The association between the race of the offender and homicide case status is driven by white offenders and then only when the case is open.

Table 4.12: Standardized residuals for race of the offender

Race of Offender	Case Status	Standardized Residual
Black	Open	-1.1
Black	Closed	.4
White	Open	2.0*
White	Closed	-.8

*significant $p < .05$

To further confirm this relationship, I will estimate a logistic regression model. As previously described, in this logistic analysis there will be one independent variable. Both the independent and dependent variables are dichotomous and were coded 0 and 1. The independent variable is the homicide offender's race (0=black, 1=white) and the dependent variable is the homicide case status (0=open, 1=closed). Once again, in examining the effects for the race of the offender on case status, there were 658 cases included in the analysis (82.5%). If we predicted all the cases would be closed we would be correct 87% of the time. When looking at the logistic results we can see that the race of the offender is statistically significant at .015 and we can also say that the odds of a closed case are reduced by 45.6% if the offender is white.

Table 4.13: Race of Offender Classification Table

Classification Table[a,b]

			Predicted		
			Status of Case		Percentage
	Observed		Open	Closed	Correct
Step 0	Status of Case	Open	0	86	.0
		Closed	0	572	100.0
	Overall Percentage				86.9

a. Constant is included in the model.

b. The cut value is .500

Table 4.14: Race of Offender and Control Variable Classification Table

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	BlkWhiOffender	-.609	.250	5.946	1	.015	.544
	Constant	2.062	.141	214.946	1	.000	7.860

a. Variable(s) entered on step 1: BlkWhiOffender.

Nagelkerke's R^2 tells me that only 1.6% of the variation in the model is accounted for by the race of the offender. The results of the logistic regression for the race of the offender effects on case status were found to be significant. After finding a significant effect for the race of the offender on case status, the question becomes what other variables could be possibly be causing this offender case status.

Race of the Offender and Control variables

Unlike the logistic analysis with the race of the victim and the control variables where I was looking for any possible suppressing of effects, in this case since the race of the offender was found to be significant, I will be looking to see if the controls minimize or take away any of the effects of the offender's race.

The control variables used in this logistic regression are the same control variables used in the multivariate logistic regression involving the race of the victim. The five variable logistic regression model that will be estimated is:

$$p= \frac{e^{b0 + b1(\text{offender race}) + b2(\text{\# wounds}) + b3(\text{\# offenders}) + b4(\text{gang/drug involved}) + b5(\text{City 4})}}{1^{+} e^{b0 + b1(\text{offender race}) + b2(\text{\# wounds}) + b3(\text{\# offenders}) + b4(\text{gang/drug involved}) + b5(\text{City 4})}}$$

In this logistic regression, there were 591 (74.1%) total cases analyzed since 207 (25.9%) were missing. Missing data for offenders in homicide cases was previously discussed. The offender and information about the offender may simply not be available because no credible information was known about the perpetrator at the time the homicide case is reported and even as its investigation continues. In the initial classification table for the logistic regression, there were 64 cases that were open and 527 cases closed. If we were to predict all the cases would be closed, we would correctly predict the cases status 89% of the time.

Table 4.15: Race of Offender and Control Variable Classification Table

Classification Table

			Predicted		
			Status of Case		Percentage
	Observed		Open	Closed	Correct
Step 0	Status of Case	Open	0	64	.0
		Closed	0	527	100.0
	Overall Percentage				89.2

The overall model that is estimated for the five variable logistic regression is:

$$\ln \frac{p}{1-p} = 2.766 - .684(\text{victim race}) - .141(\#\text{wounds}) - .529(\#\text{offenders}) - 824(\text{gang/drug}) + .980(\text{City4})$$

In examining the variables not in the equation table, we can see how many variables are individually, significant predictors of whether a case is closed. Looking more closely at the variables not in the equation (See Table 4.16 below) Roa's efficiency score statistic reports the residual χ^2 statistic as 32.433. The model has 5 degrees of freedom which will have a critical χ^2 of 11.071 at $p < .05$. The residual chi-square of 32.433 tells us that the coefficients for the variables not in the model are significantly different from zero. This is interpreted as the addition of one or more of these variables to the model will significantly affect its predictive power.

Table 4.16: Race of Offender and Control Variables not in the Equation Table

Variables not in the Equation

			Score	df	Sig.
Step 0	Variables	BlkWhiOffender	11.795	1	.001
		Wounds	1.006	1	.316
		OffendersInvolv	5.691	1	.017
		GangorDrugKil	16.815	1	.000
		PD4	6.806	1	.009
	Overall Statistics		32.433	5	.000

The four variables (race of the offender, number of offenders, gang or drug involved, and City 4) could potentially make a contribution to the model however, the number of wounds does not appear to be a good predictor since the resulting score statistic is non significant at $p<.05$. Once all five of the independent variables are entered into the model the overall model is found to be significant.

Table 4.17: Race of Offender and Control Omnibus Test of Model Coefficients

Omnibus Tests of Model Coefficients

		Chi-square	Df	Sig.
Step 1	Step	31.393	5	.000
	Block	31.393	5	.000
	Model	31.393	5	.000

A final look at the variables in the equation show us that the race of the offender, whether the killing was gang or drug involved, and whether the City of the homicide is City 4, are significant predictors when all five variables are considered together even though the number of offenders involved was a significant predictor when used alone. The odds of a closed case are reduced by 49.5% if the offender is white. The findings also report that the odds of a closed case are reduced by 56.1% if the homicide is gang or drug related. Finally, the results tell us that the odds of a closed case are increased by a factor of 2.67 if the city where the homicide occurred is PD4.

Table 4.18: Race of the Offender and Control Variables in the Equation table

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step1	BlkWhiOffender	-.684	.286	5.717	1	.017	.505
	Wounds	-.141	.279	.255	1	.614	.869
	OffendersInvol	-.529	.281	3.534	1	.060	.589
	GangorDrugKil	-.824	.284	8.398	1	.004	.439
	PD4	.980	.453	4.675	1	.031	2.665
	Constant	2.766	.286	93.676	1	.000	15.888

The main objective of this step of the logistic regression with control variables was to see if the race of the offender had any different effect on case status when controlling for specific variables compared to when the variable was considered by itself. In both cases the race of the offender did have statistically significant effects on case status.

Step 2: 2 Variable Logit Analysis

Prior to adding the race dyads, I examined a 2 variable logit model where the covariates are the race of the victim and the race of the offender and the outcome variable is case status. When considered in the same model but as separate variables, the race of the victim and offender is not significantly related to case status.

Table 4.19: Race of Victim and Race of Offender Variables in the Equation table

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1	BlkWhiVictim	-.221	.360	.377	1	.539	.802
	BlkWhiOffender	-.459	.373	1.512	1	.219	.632
	Constant	2.082	.147	199.576	1	.000	8.023

Step 3: Race Dyads

The next methodological step will be to examine the race dyads. The focus of my research is on the examination of the race dyads to see if there is a combination of victim and offender race which has an effect on homicide clearance. This step will focus on the simultaneous or interaction of both the victim's race and the offender's race with case status.

WHITE KILLING WHITE

The first dyad that was created was the reference category for the dummy variables to be used in this stage of the analysis. The reference group was where white offenders killed white victims. As a matter of information, descriptive data for

the reference group will be presented. There were 648 valid cases examined in this logistic regression which used the race typologies. Out of that total, 150 (18.8%) were missing. Of the 648 cases examined, there were 126 (19.4%) where both the offender and the victim were white. All other combinations of race totaled 522 (80.6%). A preliminary examination was conducted using cross tabulations to see if this dyad appeared to have a relationship with case status. The obtained chi-square was 3.621 which is less than the critical chi-square value of 3.84 and the reported significance was .057 which is greater than .05 therefore the two variables are not significantly related. As a result, I fail to reject H_0 and conclude that there is no relationship between cases with White offenders with white victims and the homicide case status.

BLACK KILLING BLACK

The second dyad that is used in the logistic regression is where black offenders kill black victims. There were 450 cases where black offenders killed black victims and this accounted for 69.4% of all the valid cases examined. All other race combinations accounted for the remaining 198 (30.6%). The obtained chi-square for this relationship was 7.761 which was greater than the critical chi square of 3.84. The findings are significant with the results being .005 thus $p < .05$. As a result, I reject the H_0 that there is no relationship between cases with Black offenders with black victims and the homicide case status. Black offender cases with black victims are significantly related to homicide case status. The overall cell counts for open cases are 10.7% for black offenders killing blacks and 18.7% of all the other open case offender and victim combinations. 89.3% of cases with blacks killing blacks are closed with 81.3% of all other combinations being closed. Black offenders killing

black victims though account for 450/648 or 69.4%. Looking closer at a logistic regression between Black offenders killing Black Victims, the results indicate that the odds of having a closed case are increased by a factor of .925 (1.925-1.0) if a black offender kills a black victim[8]. In other words, the odds of a closed case are increased by 93% if both the offender and victim are black.

Table 4.20: Black Killing Black Dyad Variables in the Equation Table

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1	BKB	.655	.238	7.580	1	.006	1.925
	Constant	1.470	.182	65.056	1	.000	4.351

Even though the relationship is significant, the phi value of .109 in the cross tabulation reports the strength of this relationship to be low or having a small effect.

Table 4.21: Black Killing Black Dyad Symmetric Measures table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.109	.005
	Cramer's V	.109	.005
N of Valid Cases		648	

BLACK KILLING WHITE

Typology three is where black offenders have killed white offenders. There were 53 (8.2%) cases out of the 648 where this criterion was met. All other combinations (595) accounted for the remaining 91.8%. The obtained chi-square was reported to be .756 which is below the critical chi-square of 3.84 and the reported

[8] *The log odds were transformed to the percentage change in the odds of the dependent variable with the formula 100[exp(log odds)-1] Long and Freese,2001, p.135-136).

significance is .385 which is > .05 therefore the two variables are not significantly related. I fail to reject the H_0 that there is no relationship between cases with Black offenders with white victims and the homicide case status.

WHITE KILLING BLACK

The final typology was for white offenders killing black victims. There were 19 cases where whites killed blacks (2.9%) and 629 cases with all other racial combinations. The obtained chi-square was 2.99 however there was one cell where the expected count was less than 5. Since it is the expected frequencies that are less than 5, I will use Fisher's exact test instead of chi-square. There has been use of Yate's correction in two by two tables due to its conservative nature however; the potential exists for overcorrection when it is used to adjust for small observed cell frequencies. The results for Fisher's Exact Test are .090. Since p is .090 this can be interpreted as meaning there is a 9.0% chance that given the current observed sample size and distribution that is reported, that we'd get a similar table or stronger table merely by chance. Since $p<.05$ is my significance level, I'd conclude that the distribution in the observed table cannot be said to be significantly different from chance and thus fail to reject the H_0 that the two variables are statistically significant. The relationship between white offenders and black victims is not significant.

Logistic regression of the Race Dyads with the Control Variables

The next step in the examination of the race dyads will be to use the typologies in a logistic regression along with the control variables. The logistic regression includes 582 cases which is 72.9 of the total data set. Case status is the dependent variable and has been coded 0 for open and 1 for closed. Looking at the

classification table we can see that if we predicted a case would be closed, we'd be correct 89.2% of the time which is significant, p = .000.

In looking specifically at each of the covariates, we can report that 25.9% (151/582) of the cases are gang or drug related. When considering the number of wounds that a homicide victim suffers, 53.1% (309/582) suffered more than one wound. There was more than one offender in 37.8% of the cases (220/582). When taking into account the city where the killing took place 22.3% of the homicides took place in City 4 (130/582) with the other 77.7% divided among the other three jurisdictions. Specifically addressing the race dyads, 67.9% (395/582) had both black victims and black offenders. Blacks killed whites in 8.2% (48/582) of the cases and whites killed blacks in 3.3% (19/582) of the cases. The reference dyad of white offenders with white victims accounted for 21.7% (126/582) of the homicides.

When entered separately, five of the seven variables are individually, significant predictors of whether a homicide case is closed. Those five significant variables were white offenders killing blacks, black offenders killing blacks, the number of offenders involved in the case, whether or not the killing was gang or drug related, and whether or not City 4 was the city involved.

Table 4.22 Race Dyads and Control Variables not in the Equation Table
Variables not in the Equation

			Score	df	Sig.
Step 0	Variables	BKB	11.284	1	.001
		BKW	.152	1	.697
		WKB	4.883	1	.027
		GangorDrugKilling	17.273	1	.000
		OffendersInvol	6.388	1	.011
		Wounds	.902	1	.342
		PD4	6.686	1	.010
		Constant	34.662	7	.000

A look at the results from the Omnibus Tests of Model Coefficient results show that once the independent variables are entered into the equation they significantly predict the status of the homicide case.

Table 4.23: Race Dyads and Control Variables Omnibus Tests of Model Coefficients
Omnibus Test of Model Coefficients

	Chi-square	df	Sig.
Step1	33.378	7	.000

The next step was to examine the full model which is where all of the predictors are entered controlling for each other. As reported, the omnibus test of the model coefficients and the accompanying statistics indicated that when we consider all seven variables together, the model is significant (χ^2 = 33.378, df=7, N=582, p < .05). The significance of .000 is the probability of obtaining the chi-square statistic of 33.378 if there is in fact no effect of the independent variables taken together on the dependent variable. This is the p value which when compared to the critical value of p>.05 tells me if the overall model is statistically significant. This model is statistically significant since p is .000 and is < .05. The model is also significant at p<.01.

Expressed in terms of the variables used in my analysis, the logistic regression equation is Log(p/1-p)=2.169 -.585(WKB) +.641(BKB) +.215(BKW) -.107(#Wounds)-.544(#Offenders) -.844(Gang/Drug involved) +1.00(PD4). These estimates report the relationship between the independent variables and the dependent variable, where the dependent variable is on the logit scale. The resulting estimates report the increase or decrease in the predicted log odds of case status (closed) that

would be predicted by a one unit increase or decrease in the predictor, holding all the other predictors constant.

In looking at all the independent variables in the equation, only three of the seven variables are significant. When looking at the results for the race dyads, white killing black was not significant with the results of .320. Blacks killing whites was not significant at .679. The dyad of Black offenders killing black victims was found to be significant at .044 where $p < .05$. For every one unit increase in black killing black, I would expect a .641 increase in the log odds of case status holding all other independent variables constant. Stated another way, results indicated that if a black offender killed a black victim, the odds of the case being closed were increased 89.9% when compared to the typology of a White offender killing a White victim. The number of wounds that a homicide victim suffered was not significant at .705. The number of offenders involved was also found not to be significant with the resulting significance being reported at .057. The last two independent variables were found to be statistically significant. The fact the killing was gang or drug related was reported to be significant at .003. For every one unit increase in the number of cases where drugs or gang involvement was a part (going from no involvement to gang or drug involvement), we expect a .844 decrease in the log odds of case status, holding all the other independent variables constant. This can be interpreted as if a homicide case involved drugs or was gang related, the odds of being closed were reduced by 57% than compared to when there was no drug or gang involvement. The city where the homicide took place, which can also be described as the police department that handled the homicide case, was statistically significant at .028. This specific City/PD

variable identified City/PD 4 from all other cities or departments. Results indicated that for every one unit increase (going from the combination of the other three cities to City 4) in the city where the homicide occurred, we would expect a 1.001 increase in the log odds of case status, holding all the other independent variables constant. Results indicate that if the killing took place in City 4, the odds of being closed were increased 172%.

Table 4.24: Race Dyads and Control Variables in the Equation table

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1	BKB	.641	.318	4.062	1	.044	1.899
	BKW	.215	.519	.172	1	.679	1.240
	WKB	-.585	.588	.989	1	.320	.557
	GangorDrugKil	-.844	.288	8.588	1	.003	.430
	OffendersInvol	-.544	.286	3.627	1	.057	.580
	Wounds	-.107	.281	.144	1	.705	.899
	PD4	1.001	.457	4.799	1	.028	2.720
	Constant	2.169	.348	38.887	1	.000	8.746

In summary, when taking all the race combinations into account for offenders and victims and controlling for the four control variables, it appears that only the Black offender killing Black victim dyad has a significant relationship affecting case status. Taking all the control variables into account with the race dyads, only the homicide being gang or drug related and whether the killing took place in City 4 had any significant effect.

Step 4: The Latent Construct of Effort and Case Status

In the initial conceptualization of the latent construct, 39 variables were hypothesized to make up the construct of effort. After examining the descriptive

data, variables where there was a high number of missing cases were excluded. Only those variables which covered 88% of the cases (700 or more cases) were included. After eliminating those variables with a large number of missing cases there were 26 variables remaining.

At this point in the analysis I took the remaining 26 variables and ran a reliability analysis to check if the variables were reliable measures of what they were described to represent. The reliability in this case is the correlation of the variable(s) to a hypothetical variable that measures what it is intended to measure. I wanted to test for internal consistency based on these 26 variables that remained so I used Cronbach's Alpha. The initial run of the reliability analysis revealed a low Cronbach's alpha of .358 which could be improved to .580 of the variable det01 was removed[9]. The variable det01 is the variable that records the total number of homicide detectives assigned to the case. This variable was removed from the reliability analysis and Cronbach's alpha could now be improved to .603 if the variable cs12 was removed. The variable cs12 records how many evidence technicians are on the scene. Cronbach's alpha could not be improved over the .603 that resulted from removing cs12. Both det01 and cs12 are continuous variables. In line with my categorization of effort variables being defined as effort and more effort, these two variables were recoded. As far as the detective assigned to the case variable, this variable was recoded to 0= 1 detective assigned to the case and 1= 2 or more detectives assigned to the case. Crime scene technicians working the case were

[9] An examination of this variable's descriptive showed one value of 9999 which was not a missing variable code in the codebook so this value was treated as system missing. Taking that outlier away still did not improve Cronbach's Alpha. Likewise, 16% of the values were 11 detectives. 11actually represented > 10 detectives. 72% of the values lied in the range of 1-3. 88% were accounted for by 1-3 and >10 detectives. The spreads of the values may account for the lower Cronbach's alpha.

also recoded in a similar manner. Crime scene technicians involved were recoded to 0= 1 crime scene technician working the case and 1= 2 or more crime scene technicians involved in the case. These recoded variables were checked for their effects on case status and the detective variable recoded had a significant effect yet the crime scene technicians involved did not. The detectives' variable will be retained for the logit analysis and effort variable. Wellford and Cronin (1999) reported that the assignment of 3 or 4 detectives was optimal for clearing a case, but that increasing that number was not efficient again until you reach very large numbers of detectives (i.e., 11 or more) (Wellford and Cronin, 1999).

Looking more closely at the variables that were hypothesized to make up the latent construct, it was discovered that there were specific variables that had high splits in their responses. Several variables had as high as a 90:10 split between hypothesized no effort indicators and effort indicators. These splits varied in their direction with some being 90% no effort and others being recorded as 90% effort responses. These high splits were creating what could be considered a constant with little variability since the ratios were similar. As a result, these variables were also eliminated from the reliability analysis. After removing the "high split" of 90:10 responses, I was left with 14 variables plus the two continuous variables of det01 and cs12 (See Table 4.25) for the remaining reliability analysis.

Table 4.25: Latent Effort Construct and two individual effort variable table

Variable	Variable Description
Det09	Were other law enforcement agencies involved in the investigation

Table continued

Table 4.25 Continued:

Det18	Were search warrants necessary for any other locations where perpetrator or evidence may have been?
CS01	Was the crime scene secured by the first officer on the scene?
CS22	Was the crime scene measured?
CS23	Did the homicide detectives describe the scene in their notes?
WIT10	Was a neighborhood survey conducted to locate additional witnesses or gather relevant information?
CC01	Was a computer check conducted on the decedent?
CC02	Was a computer check conducted on any suspects?
CC03	Was a computer check conducted on any witnesses?
me01	Was homicide detective present at the post-mortem examination?
me02	Were specimens (blood, hair, fibers, fingernail scrapings, or seminal fluid) collected for analysis?
me04	Did the homicide detective prepare a detailed body chart (one showing all wounds, abrasions, etc.) including the medical examiners findings?
si01	Were confidential informants used?
dis04	Was a warrant requested for a suspect?

The initial reliability analysis was conducted and included the two continuous variables and the resulting Cronbach's alpha was a low .296. This improved to .533 once det01 was removed and improved to .570 once cs12 was removed. Cronbach's alpha could not be improved over .570 with the removal of any other variables. With Cronbach's alpha being the most common form of an internal consistency reliability coefficient, it was the chosen measure of consistency for this analysis. By some standards the common cut-off point for internal consistency is .60 in exploratory research and stretches to .70 for others to retain an item as an adequate scale. Since

the resulting Cronbach's alpha was bordering on the lenient cut-off of .60 along with the idea that there are so many different activities being conducted by so many different classifications of persons during a homicide investigation, these variables will be retained as a measure of internal consistency with the realization the variables have been found on the low end of a reliability scale according to Cronbach's alpha (Garson, 2011).

The next step in the analysis was to take the remaining variables and perform a Factor Analysis using Principal Components as the extraction method. Originally, it was hypothesized that all of the variables included within the latent analysis would measure an overall concept of effort. As a result, the first Factor Analysis was performed forcing a one factor solution. This one factor solution did not fit.

As a second step both a 2 and 3 factor solution were conducted with a Varimax rotation. A Varimax rotation was chosen since it attempts to minimize complex factors by making large loadings larger and smaller loadings smaller within each factor. Varimax rotation focuses on a so-called "cleaning up" of the factors. In essence it will produce factors with high correlations into a smaller set of variables and also take those with small or no correlation and place them into another set of variables (Stevens, 1996).

With the lack of success on forcing a one factor solution and the idea that effort is being produced by different factions involved in the homicide investigation, I would hypothesize that there is not one general factor that accounts for effort but several. Since I am hypothesizing that one general factor does not account for most of any resulting variance, I have chosen a Varimax rotation.

In forcing a 2 factor solution, just as in the one factor solution, the analysis showed the variables did not fit. In forcing a three factor solution however, the results appear to indicate that the variables load on three separate factors.

