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Examining Case Clearance Through A Quantitative Approach

by

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A Capstone Project Submitted in Partial Fulfillment of the
Requirements for the Degree of Master of Science in Criminal Justice

Department of Criminal Justice

College of Liberal Arts

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Quantitative Approach**

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Chapter 1

A Comprehensive Review of Case Clearance

Introduction

The police force bears a fundamental responsibility to bring about justice for crime victims. To best fulfill this role, police officers must hold offenders accountable, beginning with their swift apprehension. Given this expectation, police agencies, and the public alike, have used clearance rates as a direct measure of police performance. However, despite its significance to victims, communities, and society at large, the complexities inherent to case clearance are rarely understood. Indeed, their definition, theoretical importance, and current figures are seldom examined among citizens and police agencies. This working paper will attempt to address this gap in knowledge by discussing the various forms of clearance, the significance of clearance rate through a theoretical and practical lens, and current clearance statistics.

Case Clearance Defined

According to the Federal Bureau of Investigation's Uniform Crime Reporting (UCR) program, a case has been solved for crime reporting purposes if it has been cleared by arrest or by exceptional means (Federal Bureau of Investigations, 2018, para.1). To be cleared by arrest, a law enforcement agency must meet the following three requirements: “at least one person has been arrested, charged with the commission of the offense, [and] turned over to the court for prosecution (whether following arrest, court summons, or police notice)” (Federal Bureau of Investigations, 2018, para.2). It is worth noting, however, that for UCR reporting purposes, clearance is calculated by the number of offenses cleared, not the number of individuals arrested for an offense.

On the other hand, for an offense to be cleared by exceptional means, an agency must meet the following four requirements: (1) an offender has been identified; (2) the agency has “gathered enough evidence to support an arrest, make a charge, and turn over the offender to the

court for prosecution;” (3) the exact location of the perpetrator is known; (4) an element outside the agency’s control prohibits them from “arresting, charging, and prosecuting” the perpetrator (Federal Bureau of Investigations, 2018, para.4). In other words, a police department may clear a case by exceptional means if, for instance, the perpetrator is deceased, the extradition of the offender is denied, or a victim refuses to cooperate after the perpetrator has been identified (Federal Bureau of Investigations, 2018, para.5).

While the Federal Bureau of Investigations (FBI) only recognizes two types of clearances, police departments may have their own informal ways of closing a case, namely administrative clearance (Federal Bureau of Investigations, 2018, para.1). However, as previously mentioned, administrative clearance is not recognized by the FBI for crime reporting purposes. Though definitions may vary across agencies, police departments typically administratively close or “suspend/office” a case if investigators have been extensively investigating but “all possible leads have been exhausted” (Annapolis Police Department, 2001, p.1). Despite the “closing” of a case, the agency may decide to reopen a case if additional information is obtained and has the potential to further the investigation (Annapolis Police Department, 2001, p.1).

Theoretical Implications of Case Clearance

Though appearing simplistic in definition, clearance rates are theoretically complex. Indeed, various criminal justice and criminology theories lend themselves to demonstrating the significance of the clearance of a case. Perhaps the most disputed domain of clearance literature, mainly by law enforcement officials, is the application of institutional theories of organizations on clearance rates. This theoretical lens posits that police departments must give the *illusion* of being capable of achieving their proposed goals in order to maintain legitimacy in the public eye

(Meyer & Rowan, 1977, p.343). Scholars argue that despite clear evidence that investigators are ineffective at solving cases, they can still maintain legitimacy through the recognition of administrative clearance. Conversely, the criminological perspective, specifically through deterrence theory, contends that if police officers are equipped and capable of investigating and apprehending perpetrators, offenders can accurately perceive the risks associated with their behavior and thus, will be deterred from committing the crime (Braga & Dusseault, 2019, p.284). Other criminological theories, however, maintain that an increase of police legitimacy levels may increase cooperation among residents, and in turn, increase the solvability of a case and citizen's disposition to report a crime or ongoing dispute. Though each perspective proclaims distinct rationales for the significance of case clearance, a common thread remains - the clearance of a case is an essential function police officers must perform.

Criminal Justice Significance of Clearance Rates

Institutional Theory of Organizations

A critical advancement in police theory and research can be attributed to the recognition of police departments operating within an institutional context. This body of theory, often referred to as institutional theory of organization, posits that police departments are “systems of coordinated and controlled activities that arise when work is embedded in complex networks of technical relations and boundary-spanning exchanges” (Meyer & Rowan, 1977, p.340). In other words, the duties and activities police departments are expected to perform largely result from their communication with external sources, namely from citizens and “the view of important constituents” (Zucker, 1987, p.443). Though not every resident may engage in “boundary-spanning exchanges” with their corresponding police department, the agencies will create organized structures and policies based on what is perceived to be a “widespread understanding

of social reality” (Crank, 2003, p.189; Meyer & Rowan, 1977, p.343).