Thirteen variables were used in the three factor principal components analysis. These variables were initially selected as representative of the latent concept of effort. After eliminating variables with a large percentage of missing cases and those with a large split in their responses creating a constant like effect were eliminated, thirteen variables remained. To determine if there was an underlying concept(s) a factor analysis was performed. A principal components method was used to extract factors and an orthogonal rotation of the factors was performed using the Varimax method. The interpretation of the scree plot is sometimes not clear cut and is often a matter of interpretation left to the researcher. Initial examination of the scree plot indicated that 3 factors should be retained. See Appendix (Figure C.1) for the scree plot from the Principal Components Analysis. The combined factors in the Principal Components Analysis accounted for 44% of the variance of the 13 variables. See Appendix C (Table C.1) for the Principal Components Analysis Total Variance table. Based on the scree test (Figure C.1), which showed the eigenvalue for each factor, the number of eigenvalues less than 1, and the drop off of the eigenvalues after the third factor as well as the explained variance, the Principal Components Analysis indicated that there were 3 components for the latent concept. The loadings of the variables on the three rotated factors are reported in Table 4.26.

Table 4.26: Principal Components Loadings table

Rotated Component Matrix[a]

	Component		
	1	2	3
OtherLEAgencies	.025	.015	.543
SWforOtherLocations	-.092	.070	.455
CSsecuredFirstOfficer	.028	.988	.069
CrimeSceneMeasured	.690	-.011	.047
InvestDescribeSceneinNotes	.715	.068	.002
NeighbSurveyConducted	.178	-.118	.392
ComputerCheckWit	.234	.055	.544
ComputerCheckSuspect	-.144	.166	.571
CompCheckVictim	.028	.988	.069
DetatPostMortemme01	.736	-.098	.073
SpecimensCollected	.569	.110	-.045
DetDoBodyChart	.338	-.033	.102
CIsUsed	.099	-.029	.493

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

Based on these loadings, Factor 1 was interpreted as representing "Evidence-related effort", Factor 2 was interpreted as representing "Victim-attentive effort", and Factor 3 represents "Case-supportive effort."

Table 4.27: Factor One Loadings table

Factor One (Evidence-related Effort)	
CrimeSceneMeasured	.690
InvestDescribeSceneinNotes	.715
DetatPostMortemme01	.736
SpecimensCollected	.569
DetDoBodyChart	.338

Table 4.28: Factor Two Loadings table

Factor Two (Victim-attentive Effort)	
CSecuredFirstOfficer	.988
CompCheckVictim	.988

Table 4.29: Factor Three Loadings table

Factor Three (Case-supportive Effort)	
OtheLEagencies	.543
SWforOtherLocations	.456
NeighbSurveyConducted	.392
ComputerCheckWit	.544
ComputerCheckSuspect	.571
CIsUsed	.493

In looking over the 3 factors, I dropped the variables from each which had low loadings. I am left with the following results for the three factors.

Table 4.30: Factor One Revised Loadings table

Factor One (Evidence-related Effort)	
CrimeSceneMeasured	.690
InvestDescribeSceneinNotes	.715
DetatPostMortemme01	.736
SpecimensCollected	.569

Table 4.31: Factor Two Revised Loadings table

Factor Two (Victim-attentive Effort)	
CSecuredFirstOfficer	.988
CompCheckVictim	.988

Table 4.32: Factor Three Revised Loadings table

Factor Three (Case-supportive Effort)	
OtheLEagencies	.543
SWforOtherLocations	.456
ComputerCheckWit	.544
ComputerCheckSuspect	.571
CIsUsed	.493

During the course of conducting the Principal Components Analysis there appeared to be one additional variable that affected the loadings for the three factors. This 14th variable was whether there was a warrant requested for the suspect. The variable brought up certain loadings and reduced others while leaving some unchanged. The table below presents the loadings for the three extracted factors both without and with this variable.

Table 4.33: Factor One Loadings with/without Warrant Requested for Suspect Variable

Component 1- Evidence-related effort	Without variable14	With variable 14
CrimeSceneMeasured	.690	.687
InvestigatorDescribeSceneinNotes	.715	.722
DetectiveatPostMortem	.736	.731
SpecimensCollected	.569	.572

Table 4.34: Factor Two Loadings with/without Warrant Requested for Suspect Variable

Component 2- Victim-attentive effort	Without variable14	With variable 14
CSsecuredFirstOfficer	.988	.980
ComputerCheckVictim	.988	.980

Table 4.35: Factor Three Loadings with/without Warrant Requested for Suspect Variable

Component 3- Case Supportive Effort	Without variable14	With variable 14
Otherleagencies	.543	.449
SWforotherlocations	.455	.493
ComputerCheckWitness	.544	.278
ComputerCheckSuspect	.571	.689
CIsUsed	.493	.358

The two variables that were in the original components prior to dropping those with low loadings were disregarded. Whether a detective did a body chart and whether a neighborhood survey was conducted, did not improve with the addition of Variable 14. The addition of the 14th variable had its greatest effect on the variable which captured data on whether a computer check was performed on any witnesses. The loading dropped from .544 to .278. The variable gathering data on whether confidential informants were used also dropped from .493 to .358. A third variable, of whether a computer check was conducted on any suspects actually improved from .571 to .689. All three of these affected variables were included in the formation of component three based on the 3 factor forced Varimax model which did not include

variable 14. Based upon the effects that the 14th variable had on the formation of the factors within the Principal Components Analysis, it was decided to keep the 13 variables for a 3 factor solution and use the 14th variable (warrants requested for the suspect) as an additional single covariate.

As previously discussed, during the formation of the latent variable, several obstacles were encountered. During the reliability analysis it appeared as if the reliability of the variables greatly improved when two specific variables were excluded from the analysis. These variables were the only continuous variables in the reliability analysis. The number of detectives assigned to a case and the actions they performed were reported to have a significant effect on case closure (Wellford and Cronin, 1999). The second continuous variable was the number of crime scene technicians involved. This variable did not have any significant effects on case status. The latent concept used in my research will be the three factors from the Principal components analysis, the number of detectives involved in the case and whether or not a warrant was requested for the suspect.

The next step will be to check for the effects that the Latent construct has on cases status. This will be accomplished by using the 3 Factors from the Principal components analysis, the number of detectives involved in the case and the variable of whether an investigator requested a warrant for the suspect.

Step 5: Logistic Regression with the Latent Concept- Effects of Effort on Case Status

This next section looks to see if effort has any effect on case status. The concept of effort that is used in the logistic regression is the results from the Principal

Components Analysis along with 2 other variables that are hypothesized to measure effort.

This logistic regression takes the variables from the Principal Components Analysis that were found to represent effort and looks for any significant effects on case status. The covariates for this analysis are the three Factors from the Principal Components Analysis, the number of detectives assigned to the case and whether a warrant was requested for the suspect in the case.

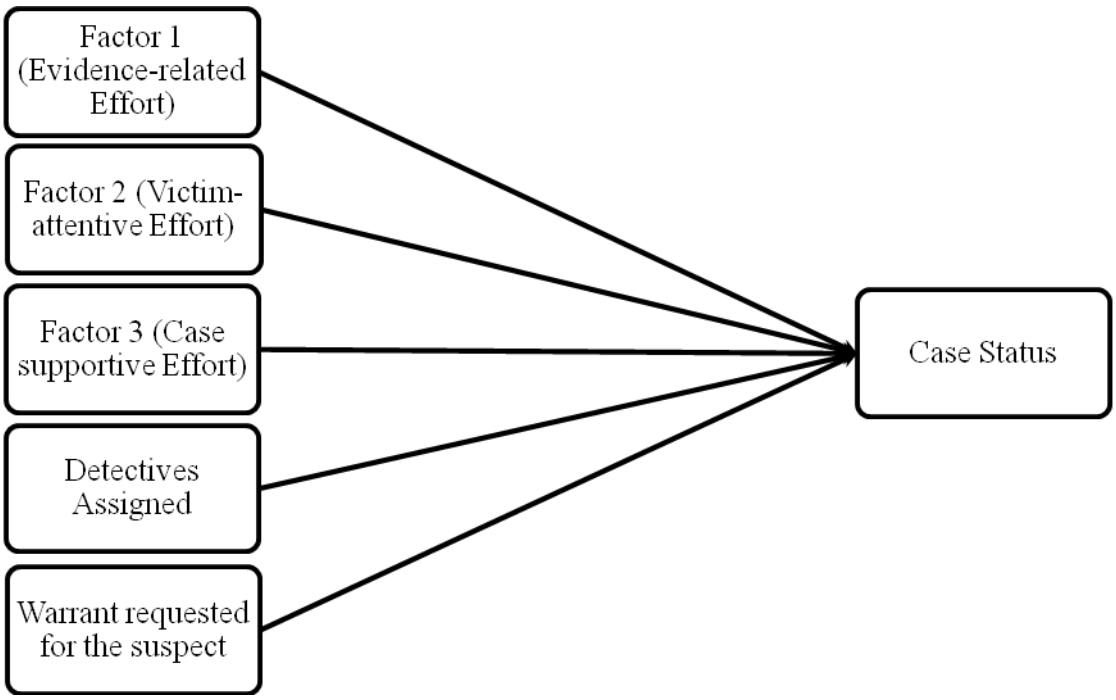

Figure 4.1: Logistic Model of Effort on Case Status

In the initial descriptive data for the logistic run of the effort variables and their effect on case status, there were 688 cases examined. In the initial Classification Table which tells us about the model with only the constant and no predictor variables included, if all the cases were predicted to be closed, the percentage of correct predictions would be 74.9%.

Table 4.36: Effort Variable Classification table

Classification Table[a,b]

			Predicted		
			Status of Case		Percentage
	Observed		Open	Closed	Correct
Step 0	Status of Case	Open	0	173	.0
		Closed	0	515	100.0
	Overall Percentage				74.9

a. Constant is included in the model.

b. The cut value is .500

Since -2LL has an approximate chi-square distribution, it makes it possible to compare values that we might expect to get by chance alone (Field, 2009). A large value of the log-likelihood statistic indicates a poorly fitted statistical model. Lower values of -2LL indicate that the model is predicting the outcome variable more accurately. The value of -2LL at the initial stage when only the constant was included was reported to be 775.963. At the point in the analysis where the latent constructs have been added as covariates, this value has been reduced to 433.203. This reduction in the -2LL value tells me that the model is better at predicting the case status than it was before the covariates were added.

Table 4.37: Effort Variable Iteration History table

Iteration History[a,b,c]

		-2 Log	Coefficients
Iteration		likelihood	Constant
Step 0	1	777.193	.994
	2	775.963	1.089
	3	775.963	1.091
	4	775.963	1.091

Looking at the Variables not in the equation table, shows that only the variables Case-Supportive effort (Factor 3) and whether or not a warrant was requested for the suspect are individually significant predictors of case status.

Table 4.38: Effort Variables not in the Equation table

Variables not in the Equation

			Score	df	Sig.
Step 0	Variables	FAC1_1	1.695	1	.193
		FAC2_1	3.114	1	.078
		FAC3_1	22.359	1	.000
		Det01RECODED	1.003	1	.316
		WarrantReqforSuspectdis04	296.553	1	.000
	Overall Statistics		307.064	5	.000

The Omnibus Test of the Model Coefficients table reports that when all of the predictors are taken together, the model was significant (χ^2= 342.759, df= 5, N=688, p< .05).

Table 4.39: Effort Variable Omnibus Tests of Model Coefficients table

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	342.759	5	.000
	Block	342.759	5	.000
	Model	342.759	5	.000

In the Model Summary table, the rough estimate of the variance can be predicted from the combination of the 5 variables. This is indicated by the two "pseudo R^2 estimates (Cox and Snell R^2=.39 and Nagelkerke's R^2 of .58) which indicate 36% or 58% of the variance in whether the homicide cases are closed are

based on the linear combination of the 5 covariates. The Cox and Snell R^2 is usually an underestimate (Leech, Barrett, and Morgan, 2011) therefore based on Nagelkerke's R^2,58% of the variance in whether a case is closed can be predicted from the linear combination of the 5 independent variables.

Table 4.40: Effort Variables Model Summary table

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	433.203[a]	.392	.580

a. Estimation terminated at iteration number 6 because parameter estimates changed by less than .001.

The final Classification table indicates how well the combination of the 5 covariates predicts case status. The model attempts to predict from the 5 variables whether or not a homicide case is closed. Overall, 82.6% of the cases were predicted correctly. The model is better at predicting whether a case was closed (83.9%) than whether the case was open (78.6%). Overall, the cases which were predicted correctly were a 7.7% improvement (82.6% versus 74.9%) compared to when no predictor variables were included in the model.

Table 4.41: Effort Variable Classification table

Classification Table[a]

			Predicted		
			Status of Case		Percentage
	Observed		Open	Closed	Correct
Step 1	Status of Case	Open	136	37	78.6
		Closed	83	432	83.9
	Overall Percentage				82.6

a. The cut value is .500

Finally, in looking at the results in Variables in the Equation table, the variables Factor 1 (Evidence-related effort), Factor 3 (Case-supportive effort), the number of detectives involved in a case, and whether or not a warrant was requested for the suspect were all statistically significant. When all five predictor variables were considered they significantly predicted whether a case was open or closed, (χ^2= 342.759, df=5, n=688, p<.05). A closer examination shows the significance and odds ratio for the variables in the model.

Table 4.42: Logistic Regression Predicting Closed Homicide Case Status

Variable	B	SE	Sig.	Odds Ratio
Factor 1-Evidence related effort	-.35	.15	.017	.706
Factor 2- Victim attentive effort	.03	.14	.850	1.03
Factor 3- Case supportive effort	.37	.14	.010	1.44
Warrant Requested	4.4	.37	.000	80.41
Detectives Involved	1.5	.39	.000	4.45
Constant	-1.7	.37	.000	.188

The logistic regression was conducted to assess whether the five covariates or predictor variables of evidence-related effort, victim-attentive effort, case-supportive effort, whether warrants were requested for the suspect, and the number of detectives assigned, significantly predicted whether or not a homicide case was open or closed. The results suggest that the odds of finding a closed case are increasingly greater when we find Factor 3, whether a warrant was requested for the suspect and based on the number of detectives involved in the case. The odds of finding a closed homicide case are decreased by 29% when Factor 1 is involved. The odds of a closed homicide case increase by 44% when Case-supportive effort is involved. The odds of a closed

homicide case also increase by a factor of 80 when a warrant is requested for a suspect and increased by a factor of 4.5 when more than one detective is assigned to a case.

Table 4.43: Logistic Regression with Effort Variables in the Equation table
Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	FAC1_1	-.348	.145	5.742	1	.017	.706
	FAC2_1	.026	.138	.036	1	.850	1.026
	FAC3_1	.368	.142	6.683	1	.010	1.444
	Det01RECODED	1.493	.393	14.395	1	.000	4.450
	WarrantReqforSuspectdis04	4.387	.369	141.462	1	.000	80.411
	Constant	-1.670	.371	20.223	1	.000	.188

a. Variable(s) entered on step 1: FAC1_1, FAC2_1, FAC3_1, Det01RECODED, WarrantReqforSuspectdis04.

One concern which has surfaced in this step of the analyses is the possibility of data separation. The variable of whether a warrant was requested for the suspect was found to be significant however the large Wald statistic along with the large spread for the 95% confidence interval focuses attention on this variable. An area of concern is the low number of open cases where a warrant was requested for the suspect. As we see in the cross tabulation performed, there is a small number of cases that are open where a warrant was requested for the suspect compared to the cases in the remaining three cells related to whether a warrant was requested and case status. A cross tabs was run on the warrant requested for the suspect and its effects on case status and the results are displayed. The table reveals that when no warrant is requested for a suspect 60% of the cases are open. When a warrant is requested for a

suspect 97% of the cases are closed. The smaller cell appears with open cases when a warrant is requested. In those cases only 3% of the cases (16 cases) are open.

Table 4.44: Cross Tabulation of Warrant requested for a suspect with Case Status
Status of Case * WarrantReqforSuspect Crosstabulation

		WarrantReqforSuspect		
		NOwarrantreqforsuspect	YESwarrantreqforsuspect	Total
Status of Case	Open	188 (60%)	16 (3%)	204
	Closed	124 (40%)	457 (97%)	581
Total		312 (100%)	473 (100%)	785

My research uses binary logistic regression to estimate any effects of the status of a homicide case. Complete separation is a condition where one predictor or a linear combination of predictors perfectly predicts the target value and quasi-complete separation occurs when values of the target variable overlap or are tied at a single or only a few values of a predictor variable. Complete separation occurs when the outcome variable separates a predictor variable or a combination of variables completely (So, 1995).

At the beginning of each logistic regression analysis, a check is made for complete separation on each predictor variable. If complete separation is detected the system provides a warning message. A more general way to explain this concept would be the idea that our predictor variable could possibly give me the problem of perfect prediction. Complete separation is also referred to by some people as perfect prediction. Another scenario exists where we may have complete separation and that is when the sample size is very small. The idea is if the sample size is large then

there should be no reason why some of the observations would not fall into different response categories. In complete separation what we try to do is fit a logistic regression model of the dependent variable on the predictor variables. This makes it impossible to compute the likelihood values because the slope of the logistic function would be infinite. In my research, the target or outcome variable which is case status, would be completely determined by the predictor variable, which is whether a warrant was requested for the suspect. This analysis has not yielded any indication from the software that complete separation has occurred. When we have complete separation the problem creates large standard errors. The Standard Error for the variable warrant requested for the suspect is only .369 thus reinforcing the conclusion that complete separation has not occurred. Quasi-complete separation must also be considered. Quasi-separation exists in a logistic regression when the outcome variable, case status, separates the predictor variable, whether a warrant was requested, to a certain degree. As the definition implies, there is a "degree" of separation and the analysis does not check for quasi-separation. The symptoms of a quasi-separation are extremely large calculated values for B_i parameters or large standard errors. In this case, the analysis may fail to converge. In my analysis, B was reported to be 80.41 and the Wald statistic was 141.46. Also, the Model Summary table for the logistic regression reported the estimation was terminated at iteration 6 thus it appears a final solution was found and the computation converged. Once a logistic regression model is estimated, there are two methods that are generally used in determining if separation has occurred. There is separation if there is no convergence and also the software used, in the case of my research SPSS, will

indicate separation in the data. Since neither of these conditions existed, I left the variable in the model. In quasi-separation, one strategy used is the "Do nothing" strategy. Even if quasi-separation occurs, the maximum likelihood for the other predictor variables in the analysis is still valid. Leaving the variable warrant requested for the suspect out of the model could lead to biased estimates for the other predictor variables in the model. The one drawback, if quasi-separation has occurred, is that we would not get any reasonable estimate for this variable that would actually predict case status effectively. As will be discussed further in the next section, I would argue that it theoretically follows that whether a warrant is requested for the suspect would be strongly related to case status. This is reflected in both the large Wald statistic as well as the low cell count for open cases where warrants were requested for the suspect. This variable had a small number of missing cases. There were only 13 missing cases which accounted for 1.6% of the total cases however, as a precaution I recoded the variable using mean substitution to try and address the small number of cases. No warrant requested for the suspect as well as the missing cases were combined into 0 coded responses. The affirmative response that a warrant was requested for the suspect was coded as 1. A dummy variable was also created. A logistic regression was performed using the mean substitution and the results revealed that excluding the missing did not affect the results since combining missing with no responses also resulted in significant results for this variable.

Putting the separation issue aside, it appears as if the latent construct of effort as evidenced by the three components from the principal components analysis and the two separate variables of the number of detectives involved and whether a warrant

was requested for the suspect revealed all the covariates were significant with the exception of what I have defined as victim-attentive effort (Factor 2).

The last stages of analysis with the latent concept of effort are performed along with the race variables. Two of the research questions to be answered are "does the concept of "police effort" have intervening effects on the clearance of a case when taking the race of the victim and the offender into account?" As far as the race of the victim, there would be no intervening effects since there were no initial effects in the bivariate analysis with victim's race and case status. A logistic regression with only the three factors confirmed no effect when considered with the latent concepts of effort. The significance of victim's race was reported to be .183.

Table 4.45: Logistic Regression with Effort Variables and Race of Victim Variables in the Equation table

Variables in the Equation

								95% C.I.for EXP(B)	
		B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Step 1[a]	FAC1_1	.152	.087	3.048	1	.081	1.164	.982	1.381
	FAC2_1	-.202	.100	4.062	1	.044	.817	.671	.994
	FAC3_1	.451	.100	20.442	1	.000	1.570	1.291	1.909
	BlkWhiVictim	-.270	.203	1.770	1	.183	.763	.513	1.136
	Constant	1.228	.110	123.903	1	.000	3.415		

a. Variable(s) entered on step 1: FAC1_1, FAC2_1, FAC3_1, BlkWhiVictim.

A logistic regression with the three factors as well as the two individual variables of how many detectives were involved and whether a warrant was requested for a suspect also revealed the victim's race was not significant (p= .111).

Table 4.46: Logistic Regression with Effort Factors, Race of Victim and two Individual Effort Variables in the Equation table Table continued

Variables in the Equation Table Continued:

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	FAC1_1	-.381	.153	6.225	1	.013	.683
	FAC2_1	.041	.147	.077	1	.781	1.042
	FAC3_1	.390	.145	7.205	1	.007	1.477
	BlkWhiVictim	.439	.276	2.537	1	.111	1.551
	WarrantReqfor Suspectdis04	4.585	.395	134.764	1	.000	97.962
	Det01RECODE D	1.490	.406	13.437	1	.000	4.435
	Constant	-1.845	.398	21.510	1	.000	.158

a. Variable(s) entered on step 1: FAC1_1, FAC2_1, FAC3_1, BlkWhiVictim, WarrantReqforSuspectdis04, Det01RECODED.

A logistic regression was also conducted with the offender's race and the effort variables for their effect on case status. The overall model was reported significant at .043.

Table 4.47: Offender's Race Variable Omnibus Tests of Model Coefficients table

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	9.877	4	.043
	Block	9.877	4	.043
	Model	9.877	4	.043

The race of the offender was significant when considered with the three latent concepts also revealed the variable was significant at p=.009.

Table 4.48 Effort Factors and Offender's Race Variables in the Equation table

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1	Variables FAC1_1	.228	.124	3.366	1	.067	1.256

Table Continued

Table 4.48 Effort Factors and Offender's Race Variables in the Equation table
Variables in the Equation Continued

	B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 Variables						
FAC2_1	-.150	.146	1.051	1	.305	.861
FAC3_1	.044	.133	.111	1	.739	1.045
BlkWhiOffender	-.740	.283	6.824	1	.009	.477
Constant	2.194	.159	191.298	l	.000	8.969

The offender's race was also placed into the logistic regression model with the two additional effort variables. The overall model was significant at p= .000 however, when the race of the offender variable was considered along with all effort variables, it was not significant (p= .848).