However, as various scholars have noted, these policies are “institutional myths” created solely to gain legitimacy. As long as the *perception* of effectiveness is maintained, so is their legitimacy among their constituents (Meyer & Rowan, 1977, p.343; Crank, 2003, p.189). According to Meyer and Rowan (1977), police departments create this false reality by loosely coupling their actions with formal structures (p.341). The discrepancies between police activities and organizational policies are best exemplified by the current climate of community-oriented policing. The underlying expectation derived from this model is that law enforcement agencies must engage in “continuous, sustained contact with law-abiding people in the community so that together, they can explore creative solutions to local concerns...” (Mohanty & Mohanty, 2014, p.176). However, though many police departments may occasionally partake in such activities, such as foot patrols to engage citizens, recent investigations have revealed the contrary. Indeed, police agencies, such as the Cleveland Police Department, have engaged in excessive use of force and have failed to “embrace and incorporate the concepts of community policing at all levels” (U.S. Department of Justice, 2014, p.28). Because the organizational structures were initially rationalized to be legitimate, the negative outcomes that follow are often ignored (Crank & Langworthy, 1992, p.342).

When applying this concept to the clearance of cases, similar trends emerge. Inarguably, one of the greatest responsibilities a police officer must fulfill is the identification and apprehension of criminal offenders (Remington, 1975, p.463). However, a recent investigation by The Atlantic has revealed that clearance rates for homicides have been steadily declining since the 1960s (Thompson, 2022, para.2). In fact, more than 90% of homicides cases were cleared by arrest or by exceptional means in the 1960s, compared to just over 50% in recent

years (Thompson, 2022, para.2). Despite these alarming figures, the legitimacy of policing is rarely discussed unless high-profile cases are brought into the public eye (Keel, Jarvis, & Muirhead, 2009, p.50; Mendez, 2018, p.1).

Even when clearance rates are included in legitimacy discourse, police agencies may rightfully choose to disclose clearance figures that contain cases that have been administratively closed. An agency-made policy such as administrative clearance could give the illusion that investigators are solving cases at a much higher rate. Moreover, the language inherent in administrative clearance policies generally tend to place the burden of solving the case on the community rather than the investigators. This shift in responsibility minimizes the pressure to produce positive case outcomes on police departments and aids in maintaining their legitimacy. Ultimately, the application of institutional theories of organizations on the clearance of cases suggests that clearance rates are vital in preserving the legitimacy of the institution, specifically through their use of administrative policies.

Criminological Significance of Clearance Rates

Deterrence Theory

Inarguably, the most simplistic yet highly effective approach to establishing the significance of clearance rates is through the use of deterrence theory. Originally set forth by Cesare Beccaria in *On Crimes and Punishments*, this paradigm claims that “individuals make decisions based on what will garner them pleasure and avoid pain, and unless deterred, they will pursue their own desires, even by committing crimes” (Tomlinson, 2016, p.33). Beccaria’s thoughts on criminal law and procedure are best summarized by eleven propositions.

Beccaria's Propositions

1. To maintain order, individuals must give up part of their freedom to establish a contractual society. The social contract enables the government to create criminal laws and punish offenders.
2. Though criminal laws may place restrictions on individual liberties, they should not be unnecessarily restrictive.
3. The guiding principle of the administration of justice should be the presumption of innocence. The rights of all parties involved should be protected at every stage of the justice system.
4. A criminal law code that defines offenses and sanctions should be written in advance.
5. All punishments should be retributive in nature because another individual's rights were violated.
6. The severity of the punishment should not exceed what is needed to prevent crime and deter criminals.
7. The punishment should be proportionate to the seriousness of the criminal act and not the criminal.
8. The punishment must be certain and imposed swiftly.
9. The purpose of imposing a sanction on an offender should not be to reform the offender or to set an example.
10. Offenders are rational thinkers that are capable of weighing the consequences of the crime, exactly like nonoffenders.
11. The aim of the criminal justice system should be to prevent crime and not be reactive in nature.

Criminological Theory: Context and Consequences
Lilly, Cullen, & Ball (2019), p.17

Though scholars of his time widely supported these propositions, some scholars argued that for a deterrent effect to take place, other conditions must be present. Indeed, Jeremy Bentham furthered this perspective by adding that a message must be relayed to a target group (i.e., if you kill someone you could go to prison for life) (Tomlinson, 2016, p.33). The public must then interpret the message as a threat and make a rational choice based on the perceived sanctions (Tomlinson, 2016, p.33). When all three elements are present, perpetrators should be deterred from committing criminal acts.

Theoretically, the clearance of a case is perhaps the most appropriate method to create a deterrent effect. Surely, if perpetrators perceive that law enforcement is equipped and capable of

identifying, swiftly apprehending, and enforcing a sanction on them, offenders can accurately gauge the risks associated with their behavior (Braga & Dusseault, 2018, p.284). However, as Bentham noted, a deterrent effect can only occur if offenders are aware of clearance rates and are able to associate them with the probability of being apprehended swiftly. Once the association occurs, offenders must feel threatened enough to make the conscious decision to not commit the crime. If all elements are present, and followed according to deterrence theory, higher clearance rates should yield lower crime levels.

Legal Cynicism

The significance of case clearance through a criminological perspective may also be exemplified by legal cynicism theory. Originally developed by Robert Sampson and Dawn Bartusch in 1998, legal cynicism theory argues that perceptions about law, criminal justice, and deviance are the result of two related influences: “(1) neighborhood structural conditions and (2) neighborhood variation in police practices and resident interaction with the police” (Kirk & Papachristos, 2011, p.1198). Simply stated, the structural characteristics of neighborhoods and police-citizen interactions, when coupled together, influence the manner in which residents view police (Sampson & Bartusch, 1998, p.777).

According to Kirk and Papachristos (2011), an individual’s cultural orientation is solely based on whether the law and its agents are perceived to be legitimate, responsive, and equipped to ensure public safety (p.1197). Indeed, this theory suggests that middle-class suburban neighborhoods are more likely to perceive our legal system as functional, primarily because it functions on their behalf (Kirk & Papachristos, 2011, p.1197). Because of their prior experiences with the police, residents living in more affluent areas expect officers to respond quickly and show concern and courteousness when arriving on scene (Kirk & Papachristos, 2011, p.1197).

Concern for the well-being of the neighborhood is further reinforced when rare violent incidents occur in the community and instantaneously make the front-page news (Kirk & Papachristos, 2011, p.1197). Given the lack of experience with violent crime and high responsiveness of the police, residents within these neighborhoods often perceive the criminal justice system as functional (Kirk & Papachristos, 2011, p.1197). Residents' faith in the legal system often result in a higher likelihood to seek assistance from the police (Kirk & Papachristos, 2011, p.1198).

Conversely, individuals residing in high-crime inner-city neighborhoods are likely to view our criminal justice system as illegitimate, unresponsive, and ill-equipped to ensure public safety (Sampson & Bartusch, 1998, p.777). Sampson and Bartusch (1998) argue that these perceptions develop because, unlike residents in middle-class urban neighborhoods, they experience violent crime at much higher rates (p.783). Ironically, in these neighborhoods, police officers are either too absent or too present, not invested in the community to attempt to prevent or fight crime, or are so invested in their authoritative role that they begin to harass residents (Sampson & Bartusch, 1998, p.738). Because these inconsistencies are so evident, when an incident occurs that requires legal assistance, residents do not feel inclined to call the police and would often rather resolve the issue informally - even if it results in a retaliatory killing (Sampson & Bartusch, 1998, p.784; Kubrin & Weitzer, 2003, p.178). Subsequently, as scholars have noted, neighborhoods characterized by higher levels of legal cynicism typically have an increased rate of violence (Kirk & Papachristos, 2011, p.1121).

When applied to the concept of case clearance, legal cynicism theory suggests that the clearance of a case may have significant implications in how citizen's may choose to interact with or refrain from the police. Indeed, when an incident occurs, all residents have a minimum expectation that police will respond promptly, conduct a thorough neighborhood canvas, and

attempt to investigate exhaustively until “justice is served.” When this occurs, especially when it culminates with the closing of a case, citizens are likely to have a better perception of the police and subsequently may feel more inclined to cooperate with police. As citizen cooperation and police legitimacy increases, residents may be less prone to solving their issues informally and instead rely on law enforcement to handle disputes. This new-found confidence in the police may also result in citizens reporting more crimes to the police.

Conversely, “cynical views of the police and the criminal justice system might lead individuals to conclude that reporting a crime to the police or cooperating with the police to help locate a suspect is of little use” (Kirk & Matusda, 2011, p.447). Should this occur, detectives will often have to reorient their investigative strategy given that identifying a perpetrator in a crime “might prove impossible without citizen cooperation” (Kirk & Matusda, 2011, p.447). When viewed collectively, legal cynicism theory suggests that the clearance of a case may play a consequential role in citizens’ perception of the police and conceivably citizens’ willingness to cooperate with ongoing investigations, rely on the police to interfere in disputes, and report crimes to the police.

Practical Significance of Case Clearance

Arguably, the most neglected feature of clearance literature is the impact that the solving of a case may have on the retaliatory cycle of urban violence. In establishing its prevalence, scholars have found that “most of the lethal violence in the United States is not a consequence of random aggression, but of violent, tit-for-tat, retaliatory responses to interpersonal conflict” (Price, 2016, para.4; Pizarro, 2008, p.328). In fact, FBI nationwide data reveals that 71% of homicides that occurred in 2011 resulted from disputes or gang activity (Price, 2016, p.4). These findings were further supported by Klofas, Altheimer, and Petitti’s (2019) study which found

that “In Rochester, New York, ... as many as 75% of homicides in any given year are the direct result of a violent dispute” (p.4).