Table 4.49: Effort Factors and two individual Effort Variables along with Offender's Race
Omnibus Tests of Model Coefficients

	Chi-Square	df	Sig.
Step 1	125.241	6	.000

Table 4.50: Effort Factors and two individual Effort Variables along with Offender's Race
Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	FAC1_1	-.186	.193	.927	1	.336	.831
	FAC2_1	.023	.175	.017	1	.897	1.023
	FAC3_1	-.008	.183	.002	1	.966	.992
	BlkWhiOffender	.069	.357	.037	1	.848	1.071
	WarrantReqforSuspectdis04	3.515	.416	71.511	1	.000	33.621
	Det01RECODED	1.060	.478	4.913	1	.027	2.886
	Constant	-.422	.477	.781	1	.377	.656

a. Variable(s) entered on step 1: FAC1_1, FAC2_1, FAC3_1, BlkWhiOffender, WarrantReqforSuspectdis04, Det01RECODED.

A final logistic regression was also performed which included the race dyads along with the three effort factors. A second logistic regression model was evaluated which included the two separate effort variables of whether a warrant was requested for the suspect and how many detectives were involved in the case along with the 3 effort components.

In the initial logistic model without the individual effort variables, the initial model indicated that the residual χ^2 was 10.26 which was not significant. The addition of one of more of the variables to the model will not significantly affect its predictive power.

Table 4.51: Race Dyads and Effort Factor Variables Not in the Equation table
Variables Not in the Equation

		Score	df	Sig
Step 0 Variables	BKB	3.734	1	.053
	BKW	.114	1	.736
	WKB	2.106	1	.147
	FAC1_1	1.628	1	.202
	FAC2_1	1.627	1	.202
	FAC3_1	.010	1	.919
	Overall Statistics	10.256	1	.114

The Omnibus Tests of Model Coefficients table indicated that the overall model is not any better at predicting case status than when only the constant is included in the model. The overall model is not significant (χ^2= 9.841, df=6, N= 591, p <.05). The p value was reported as .132 which when compared to the critical value of .05 indicates the model is not statistically significant.

Table 4.52: Race Dyads and Effort Factors Omnibus Test of Model Coefficients table
Omnibus Tests of Model Coefficients

	Chi-Square	df	Sig.
Step 1	9.841	6	.132
Model	9.841	6	.132

Looking at the model with the addition of the separate effort variables the Omnibus Tests of Model Coefficients table indicates that when we consider all the predictor variables together, the model is significant (χ^2= 130.93, df=8, N= 563, p< .05).

Table 4.53: Race Dyads and all Effort Factors Omnibus Tests of Model Coefficients table

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	130.926	8	.000
	Block	130.926	8	.000
	Model	130.926	8	.000

In the final Variables in the Equation table, only two variables, whether a warrant was requested for the suspect (p= .000) and how many detectives are working the case (.024) were significant. The odds of a closed homicide case are increased by a factor of 40 if a warrant was requested for a suspect and increased by a factor of 3 if more than one detective was involved in the case.

Table 4.54 Race Dyads and all Effort Factor Variables in the Equation table
Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1	Variables						
	BKB	-.096	.394	.060	1	.807	.908
	BKW	.133	.642	.043	1	.836	1.142
	WKB	.099	.739	.018	1	.893	1.104
	FAC1_1	-.195	.197	.972	1	.324	.823
	FAC2_1	.032	.178	.032	1	.858	1.032
	FAC3_1	-.023	.187	.015	1	.902	.977
	WarrantReqforSuspectdis04	3.697	.438	71.081	1	.000	40.306
	Det01RECODED	1.115	.495	5.071	1	.024	3.048
	Constant	-.438	.536	.667	l	.414	.645

The difference in findings regarding the addition of the two individual effort variables is discussed with the full model results as well as in the summary and discussion chapter.

Step 7: Full Model

The variables of interest that are included in the full model are taken from several analyses that were previously conducted within this paper. First, there are the three Factors from the Principal Components Analysis effort variables. These factors are "evidence-related effort", "victim-attentive effort", and "case supportive effort". These variables are also combined with two other variables hypothesized to represent effort. These two variables are the number of detectives assigned to the case and also whether a warrant was requested for the suspect. Also included in the full model are the control variables of City/Police Department 4, the number of offenders involved in the incident, the number of wounds suffered by the decedent and whether or not the homicide was gang or drug related. Finally, the race dyad combinations of offender and victim are included.

One problem which is always a concern in data analysis is missing cases. In each of the previous analysis, missing cases were bordering on an acceptable level however valid cases were examined in each step. In the final full model run, a sensitivity analysis was used in an attempt to handle the missing data. The size of the datasets used for the different logistic regression analyses changed through each step due to the combination of different variables that were used. As a result the valid cases were used with the exception of the final logistic regression where a sensitivity analysis was conducted. Figures C1-C4 (See Appendix C) lists the pertinent number

of missing cases for different analyses that were conducted. When examined separately, the variables included in the full model listed the following cases as missing:

PD4- 0%
Warrant requested for the suspect- 1.6%
Number of offenders involved- 7.1%
Gang or drug-involved killing- 0.4%
Number of wounds- 8.1%
Detectives involved in the case- 3.3%
Factors from the latent concept- 9.5%

In the logistic regression which was initially performed with the full model, the combination of the original dichotomous covariates resulted in 36.7% of the cases missing. In an effort to address the missing cases and since my variables were nominal, I first considered treating the missing data as just another category however, I first opted for the strategy of a plugged in or substituted value. This is sometimes referred to as single imputation. The substitute value that I used in an attempt to deal with the missing cases was the mean of the specific variable that had the missing cases. This method required me to substitute the missing value with the mean that resulted from analyzing the values that were present. The idea of substituting a missing value with the mean of the value that was present in order to allow the independent variable to be treated as uncorrelated with any missing dichotomy was a method that was suggested by Cohen and Cohen (1983) in treating nominal variables with missing values. Others have discussed the benefits of listwise deletion (Allison, 2002).

Mean Imputation is simply substituting the mean value for all missing values. This method also assumes the data is missing completely at random (MCAR). This

can be an extremely problematic method since the variance will be underestimated and typically any correlations or regression coefficients will also be underestimated.

Dummy variable adjustment or the missing indicator method is another technique that is sometimes used for missing data. While one advantage of dummy variable adjustment is that it uses all of the available information on the variable(s), this method also generally produces biased estimates of the coefficients (Jones, 1996)

A closely related technique is also suggested in the literature that is used in dealing with categorical indicators, is the researcher can create a set of dummy variables, one variable for each category excluding the reference category. An additional dummy variable for the cases with missing data is also created. While this may have what some refer to as an intuitive appeal, the method is biased even when the data are MCAR (Jones 1996; Vach and Blettner, 1991).

After initial attempts at mean substitution and dummy coding the variables, the results were found to be fragile and coupled with the biases which can be inherent with these techniques; a two step-solution was conducted to deal with the missing data. First, a logistic regression was performed with the variables recoded to include missing data along with the original 0 coded data. This run will be referred to as the "Complete Case Analysis." E.g., in the variable "Whether or not a warrant was requested" the coding becomes:

Table 4.55: Recoded Warrant Requested for a Suspect variable

	Frequency	Percent	Valid Percent
No Warrant + Missing cases	325	40.7	40.7
Yes Warrant requested	473	59.3	59.3
Total	798	100.0	100.0

The other variables were also recoded in the same manner. These results were examined and appeared to be fairly normal with no obvious problems.

My second step was to run the original logistic regression where missing cases (36.7%) were included and I ended up with 505 cases included in the analysis which was a reduction from the 591 valid cases that I had in the previous recoded run. The results from the previous logistic regression were taken and I started to stepwise delete those variables with the smallest Wald value. I continued this method until I dropped the missing below 15%. After dropping 8 of the variables, I reached 17.4% missing and continued until 10 were dropped where I went under 15% missing and the results actually went down to 8.8% missing. The table below lists comparison statistics in a comparison with the logistic where missing were combined with zero coded data, with the logistic including the missing, and the first and last results where the lowest Wald variables were dropped.

Table 4.56: Variable stepwise deletion table

	Complete Case Analysis (0=No+Missing) (1=Yes)	Original Variables Analysis (Missing)	Original Variables Analysis (dropped 1st variable)	Original Variables Analysis (dropped last variable)
WKB dyad				
Wald	1.166	.000	----------	----------
Sig	.280	.983	----------	----------
B	.777	.017		
BKB dyad				
Wald	1.142	.294	.322	----------
Sig	.285	.587	.570	----------
B	.446	.267	.264	
BKW dyad				
Wald	2.219	1.409	1.445	----------
Sig	.136	.235	.229	----------
B	1.011	1.078	1.075	

Deletion Table continued

Table 4.56 Continued

	Complete Case Analysis (0=No+Missing) (1=Yes)	Original Variables Analysis (Missing)	Original Variables Analysis (dropped 1st variable)	Original Variables Analysis (dropped last variable)
FAC 1				
Wald	1.093	.078	.077	----------
Sig	.296	.780	.781	----------
B	.205	-.072	-.072	
FAC 2				
Wald	.785	.571	.573	----------
Sig	.376	.450	.449	----------
B	-.164	.170	.170	
FAC 3				
Wald	.088	3.170	3.174	
Sig	.766	.075	.075	----------
B	.053	.454	.454	----------
WarrantRequestedSusp				
Wald	76.146	43.168	43.480	144.455
Sig	.000	.000	.000	.000
B	3.670	4.205	4.203	3.770
OffendersInvolved				
Wald	.057	1.743	1.747	14.194
Sig	.811	.187	.186	.000
B	-.077	-.526	-.527	-.901
GangorDrugKilling				
Wald	12.343	8.421	8.438	----------
Sig	.000	.004	.004	----------
B	-1.248	-1.261	-1.262	
DetectivesInvolved				
Wald	3.556	5.747	5.878	----------
Sig	.059	.017	.015	----------
B	.888	1.614	1.612	
WoundsonDecedent				
Wald	.053	.797	.800	----------
Sig	.818	.372	.371	----------
B	-.073	-.347	-.347	

Deletion Table continued

Table 4.56 Continued

PD4				
Wald	13.608	2.691	2.701	----------
Sig	.000	.101	.100	----------
B	-1.652	-1.216	-1.215	
Constant				
Wald	.296	.023	.029	2.092
Sig	.586	.879	.865	.148
B	.295		.118	.225

With just a few exceptions, the results from both of these logistic runs were fairly stable. The Wald statistics, the significant coefficients, and the regression coefficients were all fairly stable and consistent even when variables were eliminated. These results allowed me to conclude that including the missing cases with the valid cases had little effect. My interest was in the yes responses for the variables therefore the missing cases were included with the 0 or no responses for each variable. As a result of these two logistic analyses, my final and complete full model logistic analysis will allow me to exclude the missing cases when appropriate.

The final full model examined 591 valid cases. The only missing data (8.8%) comes from data that were missing from the Principal Component's Analysis of the latent concept of effort. The variables that are included in the final logistic regression model are the race dyads of Whites killing Blacks (WKB), Blacks killing Whites (BKW), Blacks killing Blacks (BKB), the three Factors from the Principal Components Analysis representing the latent construct of effort, the control variables of the City/Police Department 4, whether or not the killing was drug or gang related, the number of wounds on the decedents, the number of offenders involved in the incident, and the two remaining variables of how many detectives were involved in

the case and whether or not a warrant was requested for the suspect both of which are also posited to represent effort.

In the initial classification table, we can see the prediction of a closed case without any of the predictors in the model; i.e., with only the constant included in the model. The Classification Table shows that if all cases are predicted to be closed, then we would be correct 87.8% of the time.

Table 4.57: Full Model Classification table

Classification Table[a,b]

			Predicted		
			Status of Case		Percentage
	Observed		Open	Closed	Correct
Step 0	Status of Case	Open	0	72	.0
		Closed	0	519	100.0
	Overall Percentage				87.8

a. Constant is included in the model.

b. The cut value is .500

The Variables Not in the Equation table tells me that two of the twelve variables are individually, significant predictors of whether a case is closed or not. These two variables are whether a warrant was requested for the suspect and whether the homicide was gang or drug related.

Table 4.58 Full Model Variables Not in the Equation table

Variables not in the Equation

		Score	df	Sig.
Step 1	Variables			
	BKB	2.106	1	.147
	BKW	.114	1	.736
	WKB	3.734	1	.053
	FAC1_1	1.628	1	.202
	FAC2_1	1.627	1	.202

Table Continued

Table 4.58 Continued

	FAC3_1	.010	1	.919
	WarrantRECODE1	134.265	1	.000
	OffendersInvolvedRECODE1	1.265	1	.261
	GangDrugKillingRECODE1	16.999	1	.000
	Det01RECODED1	.002	1	.965
`	WoundsRECODE1	.000	1	.933
	PD4	.070	1	.792
	Overall Statistics	157.849	12	.000

The Omnibus Test of Model Coefficients table indicates that when we take all of the predictors together, the full model is significant (χ^2 =153.083, df=12, N=591, p<.05)

Table 4.59: Full Model Omnibus Tests of Model Coefficients table

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	153.083	12	.000
	Block	153.083	12	.000
	Model	153.083	12	.000

The pseudo R^2 in the Model Summary table tells me that approximately 44% of the variance in case status can be predicted by the linear combination of the 12 independent variables. The Cox and Snell R^2 is usually an underestimate so I am reporting the Nagelkerke R^2.

Table 4.60: Full Model Summary table

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	284.907[a]	.228	.436

a. Estimation terminated at iteration number 7 because parameter estimates changed by less than .001.

The final Classification Table indicates how well the combination of variables predicts case status. Specifically, in my case, I have tried to predict, from twelve variables, whether or not a homicide case would be closed.

Table 4.61: Full Model Classification table
Classification Table

Observed		Predicted: Status of Case: Open	Predicted: Status of Case: Closed	Percentage Correct
Step 1 Status of Case	Open	23	49	31.9
	Closed	19	500	96.3
Overall Percentage				88.5

The Classification Table reveals that overall, 89% of the cases were predicted correctly. The independent/covariate variables were better at helping us predict whether a homicide case would be closed (96% correct) versus open (32% correct). This is only a 0.7% improvement over the Classification Table results that were reported where only the constant is included in the model.

In the Variables in the Equation Table we find crucial information for the analysis. This table contains information on the coefficients and the odds ratios for these variables. The model that is now tested and reported on contains the predictors. This table reports the estimates for the coefficients for the predictors in the model. The coefficient in the logistic regression will tell me the change in the logit of the outcome variable of case status that is associated with a one unit change in the predictor variable. Of the twelve variables in the model, only three have resulted in significant findings. The overall equation for the model is represented by the following equation:

log (p/1-p)= .295+ .777(WKB)+1.011(BKW)+.446(BKB)-1.652(PD4)+.205(FAC1)-.164(FAC2)+.053(FAC3)+3.67(WarrantRequested)-.077(OffendersInvolved) -1.248(Gang/DrugKilling)+ .888(DetectivesInvolved)-.073(NumberofWounds) where p is the probability of a closed homicide case.

The estimates from the logistic regression tell me about the relationship between the twelve covariates and the dependent variable where the dependent variable, case status, is on a logit scale. The equation reports the increase and decrease in the predicted log odds of a closed case that would be predicted by a one unit increase or decrease in the predictor if all the others predictor variables are held constant. Looking more specifically at the results in the Variables in the Equation Table, only three variables were significant so that must be taken into account when examining the overall equation. Nine of the variables have coefficients that are not significantly different from zero.

The first variable that is significantly related to case status is the PD4 variable. This covariate was significant at .000. The H_0 that the coefficient equals 0 would be rejected. The second significant variable is whether or not a warrant was requested for the suspect. This variable was found to be statistically significant at .000 and it follows that the H_0 is also rejected. Finally, the variable of whether the killing was gang or drug related was also reported to be statistically significant at .000 and the H_0 is again rejected.

Looking further at the results for the significant variables in the following table, we see the odds of a closed homicide case are reduced by 81% if the department if PD4. We can also report that the odds of a closed homicide case are increased by a factor of 39.2 if a warrant has been requested for the suspect. Finally,

we can report that the odds of a closed homicide case are reduced by 71% if the killing was gang or drug involved.

Table 4.62: Full Model Variables in the Equation table
Variables in the Equation

	B	S.E.	Wald	df	Sig.	Exp(B)
WKB	.777	.720	1.166	1	.280	2.175
BKW	1.011	.679	2.219	1	.136	2.748
BKB	.446	.417	1.142	1	.285	1.562
FAC1_1	.205	.196	1.093	1	.296	1.228
FAC2_1	-.164	.185	.785	1	.376	.849
FAC3_1	.053	.178	.088	1	.766	1.054
WarrantReqRE-CODE1	3.670	.421	76.146	1	.000	39.249
OffendersInvol-vedRECODE1	-.077	.324	.057	1	.811	.926
GangDrugKilling RECODE1	-1.248	.355	12.343	1	.000	.287
Det01RECODE1	.888	.471	3.556	1	.059	2.430
WoundsRECODE 1	-.073	.317	.053	1	.818	.930
PD4	-1.652	.448	13.608	1	.000	.192
Constant	.295	.543	.296	1	.586	1.344

Table 4.63: Full Model Statistically significant variables table
Statistically Significant Variables from the Full Model Logistic Regression

Variable	B	SE	Wald	Sig	Odds Ratio
PD4	-1.652	.448	13.608	.000	.192
Warrant Requested	3.670	.421	76.146	.000	39.249
Gang or Drug related	-1.248	.355	12.343	.000	.287

The theoretical implications of these findings will be discussed in the following chapter.

There is one significant finding which appears interesting and contrary to the cross tabulation results. During the early stages of the analysis the variable PD4/City was found to have significant effects on case closure. The initial Wellford and Cronin (1999) study had reported that this specific city as a whole, was found to have

high homicide clearance rates as well as high total crime clearance rates. The full model has reported findings that would be in the opposite direction of what would be expected from our knowledge of the crosstab results as well as the initial variation reported in Wellford and Cronin (1999). As previously noted, the sample that was under examination was stratified based on case status so we must ask whether the same results would be reported with all cases.

As reported in the final full logistic regression with the three dyads, the latent construct of effort and the control variables, the variable PD4 was found to be significant however, the direction was a reduction in open cases. When the city variable where the homicides took place was initially examined for any effect on case status, PD 4 was the control variable that had significant effects and this is the city variable included in the full model.

Summary of the Findings

My primary focus was on both the race dyads and the introduction of the latent concept of effort. These variables did not have any significant effect in the full model. The question becomes what role, if any would the significant variables play in mitigating the effects that were found in the earlier stage analyses? Expecting the PD 4 variable to be significantly related to case closure in a manner that would find an increase in case clearance but finding the opposite raises the possibility of this variable removing any race effects and interacting with the other significant variables of gang or drug-related killing and whether or not a warrant for the suspect was requested to such a degree that it reverses the cities positive effect found earlier. To test that hypothesis, I ran an additional logistic regression where I removed each of

these significant variables from the full model. In the first logistic, I removed the variable of whether a warrant was requested for the suspect. The logistic results revealed that PD 4 was now not significant when placed into the full model without the warrant requested variable. I did find that if the killing was gang or drug-related the findings were still significant. Removing the warrant requested variable added two new significant variables to the results. Those variables were the dyad of Blacks killing Blacks and the effort variable of evidence-related effort.

A second logistic regression was performed subsequent to the full model run where I removed the variable of whether the killing was gang or drug-related. Removing this variable did not affect the results for PD 4. It was still found to be significant in a negative direction. The only other significant variable was again whether a warrant was requested for the suspect.

A third logistic regression was performed subsequent to the final full model logistic regression and this time the variable PD 4 was removed. Removing this control variable left the model with only two significant variables. They were whether a warrant was requested for the suspect and whether or not the killing was gang or drug-related.

This dissertation focused on the extralegal variable of race as well as police practices in the homicide investigation. With an abundance of disparity literature, the question became could any disparity have leaked its way into the most heinous crime of all, homicide. The idea that there is some connection between the race of an offender and the race of a homicide victim by itself could have many explanations. This research however, focuses more specifically on the connection, if any, of the

potential disparity and case status. In an effort to answer the disparity questions, I examined many different stages of analyses. I attempted to address a lack of research in these areas by focusing on the effort that is put forth in clearing the homicide case and testing to see if the race variable has any effect on that effort as well as on case clearance. My research focuses on three areas. The first was race, the second was effort, and the third area concentrated on those variables which I hypothesized could influence the relationship between race and effort.

Race of the Victim

A major area of focus in my research was the race variable. This examination included the race of the victim, the offender and the racial combinations involved in a homicide case. As in the original research by Wellford and Cronin (1999), I found no effect for the race of the victim on case clearance. Contrary to the general findings from the literature where clearances were higher for white victims and arguably for minorities getting less attention or resources (Lee, 2005; Regoeczi et al., 2000, 2008), this was not supported in my research. Homicide research has also shown differing results where clearances were also higher for blacks (Wilbanks, 1984) and lower for Hispanics (Wilbanks 1984; Cardarelli and Cavanagh, 1992). Other studies have found, like my research, no effect for the race of the victim (Addington 2006; Puckett and Lundman 2003; Riedel and Rinehart 1996; Roberts 2007; Wellford and Cronin 1999). In an attempt to further explore the victim's race, I examined the race of the victim in the context of any effects on case status where I controlled for the location of the offense (PD 4) and the three variables that comprised severity. When the race of the victim was placed into a logistic regression model along with the four

significant control variables, there were no significant effects for the race of the victim on case status. The only significant variables in the model were the control variables of the number of offenders and the location of the homicide (PD 4). The race of the victim did not appear to have any effects on case closure either individually or when combined with the controls.

Race of the Offender

The race of the offender was also examined separately. A cross tabulation showed that the patterns of the offender's race did have an effect on case status. When looking at the logistic results the race of the offender was statistically significant at .015 and the odds of a closed case were reduced by 45.6% if the offender is white. These significant findings regarding the offender are in line with the Wellford and Cronin (1999) results however my race variable differs slightly from theirs. It should be mentioned that in the coding of my race variables, I excluded races outside of black and white. While the original research reported that the race of the offender had a significant effect on closing the case, the specific race groups varied. Wellford and Cronin (1999) found that at the $p<.05$ level, the case was less likely to be solved if the offender was black compared to the offender being Hispanic. At the $p<.10$ level, the case was less likely to be solved if the offender was White rather than Hispanic. Thus, results from an examination of their 51 significant variables showed a case was more likely to be solved if the offender was Hispanic rather than Black. My findings have revealed that at the $p< .05$ level the case is less likely to be solved if the offender is white versus black. If one would argue that white offender cases would get less attention because these offenders are not seen as

threatening then the hypothesis of disparate treatment based on the race of the offender may have some merit. Drawing such conclusions at this stage would be premature.