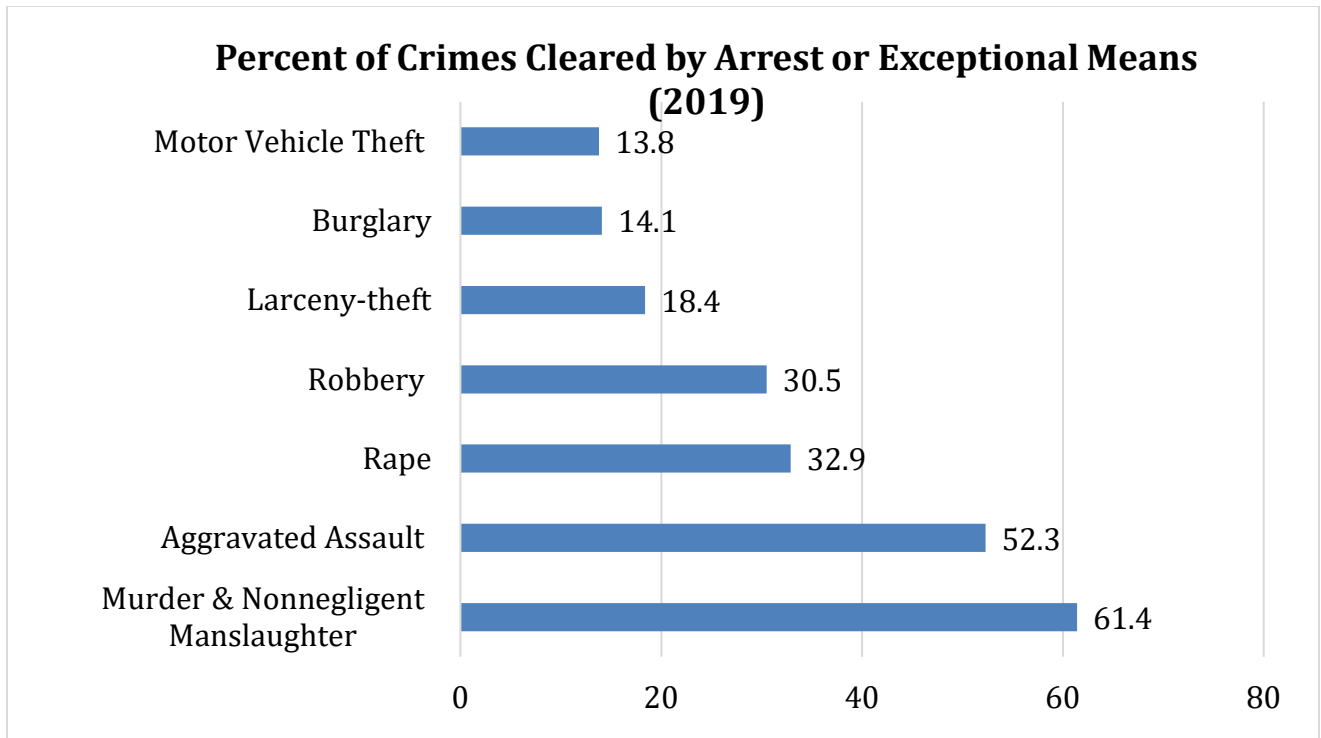
Given the preponderance of retaliatory violence on both the national and local level, leading scholars have suggested that investigative interventions, specifically through the use of criminal arrests, may be effective at preventing retaliatory violence. Certainly, the incapacitation that results from arresting a dispute participant prevents both parties from engaging in subsequent retaliatory violence (Klofas et al., 2019, p.16). Furthermore, “the filing of criminal charges can provide leverage that might be helpful with regard to other preventative measures” (Klofas et al., 2019, p.16). For instance, once an individual has been arrested and criminal charges have been filed, prosecutors may offer leniency in exchange for additional information. The potential trail of evidence that results may offer intelligence on key players, locations of weapons, or previous unsolved cases. Prosecutors may also obtain this information by monitoring jail conversations/telephone calls (Klofas et al., 2019, p.16). If proper action is taken by law enforcement during this incarceration period, subsequent retaliatory acts of violence can reasonably be prevented.

General Clearance Statistics

The final, and most pragmatic approach to understanding case clearance is through the examination of clearance rates. Clearance rates are “obtained by dividing the number of offenses cleared by the number of offenses known and then multiplying the resulting figure by 100” (FBI, 2019, p.2). Obtained by the FBI’s UCR program, this standardization of clearance figures allow us to compare jurisdictions and types of offenses.

To begin at the most basic level, figure 1 shows the national clearance rates for all part I crimes except arson.¹ As anticipated, violent crimes have significantly higher clearance rates than property crime. In fact, the largest variation observed is between motor-vehicle theft and murder and nonnegligent manslaughter, reporting a difference of 47.6%. Moreover, murder and nonnegligent manslaughter had a clearance rate 4.4 times higher than motor-vehicle theft and burglary, and 3.3 times higher than larceny-theft. Substantial differences were also observed within types of violent crime. Murder and nonnegligent manslaughter had a clearance rate 2 times higher than robbery and 2.9 times higher than rape. Furthermore, aggravated assault reported a clearance rate 1.7 times higher than robbery and 1.6 times higher than rape.

Figure 1. Percent of Crimes Cleared by Arrest or Exceptional Means (2019)



¹ Arson clearance rates were not included in this analysis given that not all agencies submit arson reports to the FBI. Though some agencies do, the significantly smaller sample size does not reflect national levels, and thus, rendered unreliable.

According to Braga and Dusseault (2018), these stark differences may be attributed to the fact that arresting serious criminals (i.e., individuals who have committed homicide), “can have great moral significance to the investigator ... [as it] gives the officer a tangible sense of protecting the community” (p.285). Consequently, officers may put forth additional effort and resources to increase their likelihood of clearing the case (Braga & Dusseault, 2018, p.287). Conversely, other perspectives suggest that violent crimes may be more likely to yield witnesses when compared to property crimes (Friedman & Cullen, 2016, para.6). In spite of these reasons, clearance rates for violent crimes are still at best mediocre given that only six out of ten suspects in a murder are arrested.

Though overall clearance rates provide some insight, specific offense breakdowns are beneficial to understanding how the circumstances of an incident may impact case outcomes. Table 1 displays offense breakdowns for part I crimes, with the exception of larceny-theft and murder and nonnegligent manslaughter, and their corresponding clearance rates.² The most apparent finding within table 1 is the large variation within the aggravated assault category, with a difference of 27.3%. The chances of clearing an aggravated assault nearly doubled if a body part was used when compared to those committed with a firearm. Vaughn (2020) claims that crimes involving personal weapons (e.g., hands, fists, feet, etc.) have a higher solvability rate “since they are more likely to involve victim-offender contact and to leave physical evidence” (p.3).

Another significant finding is the substantial difference in case outcomes between the arson of a structure and of a mobile. In fact, the arson of a structure is 2.4 times more likely to be

² The FBI obtains clearance figures for specific offense breakdowns via the Return A or the Monthly Return of Arson Offenses Known to Law Enforcement. Given that not all agencies participate, clearance figures may differ from other sources.

solved when compared to the arson of a mobile. Despite the lack of plausible explanations in the literature, this trend may be the result of a discrepancy in evidence found at the scene. Certainly, if a mobile unit has been relocated *after* the arson has been committed, the possibility of finding physical evidence diminishes greatly. Conversely, the inability to move a structure requires more effort on behalf of the perpetrator to discard of physical evidence. Though not endorsed by the literature, this may be a practical explanation to this trend.

Table 1. Clearance Rates by Type of Offense Breakdown

| Type of Offense | | Percent Cleared by Arrest |
|---------------------|-----------------------------|---------------------------|
| Rape | Rape by force | 32.6 |
| | Assault to rape-attempts | 37.1 |
| Robbery | Firearm | 22.2 |
| | Knife or cutting instrument | 33.4 |
| | Other weapon | 29.9 |
| | Strongarm | 31.2 |
| Aggravated Assault | Firearm | 31.3 |
| | Knife or cutting instrument | 55.7 |
| | Other weapon | 49.8 |
| | Hands, fists, feet, etc. | 58.6 |
| Burglary | Forcible entry | 12.7 |
| | Unlawful entry | 16.1 |
| | Attempted forcible entry | 13.8 |
| Motor Vehicle Theft | Autos | 14.6 |
| | Trucks & buses | 11.5 |
| | Other vehicles | 11.3 |
| Arson | Structure | 28.2 |
| | Mobile | 11.9 |
| | Other | 26.2 |

Conclusion

Despite there being a plethora of research available, the nuances inherent to case clearance are often misunderstood. Indeed, there are numerous variations in its definition given that police departments can create policies to close cases informally (i.e., administrative clearance). Though these policies are not recognized by the FBI UCR program, proponents of the institutional theory of organizations perspective argue that administrative clearance is used merely to appear legitimate to the public, and without it, the survival of the institution is at risk. On the contrary, criminologists argue that the clearance of a case is consequential in deterring individuals from pursuing their desires through criminal behavior and resolving disputes among themselves. When viewed within a practical context, one could also argue that the investigative intervention, solely through the arrest of a perpetrator, can largely disrupt the retaliatory cycle of violence that is inherent to urban environments. Though these perspectives provide distinct rationales for the significance of case clearance, they all proclaim that identifying and apprehending offenders are an essential function police officers *must* perform. Finally, a brief overview of clearance figures suggests that violent crimes are solved at substantially higher rates than property crimes, and even within these categories, large variations exist depending on the circumstances of the incident.

Chapter 2

Examining the Link Between Social Artifacts, Solvability Factors & Case Outcomes

Introduction

Gun violence remains a pervasive problem in America. In 2021, 20,966 were killed in gun homicides and an additional 40,605 were wounded as a result of gun violence (Simon, Kegler, Zwald, Chen, Mercy, Jones, Mercado-Crespo, Blair, & Stone, 2022, p.1286; Gun Violence Archive, 2021). Arresting perpetrators of gun violence remains a priority for police departments. Yet, in many jurisdictions, clearance rates for many types of gun violence are problematically low. Clearance rates for homicides have declined over recent decades and currently hover around 60% (Barao, Braga, Turchan, & Cook, 2021, p.578). Further, clearance rates of non-fatal shootings in some cities are below 20% (Barao et al., 2021, p.578). Low case clearance rates for gun violence affect communities in numerous ways; fueling cycles of retaliatory violence (Braga, Pierce, McDevitt, Bond, & Cronin, 2008, p.141), deepening levels of legal cynicism (Abt, 2019), and increasing fear of crime (Cordner, 2016, p.15).