Now that the race of the offender was found to be statistically significant in the bivariate relationship, the control variables were introduced into the offender model. The first attempt in my model to address whether or not the effect of the offender's race could be present due to any other variables was tested at this stage with the control variables of number of wounds suffered by the decedent, number of offenders involved in the case, and whether the case was gang or drug involved and the location where the killings occurred. Results from the logistic regression with the control variables revealed that race of the offender still was statistically significant and had an effect on case closure even when the controls were introduced. When tested individually, as well as with the control variables, the race of the offender did have statistically significant effects on case status. The location of the killing and whether or not the homicide was gang or drug involved also influenced case status. The control variables did not explain away any effects for the offender's race.

The race variable which was the main focus of this study has revealed no significant findings for the victim's race both with and without controls and statistically significant effects for the race of the offender both with and without the controls. With this knowledge, I moved on to examine the combination of victim and offender race to see if these dyads could possibly have some effect on case closure.

Race Dyads

The three race dyads were examined through cross tabulations and any significant variables were placed into a logistic model. In examining the racial dyads,

the results indicated that only the dyad of blacks killing blacks had a significant effect on whether a case was closed. This effect was a 92.5% greater chance of closure. This finding could be taken as supportive of the hypothesis which states a more exhaustive effort will be forthcoming if the majority feels threatened by the minority. The question though would have to arise why would there not be a significant effect for black offenders killing whites since that would be more threatening to the majority. The cause for this effect may lie within another variable outside of any conscious effort regarding the race variable.

The results could also be argued to support that the premise that some victims' crimes "get more law" than others however not in the context proposed by Black's theory where those in power or control would reap the benefit. In opposition to Black's theory, which predicted that the cases that involved non-white victims as well as older victims were less likely to be solved my results have found an increase in closure for cases with black victims. The caveat is the offender is also black. Based on the surface, there appears at this stage to be evidence of racial bias affecting clearance rates as others (Puckett and Lundman, 2003; and Riedel, 2002) have also reported. While the sentencing literature is one area in the criminal justice system where the race dyad has also been examined, these results are contrary to the findings regarding race that I have found. In criminal sentencing, the consistency appears to be that cases involving white victims receive more severe sentences when the defendant is black than when the defendant is white (Baldus et al., 1983; Bowers and Pierce, 1980; Garfinkel, 1949; Johnson, 1941; Paternoster, 1984; Spohn and Spears, 1996). My findings have shown black offenders again appear on the end of the stick

where their cases are closed, i.e., they get arrested at a greater rate than those with white offenders however, the difference is not found with white victims but with black victims.

In an attempt to clarify the dyad effects or the lack of dyad effects, the control variables were entered into the model. My concern was that the control variables may be the reason for the dyad effects. The results from the logistic regression with the race dyads and the controls revealed that the black killing black dyad was again the only significant race dyad. There were also significant effects for homicides which were gang or drug involved as well as for those killings taking place within one specific city (PD 4). It appeared as if the control variables did not negate the black killing black effect. The same significant effect for race of the offender as well as gang/drug involved and PD4 was found in both the individual offender logistic as well as the race dyad logistic. In the offender only race logistic, the odds of a closed case were reduced by 49.5% if the offender is white. As a check, the race variables were reversed making race categorical last and the odds of a closed case were increased 83.8% if the offender was black. This would support the black offender being significant. In the race dyad on case status analysis, the odds of a closed case were increased by 93% if both the offender and victim are black. When comparing the race of offender and victim to this point, only the offender's race appeared significant and then only when the offender was black. The victim's race was not significant by itself but only when in combination with a black offender.

Up until this point, the race of the offender has been the only race variable that has shown significant effects on case status. The victim's race has not been

significant unless it has been coupled with the offender's race. My findings have also partially supported the findings of Roberts and Lyons (2009) which indicated that for homicides, results indicated that incidents with non-white offenders were more likely to be cleared by arrest than those with white offenders, regardless of victim's race. My findings have supported the offender portion of their results however my findings were significant when the victim's race was also black.

Control Variables

Prior to beginning the analyses of the race variable, it was important to see what other variables could have an effect on case status. There were three variables which I controlled for in the overall model. Those variables were the city where the killing took place, case severity and the age of the victim. The results revealed that there was one city, PD 4, which was significantly related to case status. This city was the one city of the four in the initial study (Wellford and Cronin, 1999), which had both high clearance rates for overall crimes as well as high clearance rates for homicides.

Case severity was the second control variable. Case severity was composed of eight individual variables, all of which were hypothesized to represent a degree of severity. There could be no argument that a homicide is severe to begin with, however, there are specifics factors about a homicide case which increases the severity of the case or how heinous the case is as far as its commission. Severity was hypothesized to include the number of wounds, the weapon used in the killing, whether the victim was sexually assaulted, the number of victims, the number of offenders, whether the victim was mutilated or tortured, whether the killing was gang

or drug related, and finally whether the victim was retarded or mentally deficient. While these factors may seem representative of severity on their own merit, I found that only the number of wounds, the number of offenders, and whether the killing was gang or drug-related were found to have statistically significant effects on case status.

In following the literature, the age of the victim was also hypothesized to have some effect on case status. Younger and older victims may very well be viewed as more vulnerable. For the purposes of this study, age had been grouped into high and low risk groups based on victimization data. The variable of age was not statistically significant.

As a result of the various analyses performed on the potential control variables, only the one city (PD 4), the three severity variables (number of wounds, number of offenders, and whether the killing was gang or drug-related) were found to be significant These four variables were used as control variables throughout the study.

Effort

One of the more arduous tasks in my research was examining the latent concept of effort. In my attempt to examine effort and the actions of the police in working the homicide case, my Principal Components Analysis left many variables "outside" the three components that resulted from this procedure. It should be clear that the fact these variables did not find their way into the resulting components does not devalue them in any way or mean less emphasis should be placed on them both in practice or in future research. The intent of this study was to see if an overall concept such as effort does in fact exist.

The question that was addressed was whether the effort that comes during the investigation has any effect on case clearance. The first step was to see if such a latent concept existed. Taking all of the variables that I had posited were potential effort variables, I performed the dimension reduction through a factor analysis using the principal components method. The Principal Components Analysis revealed three components. The analysis of all the variables revealed that component one which was labeled "Evidence-related" effort was comprised of four variables. These variables were whether the crime scene was measured, whether the investigator described the crime scene in their notes, whether the detective attended the post-mortem examination, and whether specimens (blood, hair, fibers, fingernail scrapings, or seminal fluid) were collected. These variables all deal with specific evidentiary matters.

Component two was labeled "Victim-attentive" effort. This component was made up of only two variables. They were whether the crime scene was secured by the first officer and whether a computer check was performed on the victim. This component dealt with the victim as far as securing the scene where the victim was killed and attending to a computer check for information on the victim.

The third and final factor was comprised of five variables. This component was labeled "Case-supportive" effort. The first variable for this component was "were other law enforcement agencies involved in the investigation?" The second variable was "was a search warrant necessary for any other locations where the perpetrators or evidence may have been?" The third and fourth variables were related to whether a computer check was conducted on witnesses as well as on the suspect.

The final variable under this component was whether confidential informants were used. These variables were labeled "supportive" since each variable was ancillary to the case investigation in a supportive fashion.

These three factors were used in the subsequent analyses representing "effort." Two other variables were included separately as previously discussed in the analysis section. These two other variables are also posited to represent effort. They were the number of detectives assigned to the case and whether a warrant was requested for the suspect.

As a matter of reference, I checked to see which of the significant variables from the Wellford and Cronin (1999) study did not get included in my latent constructs. There were 13 variables entered into my Principal Components Analysis. Of those 13, there were several variables that had been found significant in the original Wellford and Cronin (1999) study. These were whether the investigator described the scene in their notes, whether the detective attended the post mortem, whether computer checks were conducted on the witness or suspect. The number of detectives involved in the case and whether or not the killing was gang or drug related were used as effort variables apart from the latent concept.

In the Principal Components Analysis there were three components that remained in the factors from the Principal Components Analysis that had been significant in the Wellford and Cronin (1999) study. None of the variables that were dropped from the Principal Components Analysis had been significant in the original Wellford and Cronin (1999) study.

The next step with the latent construct was to run a logistic regression with the factors to see if they had any significant effects on case status. After running the logistic regression, two of the three latent factors appeared to have a statistically significant effect on case status as well as the two individual variables. Significant factors were "evidence-related" effort, "case-supportive" effort, whether a warrant was requested for a suspect, and how many detectives were involved in the case. The "Victim-attentive" effort factor did not have statistically significant effects on case status. The variables that went into this factor were the whether the crime scene was secured by the first officer and whether a computer check was conducted on the victim. It is notable that whether the crime scene was secured by the first officer was a factor within police control that lead to closure according to Wellford and Cronin (1999). In the Wellford and Cronin study, if a computer check was conducted on the victim the case was less likely to be solved. When they are combined into this specific factor there was not an effect on case closure. The effort variables were used in subsequent tests for significance testing my hypotheses.

Case Characteristics

The literature gives us very little consensus regarding characteristics of a homicide event that may prove fruitful in determining their relationship to case status. Riedel (2008) discussed the difference in the numbers of variables as well as variation in the type of variables that are used throughout the homicide literature. Certain case characteristics have different variability than others. The race variable is an example of a case characteristic that has less variability than we could find with specific homicide event characteristics. While this is true, we must still remember that how

race gets defined is a matter of subjectivity especially with suspected offenders. It is notable that case characteristics will vary more from department to department not just through the individual operational definitions that they employ but through the researchers coding of the information. Case characteristics are beyond the control of the police yet they play just as important a role in helping us understand case closure. Case characteristics are also at the heart of helping researchers and police practitioners understand the dynamics of the crime and which characteristics can have an effect on case closure. The Wellford and Cronin (1999) study reported certain factors outside the control of the police that were related to closure. Factors such as an African American or Hispanic offender, whether the killing took place within a private location, whether an eyewitness observed the homicide, whether a weapon was found at the crime scene, whether the homicide was drug-related, whether the victim was a member of a gang or drug organization, whether the conflict was over money or property and not drugs, whether the homicide was committed in an attempt to get money to buy drugs, and whether the suspect killed the victim to avoid retaliation were all related to case closure. While it is true these factors are not something our police can control, the important point is the knowledge that these factors are arguably of equal importance in gaining insight to improving case clearances.

The case characteristics that were examined in my research were looked at from a different perspective than they were in the Wellford and Cronin (1999) study. In the original study case characteristics were examined for their individual effects on case clearance. Excluding race, my research has placed them into the model as

control variables. The intentions of my study were to examine race and the effort put into working the homicide case with the outcome variable being case closure. The case characteristic of race was narrowed down to examine black and white offenders and victims. Obviously, this approach will leave out factors outside police control. My hypothesis did include the idea that there were specific case characteristics that would influence the effort that was put forth in the investigation. These variables were the control variables. The case characteristics which were intended for use in my study as controls were case severity, city, and the age of the victim. After examining the significance of these variables with case status, and checking the significant ones at each statistical stage of analysis that I conducted, I ended up with five case characteristics as variables in my full model. Obviously the race dyads that I used are classified as case characteristics and their importance has been previously discussed. The remaining four case characteristics were all control variables within my study. Three of them measured the severity of the offense. The first was whether the homicide was a gang or drug-related killing. The idea is a killing which is gang or drug-related will be more severe since the homicide accompanies other illegal activity. Both the world of gang activity as well as the world of illegal drugs has the element of violence in their make-up at times. The second control which is also a measure of severity is the number of offenders involved in the incident. A killing with more than one offender will be taken or perceived as more severe. The final severity variable used as a control was the number of wounds inflicted on the decedent. The perception is that the more wounds suffered, the more serious the crime. The final case characteristic which was also a control variable was the location for the incident.

I used the one city or department where the bivariate and other stages of my analyses had revealed an effect on case status.

The first control variable of whether a case was gang or drug-related was found to have significant effects in the study. Gang members contribute disproportionately to the crime of homicide (Decker and Curry, 2002). They also are responsible for a large amount of violence. The drug culture and more specifically drug dealing also bring with it the perception of guns and violence. The best example of a case characteristic which has had both support and non-support in the literature is whether or not the killing is gang or drug-related. Three studies which looked at drug-involvement and its relationship in case closure were discussed in Riedel's summary of the homicide literature in 2008. There has been support for the effect drug-related cases in the literature. Research has shown drug-related killings are more difficult to clear (Litwin 2004; Wellford and Cronin 1999). In a bivariate study (Wilbanks 1984) homicides which involved drug rip-offs were more difficult to clear. One study has reported that drug-related killings are cleared more easily (Roberts 2007). While gang and drug-related violence was the third severity variable that survived for use in the subsequent analyses, its significance should be no surprise. Gang members have been reported to contribute disproportionately to homicides (Decker and Curry, 2002). The increase of homicides in the 1990s also came at the same time the United States was experiencing the increase in gangs, gang members, and gang-related violence (Klein, 1995; Miller, 2001). Gang homicides play an important part in our increasing violence and this may very well be due to them bringing about additional violence. A second area that is discussed in conjunction

with gang violence is the parallel contribution of drugs and guns with gang violence (Blumstein, 1995; Blumstein and Wallman, 2000). In their study of New York City's homicides in 1988, Goldstein et al. (1989) concluded that 74 percent of drug-related homicides were related to the black market drug trade and not drug use (Goldstein et al., 1989). Gangs have been posited to have a nexus with drugs and vice versa. For instance, the leading crack-related homicide cause was shown to be territorial disputes between rival dealers, and not crack-induced violence or violence (predatory thieving) to obtain money for crack purchases. Research has pointed to the idea that much of the violence associated with cocaine and narcotic drugs results from the business of supplying, dealing and acquiring these substances (Miczek et al., 1994). Drug dealing is just one activity that gangs immerse themselves into.

The descriptive data for the involvement of gangs and drug dealing for my homicide data analysis revealed 597 (74.8%) of the cases were classified as not being gang or drug related. The data also revealed 198 cases (24.8%) as being gang or drug-related. Basically, one-fourth of the cases were gang or drug-related. Only 3 cases (.4%) were missing data. The initial bivariate analysis conducted with the gang/drug-related variable showed weak but significant effects. The variable was not significant when it was combined with the race of the victim variable. When the variable was entered into a logistic regression with the race of the offender the results were statistically significant with the clearance of a case reduced 56.1% when the case was gang/drug-related. The gang/drug variable was also statistically significant when it was entered into the logistic regression with the race dyads. Those logistic results revealed that the clearance of a homicide was reduced by 57% when it was

considered with all the race combinations of offenders and victims. Gang and drug-related effects in the full model will be discussed in the full model summary.

The variable of a gang or drug-related killing also shows us how important variability can be in defining the variables for any analytical procedure. Some of the research which discusses drug-related homicides considered a homicide as drug-related if the offender had been under the influence when the crime was committed. Not only is this difficult to determine unless the perpetrator is captured almost instantaneously but just what does "drug-involved" mean? It could range from a killing that was perpetrated during a drug deal gone sour or a drug-turf battle to a person under the influence of marijuana or even alcohol who kills their spouse. It is a subjective interpretation.

The effect of drug-involvement could be supportive of easier closure since the offender maybe more prone to mistakes, kill in front of witnesses, and leave evidence behind (Roberts 2007). If the drug-involvement is of the kind involving drug-trafficking or the illegal drug trade, then closure could be more difficult. Witnesses could be more reluctant to cooperate and having a possible nexus with gangs makes solvability even more difficult.

A second case characteristic variable which was found to have statistically significant effects on case closure was the city where the killing took place. Controlling where the offense takes place is very important since different locations for an offense also means that different law enforcement agencies are responsible for investigating the case. Wellford and Cronin (1999) discussed the different clearance rates for the four cities chosen for their studies. City A had low homicide clearance

rates and low total clearance rates, City B had high homicide clearance rates and low total clearance rates, City C had low homicide clearance rates and high total clearance rates, and City D had high homicide clearance rates and high total clearance rates. City D (variable PD4) was the location that had statistically significant effects in my examination of the cities and their effect on case status. This variable was statistically significant in the logistic regression with the race of the victim, the race of the offender as well as in the logistic regression with the race dyads. The effects of the variable PD4 in the full model are discussed in full model section.

The Full Model

The final logistic model was comprised of all of the race dyads, the three factors representing effort, the two individual effort variables, and the four control variables along with the outcome variable of case status. The logistic regression results reported three significant variables. The control variable of where the killing took place was found to be statistically significant. The next statistically significant variable was the variable of whether or not the killing was gang or drug-related. The last significant variable was the effort variable of whether or not a warrant was requested for a suspect. None of the three factors representing the latent concept of effort were found to be statistically significant and none of the race dyads were reported to be statistically significant.

The one statistically significant variable of PD 4 raised some questions regarding the direction of its effect. As a result, three other logistic regressions were performed with each one removing one of the three significant variables to see if the results changed the direction of the effect for PD 4 or influenced the model's overall

significance. The Variables Not in the Equation table reported that the residual chi-square statistic was 157.85 which is significant at p< .05. This overall statistic told me that the coefficients for the variables not in the model are significantly different from zero.

Table 4.64: Full Model with only the Constant included table
Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 0	Constant	1.975	.126	246.690	1	.000	7.208

The results indicated that the addition of one or more of the variables will significantly affect the model's predictive power. Looking at PD 4, I discovered that p=.792. This variable was not significantly related to case status. The Variables Not in the Equation table shows that two of the twelve variables are separately significantly related to case closure and PD 4 was not one of those variables.

In the full model, the variable PD 4 was significant. When all the variables are considered together in the model, PD 4 was found to be statistically significant at p= .000. The odds ratio was reported at .192. The odds of a closed case were reduced by 80.8% if PD 4 was the location. The direction of this relationship was confirmed by B= -1.652. The odds of a closed homicide case are reduced by 81% if the department is PD4.

Table 4.65: PD 4 Variable logistic results table
Variables in the Equation

	B	S.E.	Wald	df	Sig.	Exp(B)
PD4	-1.652	.448	13.608	1	.000	.192
Constant	.295	.543	.296	1	.586	1.344

The question becomes why would the odds of cases being closed be reduced in a city where the clearance rates for homicides were high? Obviously when we consider

another factor(s) we find clearing cases more difficult in this city. That hypothesis would fall in line with the variable of whether the crime was gang or drug-related. The literature has supported the idea that gang-related killings and crimes are more difficult to clear as noted in the discussion on the case characteristic variables. There is also the possibility that another variable could be reducing case closure within the model and that could potentially be the third variable discussed below concerning whether or not a warrant was requested for a suspect.

This leads to the second variable that was found significant in the full model, whether the killing was gang or drug-related. Since the importance and relevance of this variable was discussed previously regarding case characteristics, it will not be repeated except to say that the literature shows support for this variable making case clearance more difficult (Litwin, 2004; Wellford and Cronin 1999; Wilbanks, 1984).

The third and final statistically significant variable was whether or not a warrant was requested for a suspect. This variable was significant throughout the research. While there had been concerns over this variable and data separation, that issue was previously addressed. If we enter the arena of police practice, it would follow that if we compare cases where a warrant is requested for a suspect versus those cases where a warrant is not requested, we would expect more cases to be closed where a warrant had been requested. Warrants are requested for suspects in cases where the investigator has probable cause to believe that the person in question is responsible for that particular crime. Probable cause is a set of circumstances that would lead a reasonable person to believe that the suspect was the person responsible for that particular crime. The key is the investigator does not make that determination

alone. An independent judicial officer makes the final determination based on evidence that is submitted by the investigator in the form of a warrant application or request for a warrant for the person the investigator has identified a the suspect in the killing. It would only be natural that the probability is higher for cases to be closed when a suspect has been identified. In homicide cases when a suspect has been identified, requesting a warrant is the method that is primarily used for arresting a suspect according to a high ranking official from one of the four cities involved in the original study when they were interviewed for my research.

The three variables that were statistically significant in the full model appear to be logically in-line with each other. The follow-up question becomes would the removal of one of these show any significant effect among the race variable? It would be easy to abandon the model at this point since the hypothesis has been tested. When the race of the offender and victim are considered together in conjunction with the three separate latent constructs of effort, there does not appear to be any significant effect on whether a case is closed. As a matter of follow-up, I feel it is important to briefly examine what the results would be in the full model when each of the three significant variables is removed one at a time. The reason for this examination is for possible future direction in research on homicide clearances.

Subsequent full model with variables removed

The first subsequent full model logistic regression removed the variable of no warrant requested for a suspect. As previously mentioned, this variable appears on the surface to logically relate to case closure. While including the warrant requested for a suspect variable was done with the intent of defining effort, it may very well be

that what we are measuring is not effort but the result or final culmination of effort. This may explain the highly significant effect yet the variable not loading with the other variables in a specific component measuring effort. As a result of removing the warrant requested for a suspect variable in this logistic analysis, three variables were now significant at $p<.05$. Whether the killing was gang or drug-related was still statistically significant with its effects on case status. PD 4 was no longer statistically significant. Two new variables were statistically significant. These variables were the evidence-related effort factor ($p=.008$) and the black killing black dyad ($p=.032$). These results are highly relevant as they relate to my original hypothesis. If we would agree that requesting a warrant for a suspect would be the same as using whether a suspect was actually arrested for the killing for the effects on case closure then the possibility of a near perfect relationship would exist between that variable and the outcome variable. This near perfect relationship would potentially remove any other effects such as those of race or effort. When we have these two variables being highly correlated, they are basically measuring the same phenomenon. Whether a warrant is requested would be measuring case closed. When this variable is placed into the logistic regression model, it tends to explain most of the variance in the dependent variable that is related to that phenomenon. This fact would mean there is little variance to be explained by the other covariates.

The second logistic regression excluded the variable of whether or not the killing was gang or drug-related. Removing this variable from the analysis resulted in the only significant variables being the city of the killing (PD 4, $p=.001$) and whether or not a warrant was requested for a suspect ($p=.000$). The direction of the

relationship with PD 4 was still negative thus indicating the odds of a closed case would still be reduced in this city. The fact we did not consider that variable as a covariate in the model and found different significant variables points out the importance of considering all covariates or controls that may have a potential effect. Ignoring a potential explanatory variable such as whether the homicide is a gang or drug-related killing shows why we must be cautious in interpreting our results.

The final follow-up logistic regression had the city variable of where the homicides were taking place removed. The significant variables in this logistic regression were whether a warrant was requested (p=.000) and whether the killing was gang or drug-related (p=.003). These results fit into the overall interaction that we have seen on our other logistic runs of the full model. It appears as if the warrant requested for a suspect variable as well as the gang or drug-related killing variable are the driving forces within the full model.

Looking back at the originally hypothesized model, we observe that only three variables were significant. Manipulating significant variables still only resulted in three variables being reported as significant and in only one of the models did a race dyad and effort construct become statistically significant. The results from my research have still left concerns over the variable of race. While race as represented in the dyad of offender and victim have shown no effect on case closure in the hypothesized model, we must be careful not to throw the baby out with the bathwater. In a scaled down model, the race of the offender was examined without the victim race variable in a logistic regression using the latent variables and control variables. The initial stage of the analysis shows that with the constant only in the equation, the

race of the offender, whether a warrant was requested for a suspect, and whether the killing was gang or drug related are each separately significantly related to case status.

Table 4.66: Full Model (Race of Offender substituted for Dyads) Variables Not in the Equation table

Variables not in the Equation

			Score	Df	Sig.
Step 0	Variables	BlkWhiOffender	5.642	1	.018
		PD4	.095	1	.758
		FAC1_1	1.572	1	.210
		FAC2_1	1.657	1	.198
		FAC3_1	.027	1	.869
		WarrantReqRECODE1	128.298	1	.000
		OffendersInvolvedRECODE1	1.017	1	.313
		GangDrugKillingRECODE1	16.456	1	.000
		WoundsRECODE1	.008	1	.929
		Det01RECODE1	.008	1	.929
	Overall Statistics		148.048	10	.000

The Omnibus Tests of Model Coefficients table indicates that when all the predictors are considered together, the model is significant ((χ^2= 142.54, df=10, N= 598, p< .05).

Table 4.67: Full Model (Race of Offender substituted for Dyads)Omnibus Tests of Model Coefficients table Table continued

Table 4.67 Continued

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	142.537	10	.000
	Block	142.537	10	.000
	Model	142.537	10	.000

The Variables in the Equation table shows that the location of the killing (PD4), whether a warrant was requested for a suspect, and whether the killing was gang or drug related, but not the race of the offender, are significant predictors when all the variables are considered together, even though the race of the offender was a significant predictor when used alone. This would lead to the conclusion that the race of the offender is significant until it is considered with other variables at which time any effect is taken away.

Table 4.68: Full Model (Race of Offender substituted for Dyads) Variables in the Equation table

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step1[a]	BlkWhiOffender	-.287	.377	.578	1	.447	.751
	PD4	-1.404	.423	11.036	1	.001	.246
	FAC1_1	.227	.189	1.449	1	.229	1.255
	FAC2_1	.150	.178	.711	1	.399	.861
	FAC3_1	.060	.173	.121	1	.728	1.062
	WarrantReqRECODE1	3.365	.392	73.841	1	.000	28.933
	OffendersInvolvedRECODE1	-.055	.313	.031	1	.861	.947
	GangDrugKillingRECODE1	-1.204	.343	12.317	1	.000	.300
	WoundsRECODE1	-.105	.306	.119	1	.730	.900
	Det01RECODE1	.613	.432	2.011	1	.156	1.846
	Constant	1.000	.474	4.444	1	.035	2.718

The various models have wrestled with the two variables of where the killing took place and whether or not the killing was gang or drug-related. The full model reported the importance of whether or not the crime was gang or drug-related and the subsequent models where certain variables were removed also reported the gang and drug-related variable as significant. It is important to remember that the model under scrutiny does not include all the specific variables in the original study's multivariate analysis. Only those variables aimed at testing my specific hypotheses have been included. Variables outside my model would change the results. A simple and relevant example drives this point home. When PD4 and whether or not the killing is gang or drug related are examined in a logistic regression model for their effects on case status, they are both significant in a direction supported by the literature. Knowing the city was PD4 increases the odds of closure and if the case is gang or drug-related, the case is found to be 35.5% less likely to be closed.

Table 4.69: City of Homicide and Gang/Drug-related killing and Case Status table

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	PD4	.828	.219	14.340	1	.000	2.289
	GangorDrugKilling	-.438	.181	5.868	1	.015	.645
	Constant	.988	.106	86.708	1	.000	2.686

a. Variable(s) entered on step 1: PD4, GangorDrugKilling.

We must remain cognizant of the fact I have introduced a smaller set of factors from the original model when considering the location where the killing took place, that the sample of the cities was stratified based on case status. An examination of the total killings from each of the cities would require weighting. Whichever model is reported, it is obvious that the results leave plenty of room for additional research**.**

Chapter 5: Discussions and Conclusions

Focus of the Research

Conflicting results in the literature should tell us or point us in the direction of just how difficult an area this is to study. My research is no different since the results concur at times with the previous literature and also reveals conflicting outcomes. One of the final ways to conclude my research is to look back at the original questions that I proposed that my research would address.

1- Does such a concept as "police effort" exist? The principal components analysis did result in three factors forming latent factors which I labeled specific types of effort. What these factors were measuring was based on the individual variables that formed the specific factors. Examining these specific variables allowed me to conclude that the concept of effort is not a clearly defined concept in and of itself. The many variables which meet the definition of requiring some type of action to be performed are of many different types. Concluding that there is a single effort variable does not appear feasible as is evidenced from a three factor solution in the principal components analysis.

2- Does the race of a homicide victim have any effect on the clearance of that crime? My study has confirmed the original Wellford and Cronin (1999) results which reported no effect on clearance based on the victim's race. My race variable looked specifically at African Americans and white victims and not the other races examined by Wellford and Cronin (1999). The race of the victim, black or white, did not have any effect on case status and it did not matter if the victim's race was

examined in a bivariate analysis or with other covariates. The argument for race of the victim effects was not supported in any of the analyses.

3- Does the race of the offender or suspect in a homicide case have any effect on the clearance of the homicide that the offender is suspected or accused of committing? The race of the offender revealed a weak association between the races of the offender when that variable examined in a bivariate analysis with case status. In the bivariate analysis, the race of the offender did not appear to be significant when the offender was black no matter whether a case was open or closed or when the offender is white and the case status is closed. In the bivariate analysis, the association between the race of the offender and homicide case status is driven by white offenders and then only when the case is open. When the race of the offender was examined along with the control variables, there were significant effects. There were also specific significant effects for the dyads during different stages of the study. The race of the offender may hold promise for future research.

4- Does the race of both the victim and the offender have an interactive effect on the clearance of the homicide? The answer to this question requires some qualification or further discussion. In the exact model that was run in the full model logistic regression, the answer is no. It did not appear as if there were any significant effects for any of the race dyads. If we take into account the variable of whether or not a warrant is requested for a suspect and remove it from the analysis, then the race dyad of blacks killing blacks has a significant effect on case clearance. Specifically, this variable was significant at p=.032. Blacks killing blacks increased case closure by a factor of 2.086. If we take into account that requesting a warrant for a suspect will

greatly increase case closure and we exclude that variable then it is important to consider the possibility that this dyad will have an effect. Simply stated, the race dyads had an effect in the bivariate analysis as well as when the covariates of the control variables were inserted into the analysis. The dyads had no effect when combined with the effort variables and when working within my proposed model and including all the variables, there was not an effect.

5- Does the concept of "police effort" have an intervening effect on the clearance of a case when taking the race of the victim into account? Since there was no effect for the victim's race during the bivariate analysis, effort could not have an intervening effect. The logistic regression with the victim's race and the three factors confirmed this. The three factors that resulted from the principal components analysis all had a significant effect on case closure when placed into this logistic regression. A second check was made of the victim's race where the two additional effort variables were combined with the three components. The race of the victim still had insignificant effects on case status.

6- Does the concept of "police effort" have an intervening effect on the clearance of a case when taking the race of the offender or suspect into account? The race of the offender had a significant effect in the bivariate analysis and also in the model with the three effort factors. Only the first factor which was "Evidence-related effort" had a significant effect when combined with the race of the offender. The effects from this model are similar to the full model results in that there are significant effects for an offender variable as well as for the "Evidence-related effort" variable. The latent variables did not have any intervening effect since the race of the

offender was still significant. The significance of the offender's race variable disappeared when the two additional effort variables were placed into the model along with the three components of effort. This may possibly point to the earlier concerns over whether a warrant was requested for a suspect.

7- Does the concept of "police effort" have an intervening effect on the clearance of a case when taking the racial stratification of offender and victim into account? The full model addressed this question and did not report any effects in the model for the effort factor as originally proposed. When the warrant requested for a suspect variable was removed, a significant effect was reported for "Evidence-related effort." The "Evidence-related effort" factor included whether the crime scene was measured, whether the investigator described the scene in their notes, whether the detective was at the post mortem examination, and whether specimens were collected. If the argument requesting a warrant should be excluded due to its near perfect predictability is viable, then we must acknowledge the significance of both a race variable (BKB dyad) as well as the "Evidence-related" effort factor.

In looking at the specific full model that was proposed, the original relationship between the race dyads and case status was spurious since once the full effort variable was introduced, the effect of the race dyads disappeared. The results from my overall model support the Case Characteristic or Non-Discretionary hypothesis where it is the case characteristic itself and not the discretionary response by investigators based on race that have an effect on case status. Both effort as represented by requesting a warrant for a suspect and case intra-severity, as evidenced

by whether the homicide was gang or drug related, had a significant effect on case status.

Limitations

A limitation to homicide research, as well as other criminal justice research, is limited data. The limited data I speak of is not the actual crime data but the specific police activity and case related data that are necessary to explore the issues in depth. This limitation is a potential roadblock to future research. I have been fortunate in my research to be able to conduct a secondary analysis of one of the most complete sets of data available regarding the crime of homicide. The majority of data sets which are the focus of criminal justice research on crime are from the F.B.I.'s Uniform Crime Report. This data is a nationwide collection of crime statistics which draws from over 18,000 law enforcement agencies who voluntarily report their crime data. The key here is that this is a cooperative effort so initially we will be missing some crime data. Nonetheless, this is the most comprehensive crime data available for researchers. The major problem is that this data does not collect specific case data that would be necessary for a study on the effects of police practice or the effects of case characteristics on case status. In the late 1980s, the law enforcement community saw a need for greater detail in the country's crime reporting and as a result the National Incident Based Reporting System (N.I.B.R.S.) was developed. This newer reporting system (N.I.B.R.S.) goes into much more detail in reporting crime information than the U.C.R. does. While N.I.B.R.S. data is more detailed, it still lacks the kind of details that are needed regarding case characteristics and police investigative activity. In 2007, 6,444 law enforcement agencies contributed NIBRS data to the UCR

Program. The data from those agencies only represent 25 percent of the U.S. population and 25 percent of the crime statistics collected by the UCR Program. The kind of data needed for future research is not collectively gathered by one source. Additionally, the fact my data was nominal limited the statistical techniques that were available for use in the various analyses.

A second limitation to my study is the fact that the difficulty in solving a case is not taken into account. Cases are not "solvable" at the same rate. As has been pointed out at times in the homicide literature, there are homicides that may be solved rapidly, because they are "dunkers" (Puckett & Lundman, 2003; Simon, 1991) and there are "whodunits" which are the more difficult cases to close. The data that I examined does not differentiate between the "dunkers" or "whodunits." Research operates on the assumption that all cases have the same degree of solvability. Future research could attempt to address this issue by addressing the solvability of the case and using the difficulty of the case in weighing the effectiveness of detectives' performance. As my study has pointed out, there are case characteristics that individually appear to be significant however when examined in conjunction with other characteristics do not lead to successful clearance. These relationships provide us with variables for the future study of case solvability that could be examined in conjunction with case difficulty.

Another limitation is the data in my study has been pulled from police activities that were commonplace during investigations in the late 1990s. This fact means that newer advances and investigative tools are not included. Research must also evolve and keep up to date with newer technologies and newer investigative

techniques. There is no better way to keep abreast of these other than through qualitative data gathered from investigators. Qualitative studies could provide valuable information through either observational or interview data where the investigators themselves provide insight into their success stories regarding effective investigative techniques. Coupling this with quantitative strategies could prove invaluable.

As with most studies, missing data was a concern in my research. Missing data was inevitable since one variable by its very nature will not always be known to the police. This variable is the race of a suspect or offender. Identifying information regarding the offender in a crime is not always known whereas there has to be a victim to have a crime. During my separate stages of analysis, missing cases did not reach a high level or were not of concern until the final model where the different covariates appeared to drive the number higher. In criminology, missing data is a problem that is often confronted and the typical response is to delete the missing observations from the analysis (Brame and Paternoster, 2003). The deletion of case does not present major problems when the number of missing cases is small. In testing for the latent concept, there were variables which had a high number of missing cases and these were excluded. The cut-off was based on the actual groupings of cases within the variables and those variables included in at least 700 cases or 88% of the cases were retained for the factor analysis.

Attempts at using mean substitution for the missing data resulted in fragile results therefore I handled the missing data problem by conducting a sensitivity analysis and performing two separate logistic regressions and comparing the results.

The first logistic regression analysis used variable recodes where there were no missing data for the variables except for the race dyads and the factors from the principal components analysis. I combined missing with a no response and still had the variable response that I was interested in which was coded 1. This first run had 25.9% missing cases. The second logistic regression used the variables where the data included the missing cases (36.7%). The next step was to use the model which had all the missing cases included and I began to drop the variables step by step starting with the variable having the lowest absolute value for the Wald statistic. I continued this method until I dropped the missing below 15%. As a result of those logistic regressions with the step-wise deletions, I found the results to be fairly stable. The Wald statistics, the significant coefficients, and the regression coefficients all appeared to be stable and consistent even when variables were eliminated. This allowed me to conclude that including the missing cases with the valid cases had little effect. As a result of these two logistic analyses, my final and complete full model logistic analysis was a model that included those variables excluding all missing cases. This also included the race dyads being recoded to include missing cases with all other race combinations within each specific dyad. The final model only included 8.8% missing cases which came from the latent concepts. Dealing with missing data is never easy and I chose this method because it ended up allowing me to discuss the results not in terms of point estimates but in terms of bounds (with missing data and then without missing data). Seeing stable and consistent results allowed me to be fairly confident that including the missing in the analysis would not have any major problems with the data.

A final limitation that I encountered concerned the latent concept of effort. One of the definitions found in Merriam-Webster's dictionary for effort is "the total work done to achieve a particular end." In an attempt to define the concept for my research I combined activities where someone had to take some type of action to perform a specific task which was involved in trying to close the homicide case. Where this became a concern was in trying to tag the individual components that made up the composite. There appeared to be so many different activities that are performed during a homicide investigation by different people from investigators to specialists, to medical professionals that making a clear differentiation between them becomes difficult. There are main tasks performed and there are also supportive actions. One would expect all computer checks to be representative of the same effort however in the factor analysis one computer check variable was a part of one component and two other computer check variables loaded on a different factor. The limitation is so many different actions may be too difficult to narrow down to such a general concept as effort. As mentioned in future directions there may be a better way to group these activities.

Future Directions and Research

We must ask ourselves, "Have we reached a point where we are being unrealistic to expect higher clearance rates in homicide cases?" According to the F.B.I.'s Uniform Crime Report for 2010, murder and nonnegligent homicides were cleared at a rate of 64.8%. The previous 5 years of homicide clearance data revealed a high of 66.6% in 2009, 63.6% in 2008, 61.2% in 2007, 60.7% in 2006, and 62.1% in

2005. The figures have been rather steady despite all of our advances in both law enforcement as well as research. Can we truly improve our success rate for closure?

I would posit that we must continue on in our search for factors that increase our clearances. We still have many unanswered questions concerning homicide clearances. One of the main concerns of the original research by Wellford and Cronin (1999) was to answer why cities differed in their ability to clear homicide cases. Some cities had high overall crime clearances and low homicide case clearance rates. Various combinations of overall and homicide clearance percentages exist for departments throughout our country. We must continue to ask why? Factors such as gang or drug-related killings have revealed a possible answer as to why some cities may have lower clearance rates than others. We must explore this factor further.

We must not shut the door on the race variable. One direction for us to consider if we are to advance the literature is to focus on the offender. Future research must continue to try and find ways to examine not only the victim of the homicide but the offender and the race dyads. The lack of offender data in the research has a detrimental effect on our research. Not only are we lacking offender race information but this disallows us to further examine the race dyads that are at the center of a homicide. These limitations appear in part to result from the limitation that we find within the Supplementary Homicide Reports (SHRs) used in previous homicide clearance studies (Roberts and Lyons, 2009) as well as the incomplete data we receive from the Uniform Crime Report. The availability of offender information has its limitations, if not from specific data access then from complete unavailability because offenders are not always known. One option for future research is to try and

increase our data set and a second option would be to try and deal with the missing offender data in different methodological ways. Dealing with missing data however, would be far from optimal. The idea that there could be significant results for the black killing black dyad is contrary to other findings within the literature. The literature points to the idea that certain crimes between non-Whites could results in less citizen cooperation with police investigation than those between Whites. The idea behind this line of thinking is there would be high levels of distrust in law enforcement along with the fear of retaliation among minorities (Riedel and Jarvis, 1998). My findings are opposite in the model where the warrant requested variable was removed. Case closure was increased by a factor of 2 in that case.

Perhaps, future research should also focus on third party behavior and different types of homicides for differences in case status. This focus may help explain the differing results I have found in my research. Intimate partner homicides, confrontational homicides, infanticides, mass and spree killings, and serial killings are just some different homicide types that may bring different characteristics to the table and thus variations in both police practice and outside variable influence.

The fact as to whether a homicide arrest is made has also been reported to be dependent on characteristics of the community as well as on cooperation between police and community; both of these areas need to be explored further. Perhaps homicides involving black on black killings are comprised of the types of killing where family members are victimized or are made up of those types of killings where cooperation is high and thus more easily solved (Riedel, 1999). Perhaps we should take a different approach to examining the race dyads by looking at them in a

different setting or context much like Paternoster (2004) did in his geographical disparity on prosecutorial decision making research.

An additional area of focus for future research is the location of the killing. Homicides will have characteristics that are apparently inherent to that specific locale where they occur. With the differences in cities and department clearances, it would be recommended that we not limit our focus on large departments but expand our research to include department of all sizes. Perhaps we need to look at cities based on their differing sizes as well as differing clearance rates. Police departments throughout our nation do not operate on an equal playing field. Different size cities will bring with them data sets of different sizes. Departments of different sizes bring with them uniqueness, something that is inherent in the ways different police departments do business. Some departments have specialists who share in the workload while others have investigators who wear different hats being not only those of the investigator but also those of the crime scene evidence collector. Some homicides are handled by a single investigator while other departments can afford to assign as many investigators as they deem feasible. The significant effect of the one city/police department that was studied in my research supports the idea that some locales may have something unique to them that aids or hinders their success in clearing homicide cases. We should not ignore this fact.

Along with the idea of examining data from cities of different size comes the need to gain better access to homicide data. This idea was pointed out by Riedel (2008) and one roadblock faced by researchers is gaining access to the specific data needed for a thorough study. A great deal of case information remains guarded by the

individual agencies and understandably so. It is very important to gain access to not only the detailed case information but specifically to information regarding police practice and activity. Key points for researchers should be to ensure confidentiality. The specific cities or police departments being studied should not be revealed. I would propose that this data access roadblock that researchers face in their attempts at furthering the study of homicides can be surmounted in two ways. First, it is imperative that researchers include our criminal justice partners in the research. We must make this a collaborative effort. The most difficult thing to do will be to breakdown the idea that outsiders are looking into a protected world that for decades has been guarded. Emphasis should be placed on the idea that research is looking for ways to improve clearance and not to lay blame for the lack of success. While this may seem like a utopian idea, the original Wellford and Cronin (1999) study was able to gain access to data from four large departments within the United States. We must learn from their experience and not be daunted by others failures. The second part to surmounting the roadblock to improved study is to include more qualitative research. Qualitative research conducted with good sound quantitative support brings with it the best of both worlds. It is recommended that research take advantage of going right to the source. While labor intensive, pulling information from the source, the investigator, can only prove beneficial in seeing what successes and failures they experience in trying to clear a case. Qualitative studies can provide the researcher with valuable information. This information can come from observational or interview data where the investigators themselves provide insight into their success

stories regarding what they have found to be effective investigative tools in closing a case. Coupling this with quantitative strategies could prove invaluable

In looking at factors that we have found to be effective in increasing case closure, we can take a different approach and examine the groupings not as effort but as groupings based on their main focus. Variables could be grouped much like they were in the Wellford and Cronin (1999) study. Variables could be examined as overall dimensions such as investigative variables, crime scene variables, witness variables, medical examiner variables, and computer check variables. Grouping the variables in this manner will allow combinations of variables by their groupings to be examined for successful variable combinations. It would be extremely beneficial to approach an investigation from a standpoint knowing that specific investigative variables combined with medical examiner variables lead to higher success in closure rather than just knowing certain variables individually have some effect on case status.

Implications for Research and Police Practice

The research implications for examining specific-type homicides for future research has been previously pointed out since they carry with them the issue of severity as well as other attributes making their solvability more difficult. Future research should focus on the type of killing. It would seem neglectful to consider that all homicides are created equal therefore wouldn't it be reasonable to conclude the closure of all homicides will not be equal? Gang and drug-related evidence has pointed us in this direction. It would be extremely valuable to know domestic homicides have a higher probability of being closed when variables x, y, and z are

involved yet these variables have not effect on gang-related killings. We must not lose sight of the trees that make up the forest for each is specific in its own right and brings a difference to the table that cannot be captured in looking at homicides as a whole.

We should constantly strive to improve our police practices. Evidence-based policing is centered around the idea of improving the success in our law enforcement activities based on our past success. There should be no argument that if we can determine which factors are important in helping investigators close a homicide case then we at least have a starting point to see if those same factors have been applied in cases that have remained open and try to determine why they are not successful in those specific cases. If investigators have used factors within their controls that have been significant in closing cases yet the case remains open then we do not re-invent the wheel but move on looking for other potential case solving variables. If gang or drug-related killings increase the difficulty of case closure, police investigators need to focus on gang enforcement and those preventive strategies like "Operation Cease Fire" in Boston where the focus was reducing firearm violence among youth and gang members. If specific types of killings are difficult to clear, preventing them in the first place will eliminate this potential problem. Law enforcement needs to continue their focus on those actions that were reported in the original study (Wellford and Cronin, 1999) and led to high clearance rates. The factors within the control of the police as well as other police activities which have proven valuable for clearance should by no means abandoned. Instead research needs to continue to look for combinations of factors which may possibly have an increased effect compared to

individual effects. Once, the variable whether a warrant was requested for the suspect was eliminated, the latent concept of evidence-related effort was found significant. Whether a crime scene was measured, whether the investigator described the crime scene in their notes, whether the detective attended the post-mortem, and whether specimens had been collected were variables that when combined showed significant effects on case status. Knowing combinations of variables that are successful in increasing closure will advance the literature.