Recent research has sought to provide guidance on predictors of case outcomes. Most of this research has focused on clearance of homicides, but more recent work has extended to non-fatal shootings. Findings from this research have identified key solvability factors that impact whether a case will be cleared by arrest (e.g., see Braga, Turchan, & Barao, 2019; Barao et al., 2021; Puckett & Lundman, 2003). This research has focused on four core features of an investigation that influence case solvability: victim characteristics, event characteristics, material evidence, and testimonial evidence. Scholars have derived variables from those core features that drive case clearance outcomes. For example, Braga et al. (2019) utilized data from investigative case files and in-depth interviews with detectives to determine whether the criminal history of a victim, location of an incident, collection of material evidence, or witnesses interviewed impacted investigative outcomes.

The study of solvability factors has expanded knowledge on the predictors of case clearance and helped guide law enforcement efforts to increase clearance levels for gun violence. Less attention has been given, however, to the role that documentation of solvability factors in investigative reports plays in shaping case clearance outcomes. Investigative reports are social artifacts produced by members of complex social organizations. The content police investigators record in investigative files are likely shaped by departmental culture (Gagliardi, 2010). Thus, the presence of evidence alone may not be the driving force behind what is documented in investigative case files. In departments that focus on particular solvability factors, investigators may not adequately document the presence of evidence that is not prioritized, which likely impacts case outcomes. Thus, an examination of investigative files as social artifacts can sharpen the focus on the role that the effective documentation of critical evidence plays in leading to arrests in gun violence cases. This knowledge can bolster efforts to standardize investigative documentation and help advance efforts that prioritize evidence-based investigative practices.

The goal of this study is to contribute to the growing body of research literature on case clearance levels. Focusing on non-fatal shootings, we explore how the documentation of key solvability factors in case files impacts case clearance outcomes. For this research, 166 non-fatal shooting investigative case files were obtained from a local mid-sized urban police department and coded to assess whether investigators identified key solvability characteristics for non-fatal shooting incidents. We then employed a logistic regression to assess the extent that investigative characteristics mentioned in case files were associated with the odds that the case was cleared by arrest.

Clearance of Non-Fatal Shootings Research

Investigative Files and Social Artifacts

Investigative files represent one of the most important social artifacts created by law enforcement. Though varying definitions exist, scholars typically recognize three core characteristics of a social artifact. At the most basic level, a social artifact must exist as a tangible object “endowed with its own corporality or physicality” (Suchman, 2003, p.97; Gagliardi, 2010, p.3). However, this object must be a human creation that exists independently of its maker (Suchman, 2003, p.97; Gagliardi, 2010, p.3). It must have also been intentionally and consciously produced to solve a problem or satisfy a need (Suchman, 2003, p.97; Gagliardi, 2010, p.3). Examples of social artifacts are books, photographs, paintings, newspapers, and music.

Social artifacts are particularly appealing to scholars due to their close connection to the social environment (Suchman, 2003, p.97). Because of this intimate relationship, artifacts are often considered “emblems of a socially constructed reality” (Gagliardi, 2010, p.vii). Moreover, when viewed within the institutional context, social artifacts are instruments that convey aspects of organizational culture (Gagliardi, 2010, p.vi). For instance, case files may disclose investigative practices, departmental policies, or features of detective culture that are otherwise unknown. Thus, a more in-depth examination of investigative reports as social artifacts can yield new insight into the role that the documentation of solvability factors impacts investigative practices. Given the insights this approach may yield, it is pivotal that criminal justice scholars incorporate research on social artifacts into analyses of case clearance outcomes.

Solvability Factors

Historically, scholars have utilized investigative case files to identify solvability factors. The body of literature has overwhelmingly emphasized the impact of four core features of an investigation: (1) victim characteristics, (2) event characteristics, (3) material evidence, and (4)

testimonial evidence. Collectively, these four features consist of hundreds of variables that may influence the likelihood of clearance.

Victim Characteristics

Prior research substantiates the belief that extralegal factors, primarily victim characteristics, are significant predictors of case outcomes. Scholars largely recognize that the victim's age, gender, race, and criminal history dictate the degree to which detectives investigate cases (Puckett & Lundman, 2003, p.173). Studies consistently indicate that cases involving victims that are young, female, white, have no prior convictions, or have any known gang affiliations have a greater likelihood of being cleared (Puckett & Lundman, 2003, p.173; Litwin & Xu, 2007, p.104; Litwin, 2004, p.333; Regoeczi, Kennedy, & Silverman, 2000, p.153; Alderden & Lavery, 2007, p.126; Braga et al., 2019, p.340). The theoretical framework surrounding these studies is largely borrowed from Donald Black's (1976) *Behavior of Law* theory, where he argues,

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 as merely a 'death by misadventure' (or some similar label) and accorded no investigation of any kind. (p.15)

When applied to these findings, it proposes that investigators consciously select cases to vigorously and thoroughly investigate. Simultaneously, they methodically disadvantage citizens they perceive as having lower social status. When viewed within the social artifact framework, it could also be surmised that investigators may triage the recording of information depending on the victim's characteristics. Because the treatment of the case is contingent upon the investigator, the relationship between victim characteristics and the likelihood of clearance can be convoluted.