My research has revealed that at the investigative stage, there is no apparent intentional disparity. When we saw effects for the race variable we must not close the book on the possibility that there are other reasons for significant effects. There could be underlying sociological reasons, better technology such as advancements in DNA and forensics, different types of killings; the field is wide open for exploration. We should not stop at the idea certain factors affect clearance but we must continue to look for instances where these same factors do not work and try and determine why. My research does not point specifically to certain individual police practices which practitioners could focus on during their investigations. My research by its very nature of combining individual activities has not revealed specific combinations which lead to increased closure. Hopefully, my research has shed some light on police activities and case circumstances to the extent that we need to continue our focus on individual activities in hopes of finding the combinations that will increase our chances of having if not a winning hand, a more successful hand. We must expand our focus and continue to address unanswered questions. We must continue to examine not only those factors within the control of the police but also those outside

their control. As Sir Francis Bacon stated in 1597, “Knowledge is Power.” Gaining knowledge of variables within the control of the police as well as knowledge beyond what the police can control is a valuable step in addressing and learning more about ways we may affect homicide clearance. Finding that a case is more easily closed as well as finding it is more difficult to close is just the first step. We must continually ask why and the answers to the question will be the key to increasing case closure and advancement of the literature.

Appendix A

Investigative Instrument Table including original coding and recoding if applicable for the latent analysis. Also included is whether the variable was used in the factor analysis or excluded.

Table A.1

Variable Number and Question Posed	Description	Original Coding	Included in LCA	Recoded
1: Control Number	A unique 4 digit number was assigned to each incident with the lead number indicating the department	1,2,3,4	No	N/A
2: Police Department	Department's name	The actual name of department	No	N/A
3: Incident Number	Incident number assigned by the police	Unique to the incident	No	N/A

Investigative Instrument Table continued

Investigative Instrument Table Continued

4: Total number of homicide detectives assigned to the case	Refers to the total number of investigators working a case to date or before the case is cleared	Unique to the incident (numerical) 1 2 3 4 5 6 7 8 9 10 >10	Yes	Unique to the incident (numerical) 1 2 3 4 5 6 7 8 9 10 >10
The more investigators the more effort.				
5: What is the current status of the case?	Describes whether the case is close, active or inactive	1=Closed 2=Active with regular homicide detectives 3=Active with cold-case investigators 4=Inactive	No	N/A
6: When were the homicide detectives informed of the crime?	Date and time when investigator first became aware of the crime	Date: Month, Day, and Year Time: actual time	No	N/A
7: How long after they were informed did they arrive at the crime scene?	Reports how quickly the detective arrived in 30 minute increments	1=First Response 2=less than 30 minutes 3=30-60 minutes 4= 61-120 minutes 5=more than 120 minutes	No	N/A

Investigative Instrument Table Continued

Investigative Instrument Table Continued

8: If more than 30 minutes, why were they delayed?	Lists reasons for any responding delays beyond 30 minutes	Descriptive response	No	N/A
9: Were other law enforcement agencies involved in the investigation	Indicates whether other agencies other than the lead investigating agency is involved	1=Yes 2=No 3=No mention 4-Suspected but uncertain 9=Missing	Yes	0=No 1=Yes
The recoding classifies No responses, No mention response, Suspected but uncertain, and Missing data as No. Yes responses were used to indicate Yes responses in the original data and any yes response indicates more effort than the baseline effort of the original investigating agency. Thus any uncertainty gets classified as a No response.				
9A: Which agencies (include task forces)?	Lists the agencies that assisted the originating agency	Descriptive data	No	N/A
9A: Which agencies (include task forces)?	Lists the agencies that assisted the originating agency	Descriptive data	No	N/A
The information listed in this response is merely the descriptive data of the yes responses in whether or not other law enforcement agencies were involved in the investigation.				
9B: When were they involved?	Information on the timing of when the assisting agencies got involved in the investigation	Descriptive data	No	N/A
The information listed in this response is merely the descriptive data detailing when the assisting agencies got involved.				

Investigative Instrument Table Continued

Investigative Instrument Table Continued

9C: What did they do in the investigation?	Information on the activities of the assisting agency.	Descriptive data	No	N/A
The information is again descriptive listing the specific acts the assisting agencies performed. This is what the agencies assisting did as part of their effort.				
10: What was the crime scene?	Tells where the homicide took place.	1=Commercial establishment other than a bar/club 2=Bar/Club 3=Residence 4=Public Area (Street or Park) 5=Other, Specify:_____	No	N/A
Listing where the crime occurred does not have anything to do with the effort involved in the investigation				
11: Did the assigned homicide detective go to the crime scene during the initial phase of the investigation?	Reports on whether the investigator went to the crime scene when the crime was initially investigated	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	Yes	0=No 1=Yes
A response of Yes indicates effort on the part of the investigator. Responding to the scene may seem like a natural response however it is an example of effort.				
12: Was a search warrant necessary for the crime scene	Responses indicate whether of not investigators had to take the step of applying for a search warrant	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	Yes	0=No 1=Yes
A Yes response is indicative of effort since applying for warrant can be an arduous and time consuming task.				

Investigative Instrument Table Continued

Investigative Instrument Table Continued

13: When was the search warrant issued for the crime scene?	Reports how quickly the warrant was issued	1=Within 24 hours 2=Within 48 hours 3=Within 72 hours 4=Over 72 hours 9=Missing	No	N/A
How quickly the search warrant was issued for the crime scene can depend on other factors beyond the investigator's control. Probable cause can exist immediately or take time to develop. Effort could or could not be exerted by the investigator and the warrant could still take time to be issued.				
13A: How soon after issuance was the warrant executed?	Reports on how quickly after the warrant it took the police to execute the warrant.	Descriptive data reporting the time frame	No	N/A
The same issues are present as in reporting on how quickly the warrant was issued (see previous table entry)				
14: Were search warrants necessary for any other locations where perpetrator or evidence may have been?	Responds to whether other search warrants for necessary for other than the crime scene	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	Yes	0=No 1=Yes
The same justification as in including the variable in needing a search warrant for the crime scene. A Yes response is indicative of effort since applying for warrant can be an arduous and time consuming task.				
How quickly the search warrant was issued and served for any location can depend on other factors beyond the investigator's control. Probable cause can exist immediately or take time to develop. Effort could or could not be exerted by the investigator and the warrant could still take time to be issued and logistical reasons could delay its execution.				
15: For what location was the search warrant issued?	Tells the target location for the search warrant	Descriptive information	No	N/A
Listing the location for the search warrant does not have anything to do with the effort involved in the investigation				

Investigative Instrument Table continued

Investigative Instrument Table Continued

16: When was the search warrant issued for other locations?	Reports how quickly the warrant was issued	1=Within 24 hours 2=Within 48 hours 3=Within 72 hours 4=Over 72 hours 9=Missing	No	N/A
How quickly the search warrant was issued for any other location can depend on other factors beyond the investigator's control. Probable cause can exist immediately or take time to develop. Effort could or could not be exerted by the investigator and the warrant could still take time to be issued.				
16A: How soon after issuance was each warrant executed?	Reports on how quickly after the warrant it took the police to execute the warrant.	1=Within 24 hours 2=Within 48 hours 3=Within 72 hours 4=Over 72 hours 9=Missing	No	N/A
The same issues are present as in reporting on how quickly the warrant was issued				
17: Was the crime scene secured by the first officer on the scene?	Reports on whether or not the first officer to arrive on the crime scene took steps to secure the scene	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	Yes	0=No 1=Yes
Securing the crime scene is indicative of effort no matter who does it.				
18: What did the officer do to secure the crime scene?	Reports on the specific actions taken to ensure the crime scene was protected	Descriptive data	No	N/A
Actions taken to secure the scene are the results of effort.				
19: Who secured the crime scene?	Reports who actually secured the crime scene	Descriptive data	No	N/A
While it may be important for policy implications, the person who secures the scene is merely the conduit of effort. They are how the specific effort gets executed.				

Investigative Instrument Table continued

Investigative Instrument Table Continued

20: How many minutes passed from the time the homicide was reported to the police until the crime scene was secured?	Reports in minutes how much time elapsed from the crime's discovery until the scene was secured.	Reported in minutes	No	N/A
Too many intangibles go into the time between the discovery of the offense until the scene gets secured.				
21: How long was the crime scene kept secure?	Reports in hours how long the scene stayed secured.	Reported in hours	No	N/A
Too many intangibles go into the length of time the scene needs secured.				
22: Were evidence technicians at the crime scene?	Identifies whether evidence technicians were at the homicide scene	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	Yes	0=No 1=Yes
Evidence technicians at the scene are indicative of effort.				
23: How long were evidence technicians on the scene?	Reports the length of time the crime scene technicians stayed on the crime scene.	Rounded to the closest hour	No	N/A
Too many intangibles are involved with the length of time that is required for the evidence technicians to stay on the scene.				

Investigative Instrument Table continued

Investigative Instrument Table Continued

24: How many evidence technicians were on the scene?	Refers to the total number of technicians were on the scene.	Unique to the incident (numerical) 1 2 3 4 5 6 7 8 9 10 >10	Yes	Unique to the incident (numerical) 1 2 3 4 5 6 7 8 9 10 >10
The more technicians present, the more effort.				
25: What did the evidence technicians do at the scene?	Describes the specific activities that the technicians performed at the crime scene	Descriptive data	No	N/A
The response is specific information or details regarding the effort put forth.				
26: Was a search made for fingerprints or other physical evidence?	Reports whether a search was made for evidence.	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	Yes	0=No 1=Yes
Searching for evidence takes effort.				
27: Were fingerprints or other physical evidence found?	Reports on whether or not evidence was discovered.	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	No	N/A
Whether or not evidence is present is opportunistic. Effort can be expended but nothing located either through ineptness or because nothing was present to find.				
28: Were photographs of the crime scene taken?	Reports on whether photos were taken at the crime scene.	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	Yes	0=No 1=Yes

Investigative Instrument Table continued

Investigative Instrument Table Continued

Taking photographs requires effort.				
29: Was a sketch of the crime scene made?	Reports on whether a crime scene sketch was made.	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	Yes	0=No 1=Yes
Making a crime scene sketch requires effort.				
30: Was the crime scene measured?	Reports on whether measurements were made of the crime scene.	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	Yes	0=No 1=Yes
Measuring the crime scene takes effort.				
31: Did the homicide detective describe the scene in their notes?	Description of the crime scene	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	Yes	0=No 1=Yes
Writing down a description of the crime scene takes effort.				
32: What evidence was found at the crime scene?	Description of what was actually found at the scene.	Description of specific evidence located.	No	N/A
Reporting on the specific evidence is the result of effort and not the actual effort.				
33: Were witnesses found at the crime scene?	Tells whether any witnesses were located at the crime scene.	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 5=No witnesses at the crime scene 9=Missing	Yes	0=No 1=Yes
Finding witnesses at the crime scene means someone looked for them and this takes effort.				
34: Why were the witnesses not interviewed?	Description of why witnesses were not interviewed.	1=Refused 2=Denied they witnesses the event 3=Language barrier 4=Left scene could not be located 5=Too young 6=Other, specify_____	No	N/A

Investigative Instrument Table continued

Investigative Instrument Table Continued

Telling why witnesses were not interviewed is not indicative of effort.				
35: Who interviewed the witnesses?	Describes	1=Homicide Detective 2=Patrol Officer 3=Both Homicide Detective and Patrol Officer 4=Other, specify_____	No	N/A
Is not important who interviewed any witness but the fact someone did is evidence of effort.				
36: How long after the police were notified of the homicide were the witnesses interviewed?	Reports the time it took to interview witnesses from the time the police were notified until the actual interview takes place.	Quantitative	No	N/A
A lot of circumstances can intervene or affect this time and be beyond any effort.				
37: Where were the witnesses interviewed?	Describes the location where the interview takes place.	1=Crime scene 2=Headquarters 3=Both Crime scene and Headquarters 4=Other, specify_____	No	N/A
The location of the interview has nothing to do with the effort of the interview.				
38: How long were witnesses held for questioning?	Reports the time the witnesses were held before any questioning took place.	Quantitative number	No	N/A
The length of time it takes to get to the actual interview of a witness van be affected by numerous variables and be unrelated to any effort.				
39: Did the witnesses provide valuable information?		1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	No	N/A
The quality of the interview results has nothing to do with effort.				

Investigative Instrument Table continued

Investigative Instrument Table Continued

40: What information was gathered from the witnesses?	Description of the actual information received from the witness interview.	1=Circumstances of death 2=Motivation for death 3=Identification of offender 4=Characteristics of offender 5=Identification of victim 6=Location of offender 7=Vehicle identification 8=Other, specify_____	No	N/A
The actual information resulting from the interview has nothing to do with any effort.				
41: Was the event captured on any kind of surveillance or other video?	Reports on whether the crime happened to be captured by some type of surveillance	1=Yes, specify_____ 2=No 3=No mention	No	N/A
The fact the crime was captured by some type of surveillance is not related to effort.				
42: Was a neighborhood survey conducted to locate additional witnesses or gather relevant information?	Reports on whether someone conducted a neighborhood survey.	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	Yes	0=No 1=Yes
Conducting a survey takes effort.				
43: How many officers conducted the neighborhood survey?	Describes the actual number of officers that were used in conducting the neighborhood survey.	Unique to the incident (numerical) 1 2 3 4 5 6 7 8 9 10 >10	Yes	Unique to the incident (numerical) 1 2 3 4 5 6 7 8 9 10 >10

Investigative Instrument Table continued

Investigative Instrument Table Continued

The higher the number the more effort.				
44: Was the information gathered from the neighborhood survey valuable?	Tells is whether of not the information gathered from the survey was valuable.	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	No	N/A
Is subjective determination of the value of information gathered frm surveying the neighborhood.				
45: What information was found during the neighborhood survey?	Reports what specific information was gathered from the neighborhood survey.	Is a description of the actual information fond from the survey.	No	N/A
The actual information that is specific content is not related to effort.				
46: How many witnesses were identified who were not at the crime scene?	Tells us the number of witnesses that were identified yet not present at the crime scene.	Unique to the incident (numerical) 1 2 3 4 5 6 7 8 9 10 >10	No	N/A
This response is beyond any effort. Is descriptive information gathered that identifies witnesses.				

Investigative Instrument Table continued

Investigative Instrument Table Continued

47: Who else (other than witnesses) was interviewed during the investigation?	Unique description of others interviews	1=Family members (#) 2=Friendships/Acquaintances (#) 3=Co-workers (#) 4=Roommates (#) 5=Neighbors (#) 6=Other, specify each and number	Yes	Unique to the incident (numerical) 1 2 3 4 5 6 7 8 9 10 >10
As the number increases the more effort.				
48: Did any of these provide valuable information?		1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	No	N/A
The fact something is valuable information is subjective and is not indicative of effort.				
49: What information did the next of kin provide?		1=Circumstances of death 2=Motivation for death 3=Identification of offender 4=Characteristics of offender 5=Identification of victim 6=Location of offender 7=Vehicle identification 8=Other, specify_____	No	N/A
The actual content of the information is not related to any effort.				
50: Was a computer check conducted on the decedent?	Tells us if a check was made on the decedent	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	Yes	0=No 1=Yes
Running computer checks is indicative of effort.				
51: Was a computer check conducted on any suspects?	Tells us if a check was conducted on any suspects.	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	Yes	0=No 1=Yes
Running computer checks is indicative of effort.				

Investigative Instrument Table continued

Investigative Instrument Table Continued

52: Was a computer check conducted on any witnesses?	Tells us if a check was conducted on any witnesses in the case.	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	Yes	0=No 1=Yes
Running computer checks is indicative of effort.				
53: Was a computer check conducted on any guns?	Tells us if a check was conducted any guns.	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 5=No guns involved 9=Missing	Yes	0=No 1=Yes
Running computer checks is indicative of effort.				
54: Was a computer check conducted on any shells or casings?		1=Yes 2=No 3=No Mention 4=Suspected but uncertain 5=No guns involved 9=Missing	Yes	0=No 1=Yes
Running computer checks is indicative of effort.				
55: Was a computer check conducted on any vehicles?		1=Yes 2=No 3=No Mention 4=Suspected but uncertain 5=No vehicles involved 9=Missing	Yes	0=No 1=Yes
Running computer checks is indicative of effort.				
56: Was a computer check conducted on the crime scene location?		1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	Yes	0=No 1=Yes
Running computer checks is indicative of effort.				

Investigative Instrument Table continued

Investigative Instrument Table Continued

57: Did any of these computer checks provide valuable information?	Reports on whether any computer checks provided valuable information.	1=Yes, specify____	No	N/A
Is the result of effort				
58: Which of the following information systems were used?	Describes the information systems used.	1=Local CJIS 2=State CJIS 3=NCIC 4=ATF 5=Drug Fire 6=MVA 7=Warrants 8=Other, specify_____	Yes	0=No 1=Yes
The more systems used, the more effort there will be. If no systems were used then no effort and if any of the systems wee used then effort was in existence.				
59: Did the decedent go to the hospital?	Tells us if the homicide victim got transported to the hospital	1=Yes 2=No	No	N/A
The fact the decedent went to the hospital is not related to effort. It just reports the mode of transportation the body took to get to the hospital.				
60: Did an officer or detective collect the decedent's belongings from the hospital or morgue?	Reports on police activities regarding taking possession of the victims property	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	Yes	0=No 1=Yes
Collecting the belongings is an indication of effort.				
61: What happened to the decedent's belongings?	Tells us the disposition of the victim's property.	Descriptive information	No	N/A
Reporting on the disposition of property is the description or result of any effort in collecting the victim's property.				

Investigative Instrument Table continued

Investigative Instrument Table Continued

62: Was a body chart of the decedent made?	Tells us whether or not a chart was prepared of the decedent.	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	Yes	0=No 1=Yes
Making a body chart indicates effort.				
63: Was the attending physician or other medical personnel at the hospital interviewed?	Reports on whether someone at the hospital was interviewed.	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	Yes	0=No 1=Yes
Conducting an interview indicates effort.				
64: Did the attending physician or other medical personnel provide valuable information?	Reports on whether valuable information was the result of the interview with the medical personnel of the physician.	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	No	N/A
This answer is the result of effort and is the qualitative counterpart to response #63.				
65: What information was gathered from the physician or other medical personnel?	Describes the specific information gathered from the interview.	1=Cause of death 2=Retrieval of evidence, specify_____ 3=Other, specify_____	No	N/A
Is the result of effort.				
66: If witnesses were found at the hospital were they interviewed?	Tells us whether any witnesses found at the scene were interviewed.	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 5=No witnesses found 9=Missing	Yes	0=No 1=Yes
Interviewing witnesses is indicative of effort.				

Investigative Instrument Table Continued

Investigative Instrument Table Continued

67: Did the witnesses at the hospital provide valuable information	Tells us if the witnesses at the hospital provided valuable information.	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	No	N/A
Regarding effort, this is again a result of the actual effort of gathering information.				
68: What information was gathered from witnesses found at the hospital?	Describes the specific information gathered from witnesses that were found at the hospital.	1=Circumstances of death 2=Motivation for death 3=Identification of offender 4=Characteristics of offender 5=Identification of victim 6=Location of offender 7=Vehicle identification 8=Other, specify_____	No	N/A
This answer is specific results from effort.				
69: Was the person who transported the decedent to the hospital interviewed?	Tells us if the person who did the transporting of the decedent was interviewed at the hospital.	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	Yes	0=No 1=Yes
Interviews are indicative of effort.				
70: Did the person who transported the decedent to the hospital provide valuable information?	Reports on whether the information received from the person who transported the decedent provided valuable information.	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	No	N/A
These are results and not effort. Is a subjective determination.				

Investigative Instrument Table continued

Investigative Instrument Table Continued

71: What information was gathered from the person who transported the decedent to the hospital?	Describes specifics on the information gathered from the person who transported the decedent to the hospital	1=Circumstances of death 2=Motivation for death 3=Identification of offender 4=Characteristics of offender 5=Identification of victim 6=Location of offender 7=Vehicle identification 8=Other, specify_____	No	N/A
This response is reporting the results of the effort of gathering information.				
72: Was homicide detective present at the post-mortem examination?	Tells us whether the homicide detective was present at the post-mortem examination.	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	Yes	0=No 1=Yes
Being present at the post-mortem is indicative of effort.				
73: Were specimens (blood, hair, fibers, fingernail scrapings, or seminal fluid) collected for analysis?	Tells us whether any specimens were collected for analysis.	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	Yes	0=No 1=Yes
Collecting evidence of any kind is indicative of effort.				
74: If a gun or guns were used in the homicide, were projectiles recovered?	Reports on whether any projectiles were recovered in cases involving guns.	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 5=No gun used 9=Missing	Yes	0=No 1=Yes
Recovering any evidence is indicative of effort.				

Investigative Instrument Table continued

Investigative Instrument Table Continued

75: Did the homicide detective provide a detailed body chart (one showing al wounds, abrasions, etc.)	Tells us if a detailed body chart was prepared.	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	Yes	0=No 1=Yes
Preparing a body chart is indicative of effort.				
76: Were confidential informants used?	Reports on the use of confidential informants.	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	Yes	0=No 1=Yes
The use of informants is indicative of effort.				
77: Did the confidential informants provide valuable information?	Reports on the value of information received from the confidential informant.	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	No	N/A
This response reports details of the effort of using an informant.				
78: What information did the confidential informants provide?	Reports the specifics of the information provided by the informant.	1=Circumstances of death 2=Motivation for death 3=Identification of offender 4=Characteristics of offender 5=Identification of victim 6=Location of offender 7=Vehicle identification 8=Other, specify_____	No	N/A
The response is specific information or details regarding the effort put forth.				
79: Did other police officers provide information?	Tells us if other officers provided information on the case.	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	Yes	0=No 1=Yes
The providing of information is indicative of effort.				

Investigative Instrument Table continued

Investigative Instrument Table Continued

80: What information did other officers provide?	Describes the specifics of the information that other officers provided.	1=Circumstances of death 2=Motivation for death 3=Identification of offender 4=Characteristics of offender 5=Identification of victim 6=Location of offender 7=Vehicle identification 8=Other, specify_____	No	N/A
The response is specific information or details regarding the effort put forth.				
81: Was surveillance used?	Reports on whether any surveillance was used.	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	Yes	0=No 1=Yes
Using surveillance is indicative of effort.				
82: What or who was placed under surveillance?	Describes what was under surveillance.	Description such as suspect, suspect and residence, possible location of a suspect, witness, witness residence, possible location of the witness, crime scene, and other.	No	N/A
The response is specific information or details regarding the effort put forth.				
83: Did the surveillance provide valuable information?	Reports on whether the surveillance provided valuable information.	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	No	N/A
Is a qualitative response regarding the effort of using surveillance.				
84: What information was discovered from the surveillance?	Reports on what was discovered from the surveillance.	1=Circumstances of death 2=Motivation for death 3=Identification of offender 4=Characteristics of offender 5=Identification of victim 6=Location of offender 7=Vehicle identification 8=Other, specify_____	No	N/A
The response is specific information or details regarding the effort put forth.				

Investigative Instrument Table continued

Investigative Instrument Table Continued

85: Did any witnesses come forward on their own?	Reports on whether any other witnesses came forward.	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	No	N/A
86: Were any witnesses placed in protection?	Reports if witnesses were placed into any protective custody or whether arrangements were made for any protection.	1=Yes 2=No 3=No Mention 4=Suspected but uncertain	Yes	0=No 1=Yes
Placing witnesses into any type of protection requires effort.				
87: Did these witnesses provide valuable information?	Reports of any witnesses provided any valuable information.	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	No	N/A
The response is specific information or details regarding the effort put forth.				
88: What information did these witnesses provide?	Describes the actual information provided.	1=Circumstances of death 2=Motivation for death 3=Identification of offender 4=Characteristics of offender 5=Identification of victim 6=Location of offender 7=Vehicle identification 8=Other, specify_____	No	N/A
The response is specific information or details regarding the effort put forth.				
89: Did the detective follow-up on all witness information?	Tells us if the detective followed-up on all witness information.	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	Yes	0=No 1=Yes

Investigative Instrument Table continued

Investigative Instrument Table Continued

90: Did the follow-up prove valuable?	Subjective determination on whether the follow-up was valuable.		No	N/A
This response is qualitative and subjective.				
91: What was discovered from the follow-up?	Reports on what was discovered in the follow-up.	Is a description of the discovery such as identify the suspect or offender, located the weapon, located the offender, motivation for the death, and other.	No	N/A
The response is specific information or details regarding the effort put forth.				
92: Was a warrant requested for a suspect?	Reports on the acquiring of a warrant for the suspect.	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	Yes	0=No 1=Yes
Requesting a warrant is indicative of effort.				
93: Was a likely suspect identified but a warrant not requested?	Tells whether a suspect was identified.	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	Yes	0=No 1=Yes
Even though obtaining a warrant is effort, identifying a suspect takes effort of varying degree.				
93A. Why not?	Describes why a warrant was not requested.	Description of the reason a warrant was not requested for a likely suspect.	No	N/A
The response is specific information or details regarding the effort of identifying a likely suspect.				
94: Was a warrant issued for the arrest of a suspect?	Reports on whether a warrant was issued.	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	Yes	0=No 1=Yes
Getting a warrant issued takes effort.				

Investigative Instrument Table continued

Investigative Instrument Table Continued

95: Was the warrant served and a suspect arrested?	Reports on whether a warrant was served and the suspect arrested	1=Yes 2=No 3=No Mention 4=Suspected but uncertain 9=Missing	Yes	0=No 1=Yes
Service of a warrant and making an arrest are indicative of effort.				
96: If the case has been closed, which of the following were most important in the closing?	Describes the most important factor in closing the case.	1=Offender arrested at or near scene 2=Offender dead at scene 3=Witnesses at scene identified the offender 4=Physical evidence collected at the scene, specify: _____ 5=Investigator identified those who identified their offender 6=Method of crime linked to offender 7=Information supplied by others, specify who and what information: 8=Other, specify: _____	No	N/A
Reporting on important factors in closing the case is not effort itself but can be the culmination of all effort.				
97: If the case has been closed, how long from assignment to homicide unit and closing?	Depending on whether the case is closed, describes the time it took from case assignment until the closure.	Reports on the length of time from case assignment to closure.	No	N/A
The time is not specific effort and too many variables come into play in determining how quickly a case gets closed.				

Investigative Instrument Table continued

Investigative Instrument Table Continued

98: If case has not been closed, which of the following is the most important reason why it has not been closed?	Describes factors hindering case closure and resulting in an open or suspended (not closed) case.	1=Witnesses not identified 2=Witnesses intimidated/refuse to cooperate 3=Absence of physical evidence specify: _____ 4=Unable to identify victim 5=Unable to determine circumstances of death 6=Other, specify:	No	N/A
The reason the case is not closed is not indicative of effort. Extreme effort could be put forth but the case still open.				

Appendix B

Table B1: The tolerance and VIF statistics for the Control Variables

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1 (Constant)	.827	.027		30.562	.000		
NumberofWounds	-.029	.030	-.036	-.943	.346	.989	1.011
OffendersinIncident	-.084	.032	-.102	-2.653	.008	.941	1.063
GangDrugKilling	-.068	.035	-.073	-1.910	.057	.950	1.053
PD4	.172	.037	.175	4.628	.000	.984	1.016

a. Dependent Variable: Status of Case

Appendix C

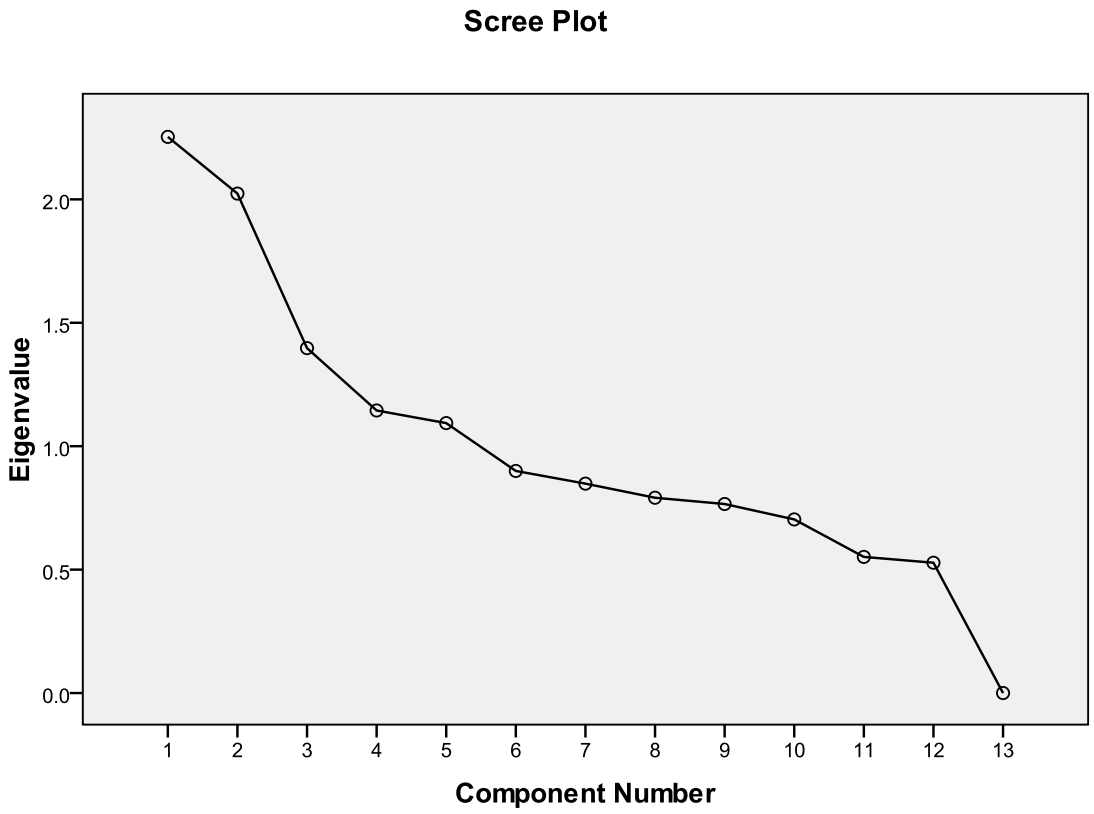

Figure C.1: Scree Plot for Principal Components Analysis

Table C.1: Principal Components Analysis Total Variance table

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.253	17.332	17.332	2.253	17.332	17.332	2.093	16.102	16.102
2	2.023	15.564	32.896	2.023	15.564	32.896	2.032	15.629	31.731
3	1.397	10.748	43.645	1.397	10.748	43.645	1.549	11.914	43.645
4	1.145	8.805	52.450						
5	1.094	8.413	60.862						
6	.900	6.921	67.783						
7	.848	6.526	74.309						
8	.791	6.086	80.395						
9	.766	5.891	86.286						
10	.703	5.410	91.697						
11	.551	4.242	95.939						
12	.528	4.061	100.000						
13	-1.542E-17	-1.186E-16	100.000						

Extraction Method: Principal Component Analysis.

Appendix D

The size of the datasets used in the steps of the analyses changed through each step due to the combination of variables that were used. The Race of the Offender accounted for the majority of missing in each step where the offender was included. As a result the valid cases were used with the exception of the final logistic regression where a sensitivity analysis was conducted. Figures D1-D3 lists the pertinent number of missing cases for each analysis.

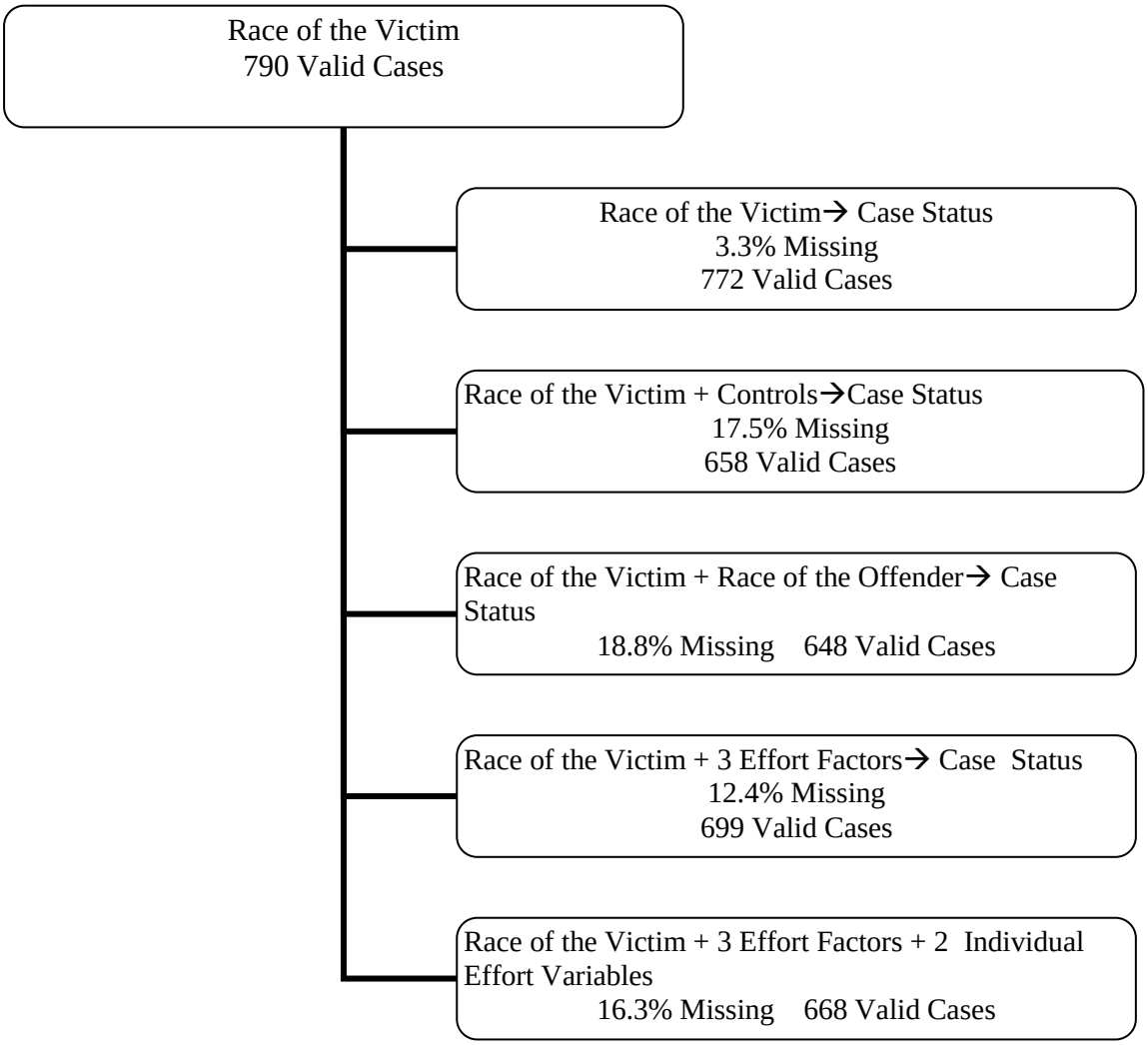
Race of the Victim
790 Valid Cases
Race of the Victim→ Case Status
3.3% Missing
772 Valid Cases
Race of the Victim + Controls→Case Status
17.5% Missing
658 Valid Cases
Race of the Victim + Race of the Offender→ Case Status
18.8% Missing 648 Valid Cases
Race of the Victim + 3 Effort Factors→ Case Status
12.4% Missing
699 Valid Cases
Race of the Victim + 3 Effort Factors + 2 Individual Effort Variables
16.3% Missing 668 Valid Cases

Figure D.1

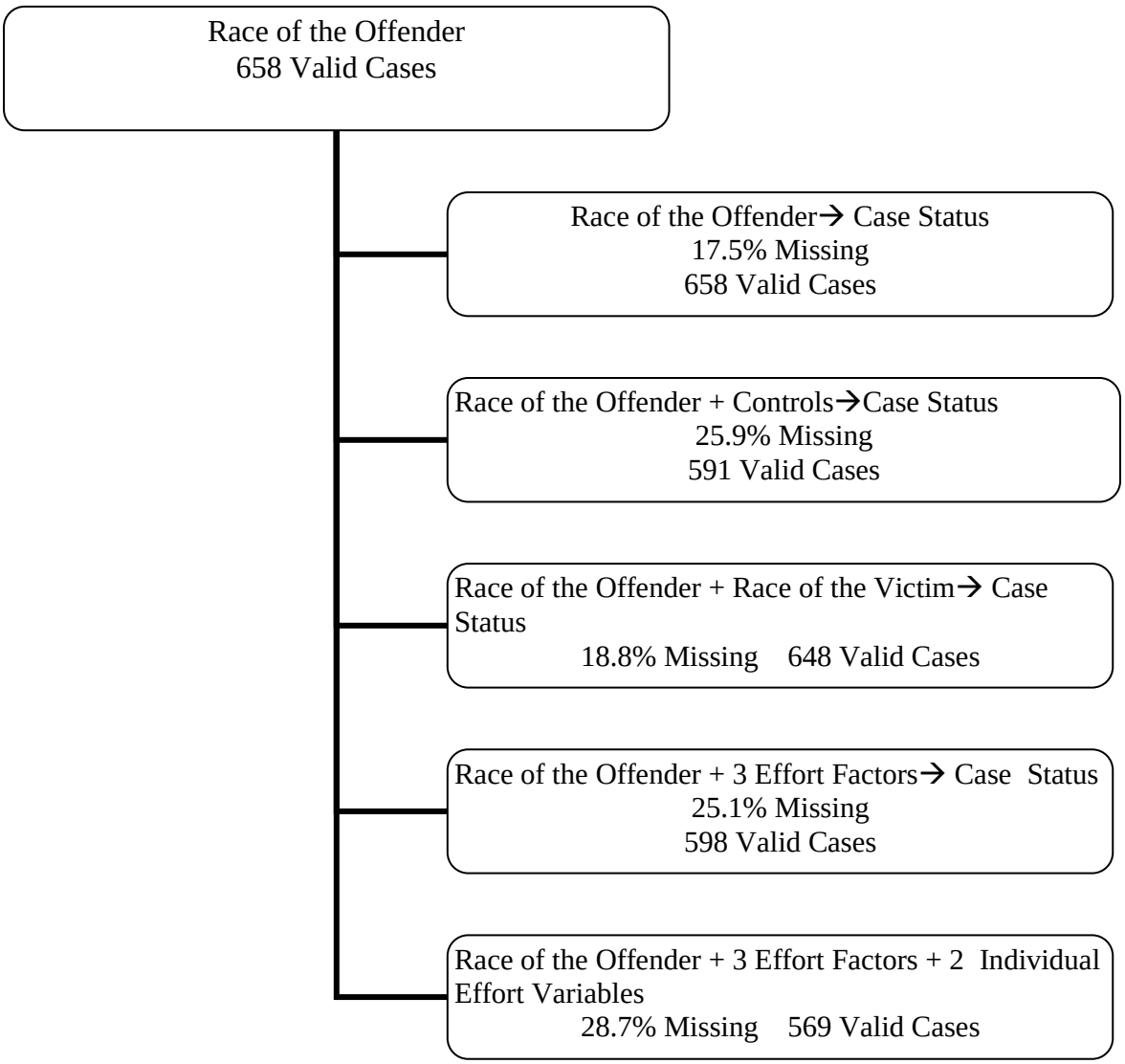
Race of the Offender
658 Valid Cases
Race of the Offender→ Case Status
17.5% Missing
658 Valid Cases
Race of the Offender + Controls→Case Status
25.9% Missing
591 Valid Cases
Race of the Offender + Race of the Victim→ Case Status
18.8% Missing 648 Valid Cases
Race of the Offender + 3 Effort Factors→ Case Status
25.1% Missing
598 Valid Cases
Race of the Offender + 3 Effort Factors + 2 Individual Effort Variables
28.7% Missing 569 Valid Cases

Figure D.2

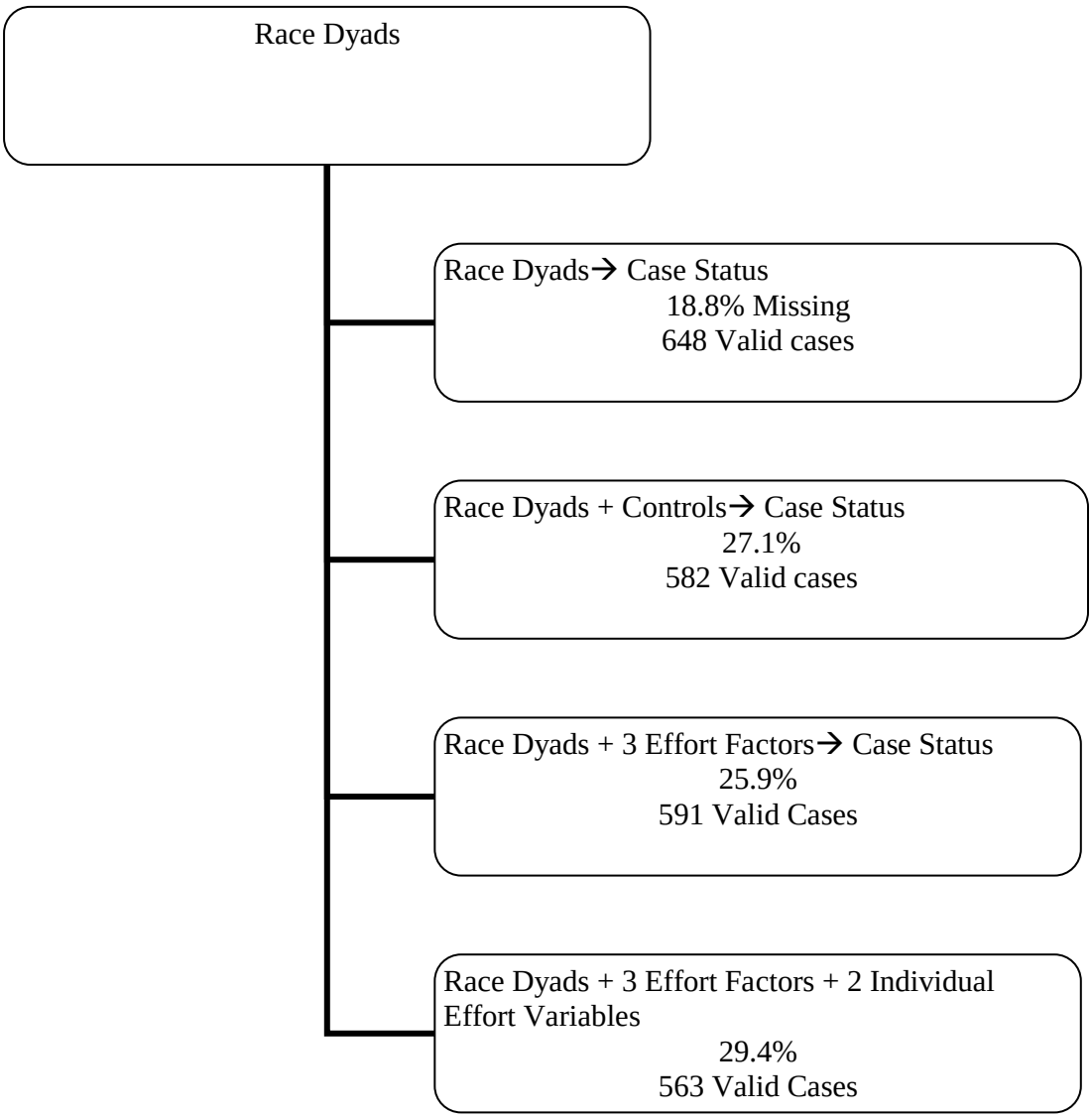
Race Dyads
Race Dyads→ Case Status
18.8% Missing
648 Valid cases
Race Dyads + Controls→ Case Status
27.1%
582 Valid cases
Race Dyads + 3 Effort Factors→ Case Status
25.9%
591 Valid Cases
Race Dyads + 3 Effort Factors + 2 Individual Effort Variables
29.4%
563 Valid Cases

Figure D.3

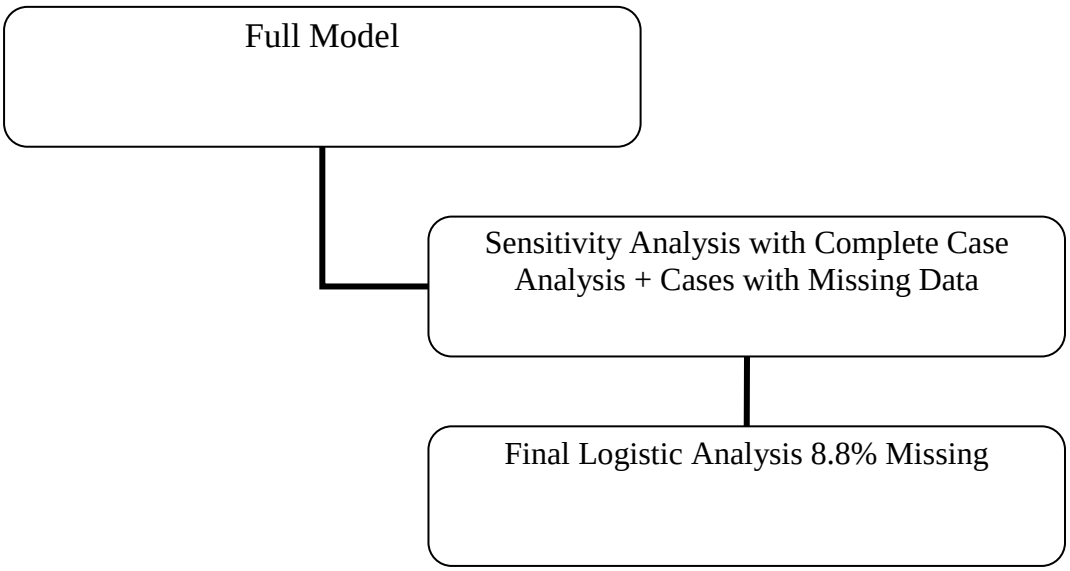
Full Model
Sensitivity Analysis with Complete Case Analysis + Cases with Missing Data
Final Logistic Analysis 8.8% Missing

Figure D.4

References

Addington, L. (2006). Using National Incident-Based Reporting System murder data to evaluate clearance predictors. *Homicide Studies, 10*: 140–152.