Event Characteristics

Other scholars, however, argue that victim characteristics have little to no impact on clearance rates (Pucket & Lundman, 2003, p.173). Instead, they contend that crime scene settings and neighborhood dynamics are perhaps the strongest predictors of clearance. Certainly, whether the crime occurred indoors or outdoors highly influences the likelihood of clearance (Regoeczi, Jarvis, & Riedel, 2008, p.146). When crimes occur indoors, they typically involve victims and offenders “who know one another, which makes them inherently easier to clear by arrest” (Regoeczi et al., 2008, p.146). Incidents that occur indoors also facilitate the preservation of evidence found at the scene compared to incidents that occur in public areas (Regoeczi et al., 2008, p.146, Addington, 2006, p.142).

The broader neighborhood dynamics in which an incident occurs have also proven to influence the likelihood of clearance. Prior studies have found that homicides that occur in socioeconomically disadvantaged neighborhoods are characterized by high levels of cynicism that view criminal justice practitioners as “illegitimate, unresponsive, and ill equipped to ensure public safety” (Kirk & Papachristos, 2011, p.1191). Cynical views of law enforcement significantly impact the willingness of witnesses or persons with knowledge to share critical information of the incident and assist further in testifying in court (Braga et al., 2019, p.341). When officers are unable to obtain trust from residents, the collection of testimonial evidence is nearly impossible, which in turn decreases the likelihood of clearance.

Material Evidence

Existing studies have examined the influence of evidence collection on case outcomes, though scholars have failed to reach a consensus about their relationship. The current discourse has emphasized the prioritization of material evidence for several reasons: (1) it cannot be retracted the way witness testimony can be, (2) it is not subject to subjective analysis, (3) it can

scientifically link a particular person to an event, and (4) it is not precluded by the Fifth Amendment (Indiana State Coroners, p.80). Investigative case files from previous studies have indicated that officers typically search for DNA evidence, trace evidence, weapons, drugs, electronic evidence, and latent prints (McEwen & Regoeczi, 2015, p.1190). However, they only do so “as a ‘tool of last resort’, relying on it only when all other investigative means [have] been exhausted” (Schroeder & White, 2019, p.319).

When evidence is collected, it hardly affects clearance, or at times, even negatively correlates to case clearance (Schroeder & White, 2019, p.330). Indeed, Schroeder & White’s (2019) study found that fingerprint evidence was negatively associated with clearance, and DNA evidence was not significant at all (p.330). Other studies, however, namely the National Institute of Justice’s sponsored experiment, “found that the collecting and analysis of physical evidence at crime scenes improves the ability of investigators to identify, arrest, and prosecute criminal offenders” (Braga & Dusseault, 2018, p.288). While the research on this area is convoluted, research largely suggests that the impact of material evidence on case outcomes are contingent upon the type of evidence collected and its availability. These inconclusive results in the literature, when viewed within the social artifact framework, indicate that investigators may collect physical evidence only because it provides documentation of their efforts, and this recording of investigative efforts is often done solely to satisfy supervisors, regardless if it increases their likelihood of solving the case.

Testimonial Evidence

Conducting interviews with victims and witnesses are arguably the most essential practice of investigators, and the literature suggests they are perhaps linked most strongly with making an arrest. Interviews are particularly important since “the most serious crimes are solved

by the responding patrol officer through information obtained from the victim or victims, rather than leads developed by investigators” (Braga & Dusseault, 2018, p.286; Pizarro, Terrill, & LoFaso, 2020, p.6). When responding patrol officers are unable to solve the case, an investigator’s follow-up interview with a witness will also produce outstanding leads, additional physical evidence, or help investigators develop new theories or suspects (Davis, Jensen, Burgette, & Burnett, 2014, p.375). However, much of the information resulting from the interview concerns the circumstances of the incident, the perpetrator’s motive, identification of suspects or victims, or location of the suspect (Smythe, 2009, p.20). These subsequent efforts then contribute to the overall solvability of the case (Davis et al., 2014, p.375).

Social Artifacts, Solvability Factors, and Case Outcomes

An examination of investigative reports as social artifacts opens important vistas for scholars seeking to advance knowledge of case clearance for gun violence. As noted above, the documentation of solvability factors in investigative reports is likely impacted by departmental culture. Therefore, it is plausible that the documentation of key evidence is driven by the actual presence of evidence, investigator acumen, and broader departmental factors. Importantly, the documentation of key evidence likely serves as a key factor in case outcomes. Inclusion of key evidence in investigative files likely drives subsequent system actions that impact the likelihood of any arrest. For example, inclusion of key suspect information may allow crime analysts to link key evidence with information gathered by other law enforcement actors. Further, the failure to properly document key solvability factors likely reduces the willingness of prosecutors to file charges against suspects.

An examination of investigative reports as social artifacts serves as a starting point for understanding what solvability factors are likely to be included in investigative files and how the

documentation of those solvability factors impacts case clearance. This study seeks to elucidate the link between social artifacts, solvability factors, and case outcomes by examining 166 case files completed by officers and investigators in a mid-sized northeastern city. We examine the following research questions:

1. What solvability factors are likely to be included in investigative reports?
2. How does the documentation of particular solvability factors in investigative reports impact the odds of clearance by arrest for non-fatal shootings?