Addington, L. (2008). Hot vs. Cold Cases: Examining Time to Clearance for Homicides Using NIBRS Data. *Justice Research and Policy, 9* (2): 87-112.

Alderden, M. A. and Lavery, T. A. (2007). Predicting Homicide Clearances in Chicago: Investigating Disparities in Predictors Across Different Types of Homicide. *Homicide Studies 11*: 115.

Allison, P. D. (2002). *Missing data*. Thousand Oaks, CA: Sage Publications.

Baldus, D.C., Pulaski, C., & Woodworth,G. (1983). Comparative review of death sentences: An empirical study of the Georgia experience. *Journal of Criminal law and Criminology, 74*: 661-753.

Baumer, E. P., Messner, S. F., & Felson, R. B. (2000). The role of victim characteristics in the disposition of murder cases. *Justice Quarterly, 17*, 281-307.

Bittner, E. (1967). The Police on Skid Row: A Study of Peacekeeping. *American Sociological Review, 32*: 699-715

Black, D. (1976). *The Behavior of Law*. New York: Academic Press.

Black, D. (1980). *The Manners and Customs of the Police*. New York: Academic Press.

Block, R., & Block, C. R. (1992). Homicide syndromes and vulnerability: Violence in Chicago community areas over 25 years. *Studies on Crime and Crime Prevention, 1*, 61–87.

Blumstein, A. (1995). Youth violence, guns and the illicit-drug industry. *Journal of Criminal Law and Criminality, 86*:10-36.

Blumstein, A. & Wallman, J. (2000). *The crime drop in America*. New York: Cambridge University Press.

Borg, M. J. & Parker, K.F. (2001). Applying Black's Theory to the Study of Homicide Clearance Rates. *Law and Society Review* 35(2): 435-466.

Bowers, W.J. and Pierce, G. L. (1980). Arbitrariness and Discrimination under Post-Furman Capital Statutes. *Crime and Delinquency, 26*: 453-484.

Brame R. & Paternoster R. (2003). Missing Data Problems in Criminological Research. *Journal of Quantitative Criminology, 19* (1):55-78.

Bynum, T. S., Cordner, G. W., & Greene, J. R. (1982). Victim and offense characteristics: Impact of police investigative decision-making. *Criminology, 20*, 301–318.

Camilli, G. & Hopkins, K.D. (1978). The applicability of chi-square to 2x2 contingency tables with small expected cell frequencies. *Psychological Bulletin, 85*, 163-167.

Cardarelli, A. P. & Cavanaugh, D. (1992). Uncleared homicides in the United States: An exploratory study of trends and patterns San Francisco, CA: American Society of Criminology.

Chaiken, J.M. (1975). The Criminal Investigation Process: Volume II: Survey of Municipal and County Police Departments. Santa Monica, CA: RAND Corporation.

Chaiken, J.M., Greenwood, P.W., & Petersilia, J.R. (1976). The Criminal Investigation Process- A Summary Report.

Chiricos, T. & Waldo, G. (1975). A Socioeconomic Status and Criminal Sentencing: An Empirical Assessment of a Conflict Proposition. *American Sociological Review 40*: 753-772.

Cochran, W. G. (1954). Some methods of strengthening the common chi-square tests. *Biometrics, 10*, 417-451.

Cohen, J., & Cohen, P. (1983). Missing data. In J. Cohen & P. Cohen, *Applied multiple regression: Correlation analysis for the behavioral sciences*. Hillsdale, NJ: Erlbaum.

Collins, L. M., & Lanza, S. T., (2010). *Latent class and latent transition analysis: With applications in the social, behavioral, and health sciences*. New York: Wiley.

Cordner, G. W. (1989). Police agency size and investigative effectiveness. *Journal of Criminal Justice, 17* (3), 145-155

Corsianos, M. (2003). Discretion in Detectives' Decision Making and High Profile Cases. *Police Practice and Research, 4*, (3), pp. 301–314.

Decker, S. H. & Curry, G. D. (2002). "Gangs, Gang Members and Gang Homicides: Organized Crimes or Disorganized Criminals". *Journal of Criminal Justice 30*: 343-352.

Denno, D. & Cramer, J. (1976). The effects of victim characteristics on judicial decision-making in W.F. McDonald (ed.) *Criminal Justice and the Victim*. Beverly Hills, CA: Sage.

Eck, J. E. (1979). Managing Case Assignments: The Burglary Investigation Decision Model Replication. Washington D.C. Police Executive Research Forum.

Eck, J. E. (1983). Solving crime: A study of the investigation of burglary and robbery. Washington, DC: Police Executive Research Forum.

Eck, J. E. (1992). Criminal investigation. In G.W.Cordner & D. C. Hale (Eds.), *What works in policing* (pp. 19-34). Cincinnati, OH: Anderson Publishcing Co.

Federal Bureau of Investigation (2008). *Crime in the United States*. Washington D.C.: U.S. Government Printing Office. Retrieved November 19, 2009, from http://www.fbi.gov/ucr/cius2008/data/table_43.html

Field, A. (2009). *Discovering Statistics Using SPSS (Introducing Statistical Method)*. Sage Publications Ltd; Third Edition edition

Gaines, L.K., Lewis, B., & Swanagin, R. (1983). Case Screening in Criminal Investigations: A Case Study of Robbery. *Police Studies 6*: 22-29.

Garfinkel, H. (1949). Research Note on Inter- and Intra-Racial Homicides. *Social Forces, 27* (4): 369-381.

Garson, G. D. 2011. Scales and Standard Measures, from *Statnotes: Topics in Multivariate Analysis.* Retrieved 01/05/2012 from http://faculty.chass.ncsu.edu/garson/pa765/statnote.htm.

Goldman, N. (1963). *The Differential Selection of Juvenile Offenders for Court Appearance*. New York: National Council on Crime and Delinquency.

Goldstein, P. J., Brownstein, H. H., Ryan, P. J., & Belluci, P. (1989). Crack and Homicide in New York City, 1988: A Conceptually Based Event Analysis. *16 Contemporary Drug Problems*. 651-688.

Gottfredson, M. R. & Hindelang, M. J. (1979). The Study of The Behavior of Law. *American Sociological Review 44*: 3-27.

Green, B. F. (1951). A general solution for the latent class model of latent structure analysis. *Psychometrika* 16: 151-166.

Green, B. F. (1952). Latent structure analysis and its relation to factor analysis. *Journal of the American Statistical Association* 49: 732-764.

Green, E. (1964). Inter- and Intra-Racial Crime Relative to Sentencing. *Journal of Criminal Law and Criminology, 55*: 348-358.

Greenberg, B., Yu, B., & Lang, K. (1972). *Enhancement of the Investigative Function.* Menlo Park: Standford Research Institute.

Greenberg, B., Elliot, C., Craft, L., & Procter, H. S. (1977). *Felony Investigation: Decision Model.* Washington D.C.: National Institute of Law Enforcement and Criminal Justice.

Greenwood, P. (1970). *An Analysis of the Apprehension Activities of the New York City Police Department*. New York: Rand Institute.

Greenwood P. W. & Petersilia, J. R. (1975). The Criminal Investigation Process Volume I: Summary and Policy Implications. Santa Monica, CA: RAND Corporation.

Greenwood P. W., Chaiken, J., & Petersilia, J. (1977). The Criminal Investigation Process. Lexington, MA: D. C. Heath.

Hagan, J. (1972). The labeling perspective, the delinquent, and the police: a review of the literature. *Canadian Journal of Criminology and Corrections, 14*: 150-165.

Hagan, J. (1974). Extra-Legal Attributes and Criminal Sentencing: An Assessment of a Sociological Viewpoint. *Law and Society Review, 8* (3):357-383.

Hindelang, M. J. (1974). Decisions of shoplifting victims to invoke the criminal justice process. *Social Problems, 21*: 580-593,

Isaacs, H. (1967). A Study of Communications, Crimes and Arrests in A Metropolitan Police Department. Task Force Report: Science and Technology, A Report to the President's Commission on Law Enforcement and Administration of Justice.Washington, DC: USGPO.

Jacoby, J. E. & Paternoster, R. (1982). Sentencing Disparity and Jury Packing: Further Challenges to the Death Penalty, *Journal of Criminal Law and Criminology, 73* (1): 379-387.

Jarvis, J. P. & Regoeczi, W. C. (2007). Murder Clearance Rates. Guest Editors' Introduction. *Homicide Studies, 11* (2): 79-81.

Jarvis, J. P. & Regoeczi, W. C. (2009). Homicide Clearances: An Analysis of Arrest versus Exceptional Outcomes. *Homicide Studies, 13* (2):174-188.

Johnson, G. B. (1941). The Negro and crime. *The Annals of the American Academy of Political and Social Science*. 217: 93-104.

Jones, M. P. (1996) Indicator and stratification methods for missing explanatory variables in multiple linear regression. *Journal of the American Statistical Association,* 91, 222-230.

Kaiser, H. F. (1960). The application of electronic computers to factor analysis. *Educational and Psychological Measurement*, 20, 141-151.

Keel, T. G, 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.

Klein, M.W. (1995). *The American Street Gang*. New York, NY: Oxford University Press.

Klinger, D. A. (1997). Negotiating order in patrolwork: An ecological theory of police response to deviance. *Criminology, 35*, 277-305.

LaFree, G. D. (1980). The effect of sexual stratification by race on official reactions to rape. American Sociological Review 45: 842-854.

LaFree, G. & Russell, K. (1993). The argument for studying race and crime. *Journal of Criminal Justice Education 4*: 273-289.

Leech, N. L., Barrett, K. C., & Morgan, G. A. (2011). *SPSS for Introductory and Intermediate Statistics: Use and Integration* 4th edition. New York, NY. Routledge Academic.

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*: 527-534.

Litwin, K. J. (2004). A Multilevel Multivariate Analysis of Factors Affecting Homicide Clearances. *Journal of Research in Crime and Delinquency 41*: 327.

Litwin, K. J. & Xu, Y. (2007). The dynamic nature of homicide clearances: A multilevel model comparison of three time periods. *Homicide Studies 11*: 94-114.

Long, J. S. & Freese, J. (2001). *Regression Models for Categorical Outcomes Using Stata*. College Station, TX: Stata Press.

Marché, G. E. (1994). The production of homicide solutions: An empirical analysis. *American Journal of Economics and Sociology, 53,* 385–401.

McCutcheon, A. L. (1987). *Latent Class Analysis. Sage University Paper series on Quantitative Applications in the Social Sciences*. Beverly Hills and London: Sage Publications.

McDonald, W. F. (1976). Criminal justice and the victim, in W. F. McDonald (ed.) *Criminal Justice and the Victim*. Beverly Hills, CA: Sage.

McEwen, T. (2009). Volume I Evaluation of the Phoenix Homicide Clearance Project Final Report. Prepared for National Institute of Justice Office of Justice Programs U.S. Department of Justice.

Miczek, K. A., DeBold, J. F., Haney, M., Tidey, J., Vivian, J., & Weertz, E. M. (1994). Alcohol, drugs of abuse, aggression and violence. In A. J. Reiss, Jr. & J. A. Roth (Eds.), Understanding and preventing violence. *Social influences* (Vol. 3, pp. 377-570). Washington, DC: National Academy Press.

Miller, W.B. (2001). The Growth of Youth Gang Problems in the United States: 1970–98 Report. Washington, DC: U.S. Department of Justice, Office of Justice Programs, Office of Juvenile Justice and Delinquency Prevention

Mouzos, J. & Muller, D. (2001). Solvability factors of homicides in Australia: An exploratory analysis. *Trends and Issue in Crime and Criminal Justice* (216).

Paternoster, R. (1983). Race of the Victim and Location of Crime: The Decision to Seek the Death Penalty in South Carolina. *The Journal of Criminal Law and Criminology 74* (3): 754-785.

Paternoster, R. (1984). Prosecutorial Discretion in Requesting the Death Penalty: A Case of Victim-Based Racial Discrimination. *Law and Society Review* 18: 437-478.

Paternoster R., Brame, R., Bacon, S. & Ditchfield, A. (2004). Justice by Geography and Race: The Administration of the Death Penalty in Maryland, 1978-1999. Margins: Maryland's Law Journal on Race, Religion, Gender, and Class.

Paternoster, R. and Brame, R. (2008a) Reassessing Race Disparities in Maryland Capital Cases. *Criminology 46* (4): 971-1008.

Paternoster, R. and Brame, R. (2008b). An Empirical Analysis of Maryland's Death Sentencing System with Respect to the Influence of Race and Legal Jurisdiction. Final Report. Accessed on 12-17-09 at http://www.newsdesk.umd.edu/pdf/finalrep.pdf.

Peterson, R. D. & Hagan, J. (1984). Changing conceptions of race: Toward an account of anomalous findings of sentencing research. *American Sociological Review*, 49, 56–70.

Piliavin, I. & Briar, S. (1964). Police Encounters with Juveniles. *American Journal of Sociology*, 70 (2): 206-214.

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*: 171-193.

Quinney, R. (1977). *Class, state and crime*. New York: D. McKay.

Radelet, M. L. (1981). Racial Characteristics and the Importance of the Death Penalty. *American Sociological Review* 46 (6):.918-927.

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.

Riedel, M. (1995). Toward a theory of stranger violence. Unpublished manuscript, Southern Illinois University, Carbondale.

Riedel, M. (1999). *Sources of Homicide Data: A Review and Comparison, in Homicide: A Sourcebook of Social Research,* edited by M. Dwayne Smith and Margaret Zahn. Newbury Park: Sage Publications.

Riedel, M. (2002). *Arrest Clearances for Homicide: A Study in Los Angeles*. Pp. 91-119 in Crime and Justice at the Millennium: Essays in honor of Marvin Wolfgang, edited by Robert A. Silverman, Terence P. Thornberry, Bernard Cohen, and Barry Krisberg. Boston, MA: Kluwer Academic.

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, 151-164.

Riedel, M.& Jarvis, J. P. (1998). The decline of arrest clearances for criminal homicide: Causes, correlates, and third parties. *Criminal Justice Policy Review*, 9, 279-306.

Riedel, M. & Rinehart, T. A. (1994). *Clearance, missing data, and murder*. Paper presented at the annual meeting of the Academy of Criminal Justice Sciences.

Riedel, M., & Rinehart, T. A. (1996). Murder clearances and missing data. *Journal of Criminal Justice, 19*, 83–102.

Riedel, M., Zahn M. A., & Mock, L.F. (1985). *The nature and patterns of American homicide*. Washington DC: U.S. Department of Justice.

Rinehart, T.A. (1994). An analysis of murder clearances in Chicago: 1981-1991. Unpublished Master's thesis, Southern Illinois University, Carbondale.

Roberts, A. (2007). Predictors of Homicide Clearance by Arrest: An Event History Analysis of NIBRS Incidents. *Homicide Studies, 11*: 82-93.

Roberts, A. & Lyons, C. (2008). *Victim-Offender Racial Stratification and Crime Clearance by Arrest*. Paper presented at the annual meeting of the American Sociological Association Annual Meeting, Sheraton Boston and the Boston Marriott Copley Place, Boston, MA, Jul 31, 2008. Retrieved 07-05-10 online at http://www.allacademic.com/meta/p239876_index.html.

Roberts, A. & Lyons, C. J. (2009). Victim-Offender racial dyads and clearance of lethal and nonlethal assault. *Journal of Research in Crime and Delinquency, 46* (3): 301-326.

Roth, J. (1977). Some contingencies of the moral evaluation and control of clients. *American Journal of Sociology, 77*: 830-56.

Scheff, T. (1978). Typification in rehabilitation agencies. Pp 172-175 in E. Rubington and M.S. Weinberg (eds.*), Deviance: The Interactionist Perspective*. NewYork: Macmillan.

Sherman, L. W. (1980). Causes of Police Behavior: The Current State of Quantitative Research. *Journal of Research in Crime and Delinquency, 17* (1): 69-100.

Sherman, L. W. (1990). Police Crackdowns: Initial and Residual Deterrence. *Crime and Justice, 12*: 1-48.

Silverman, R.A. & Kennedy, L.W. (1987). "Relational distance and homicide: The role of the stranger", *The Journal of Criminal Law and Criminology*, *78*, (2), pp. 272–308.

Simon, D. (1991). *Homicide: A Year on the Killing Streets*. Boston, MA. Houghton Mifflin.

Skolnick, J. H. (1966) (1967). *Justice without Trial: Law Enforcement in Democratic Society*. New York: John Wiley & Sons.

Smith, D.A. (1987). Police response to interpersonal violence: Defining the parameters of legal control. *Social Forces, 65,* (3):767-782.

Smith, D. A. & Visher, C. A. (1981). Street-Level Justice: Situational Determinants of Police Arrest Decisions. *Social Problems, 29* (2): 167-177.

Smith, D.A., Visher, C. A., & Davidson, L. A. (1984). Equity and Discretionary Justice: The Influence of Race on Police Arrest Decisions. *The Journal of Criminal Law and Criminology, 75* (1): 234-249.

So Y. (1995). A Tutorial on Logistic Regression. SUGI Proceedings. Retrieved online 01-05-12 at: http://support.sas.com/techsup/technote/ts450.pdf

Spohn, C. & Spears, J. (1996). The Effect of Offender and Victim Characteristics on Sexual Assault Case Processing Decisions. *Justice Quarterly* 13: 401-431.

Steffensmeier, D. & Terry, R. (1973). Deviance and respectability: An observational study of reactions to shoplifting. *Social Forces, 51*: 417-426.

Stern, L. D. (2010). *A Visual Approach to SPSS for Windows. A Guide to SPSS 17.0* 2nd edition. Allyn and Bacon.

Stern, M. (1931). A Study of Unsolved Murders in Wisconsin from 1924-1928. *Journal of the American Institute of Criminal Law and Criminology, 21* (4), pg. 513-536.

Sudnow, D. (1965). "Normal Crimes: Sociological Features of the Penal Code in a Public Defender's Office." *Social Problems* 12:255-276.

Swigert, V. L. & Farrell, R. (1977). Normal homicides and the law. *American Sociological Review, 42* (1): 16-32.

Taylor, T. J., Holleran, D., & Topalli, V. (2009). Racial Bias in Case Processing: Does Victim Race Affect Police Clearance of Violent Crime Incidents? *Justice Quarterly, 26* (3), 562 — 591

Turk, A. T. (1969). *Criminality and legal order*. Chicago: Rand-McNally.

U.S. Census (2000). Profiles of General Demographic Characteristics. Issued May 2001. Retrieved January 1, 2010, from http://www.census.gov/prod/cen2000/dp1/2kh00.pdf

U.S. Department of Justice, FBI. (1965 & 2008). Uniform crime reports. Washington D.C.: U.S. Government Printing Office.

Vach W. & Blettner, M. (1991). Biased estimation of the odds ratio in case-control studies due to the use of ad hoc methods or correcting for missing values of confounding variables. *American Journal of Epidemiology, 134*, pp. 895-907.

Vartania, T.P. Multicollinearity SW541. (2012). Retrieved 01-07-12 from Lecture Notes Online at: http://www.brynmawr.edu/socialwork/GSSW/Vartanian/Handouts/MC_PHD.htm.

Waegel, W. B. (1981). Case routinization in investigative police work. *Social Problems, 28* (February): 263-275.

Wellford, C., & Cronin, J. (1999). An analysis of variables affecting the clearance of homicides: A multivariate study. Washington, DC: Justice Research Statistics Association.

Wellford, C. F. & Cronin, J. (2000). Clearing Up Homicide Clearance Rates, National Institute of Justice Journal Issue No. 243.

Wickens, T. D. (1989). *Multiway contingency tables analysis for the social sciences*. Illsdale, NJ: Lawrence Erlbaum.

Wilbanks, W. (1984). Murder in Miami: An Analysis of Homicide Patterns and Trends in Dade County (Miami) Florida 1917–1983. Lanham, MD: University Press of America.

Wolfgang, M. E. (1958). *Patterns in Criminal Homicide*. Philadelphia, PA: University of Pennsylvania Press.

Wolfgang, M. E. & Riedel, M. (1973). Race, Judicial Discretion, and the Death Penalty. *Annals of the American Academy of Political and Social Science, 407*: 119-133.

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*: 453.