Data & Methods

Data for this analysis come from 166 investigative case files completed by police officers and investigators from a mid-size northeastern police department. These case files document the investigative efforts for every non-fatal shooting incident from January 1, 2015, to December 31, 2015. Once arriving on scene, officers and investigators are required to document each step of the investigative process through a series of incident reports which are finalized when approved by a supervisory Sergeant of the police department. Each individual incident report is compiled into a case file with an associated case number for the criminal incident.

Interviews with local investigators, a review of the literature, and a systematic review of the investigative case files led to the development of an investigative codebook. The codebook consists of 33 variables, which mainly included basic event characteristics, victim characteristics, testimonial evidence, material evidence, and clearance measures. This codebook allowed trained coders to identify those factors most noted in the literature and serve as a guideline for comparing how many key factors were captured by the social artifact of interest. Data derived from those variables were coded “1” for present (i.e., mentioned) and “0” for absent (i.e., not mentioned).

To validate this codebook, borrowing from the process outlined by Maguire, Uchida, & Hassell (2015), two trained coders coded a random sample of five case files. According to Cohen’s parameters in “A Coefficient of Agreement for Nominal Scales” (1960), this process led to an inter-rater reliability test that resulted in a substantial Kappa (.786). In this process, 18 variables with moderate inter-rater reliability (Kappa=.543) were identified. The trained coders discussed the discrepancies and alterations were made to the codebook. After making those alterations, an additional five cases were randomly selected, coding only those 18 problematic variables. This process led to a “near-perfect” reliability for those variables (Kappa=.806). The completed codebook was then used to code every case file for the year 2015. Overall, 166 non-fatal shooting cases were coded and analyzed in this study.

Table 1. Core Investigative Variables from 166 Non-Fatal Shootings.

| |
|---|
| Event Characteristics |
| Does the report mention the date of the incident? |
| Does the report mention the time of the incident? |
| Does the report mention the type of incident? |
| Does the report mention the location of the incident? |
| Does the report mention where the crime occurred? |
| Does the report mention if the location is known for criminal activity? |
| Victim Characteristics |
| Does the report mention the name of the victim? |
| Does the report mention the number of victims identified? |
| Does the report mention the victim status? |
| Does the report mention if the victim has a criminal history? |
| Does the report mention if the victim is associated with a gang? |
| Material Evidence |
| Does the report mention if they checked for private cameras? |
| Does the report mention if they checked for city cameras? |
| Does the report mention if the scene was searched? |
| Does the report mention if the officer secured the scene? |
| Does the report mention if bullet evidence was collected? |
| Does the report mention if photos were taken of the crime scene? |
| Does the report mention if physical evidence was collected? |
| Does the report mention if a lab report was submitted? |
| Does the report mention if DNA evidence was collected? |
| Does the report mention if the firearm was collected as evidence? |

| |
|---|
| Does the report mention if physical evidence tests were completed? |
| Testimonial Evidence |
| Does the report mention if interviews were conducted? |
| Does the report mention if a victim was interviewed? |
| Does the report mention if a neighborhood canvas was conducted? |
| Does the report mention if information was obtained during the neighborhood canvas? |
| Does the report mention if a person with knowledge was interviewed? |
| Does the report mention if the victim was cooperating? |
| Does the report mention if a witness was interviewed? |
| Does the report mention if depositions were obtained? |
| Does the report mention if this case is dispute related? |
| Does the report mention if the persons with knowledge were cooperating? |
| Does the report mention if the witness is cooperating? |

The first portion of our analysis examines the presence of core investigative variables in these cases, not the outcomes of those investigative steps. This is a key distinction. If the investigative file mentioned the variable, regardless of whether or not the investigative practice was carried out, the coders coded it as “1” for present. For instance, if investigators took the step to check for video footage of a shooting, the variable would be coded as “1” for present, regardless of if any footage was obtained. In other words, our analyses only account for the mention of the investigative practice, not whether it was carried out. This portion of the analysis aims to better understand the investigative steps detectives perform during nonfatal shooting investigations.

The second part of our analyses employs a stepwise backward elimination logistic regression to determine the core variables that were associated with clearance by arrest in those cases. This approach began with a full model of the core investigative variables identified in our first part of the analysis, and gradually removed variables from the regression model at each interval based on their corresponding coefficients. This determined an ideal model that better explained the data most effectively. This step was then repeated until only the significant variables remained. The final model identified variables that significantly impacted the

likelihood of clearance, resulting in the second portion of our analysis.

Although this general method has been used in previous studies, this current study is one of very few to have conducted a systematic analysis measuring the presence of investigative variables in case files. This methodology can be seen in various other studies, particularly those analyzing problem-oriented policing cases. For instance, Maguire, Uchida, & Hassell (2015) conducted a similar study of 753 problem-oriented policing cases in Colorado Springs, which is considered to be one of the most ambitious studies to date because of the volume of cases and variables coded. This method can also be seen in early studies like the systematic content analysis of 63 problem-oriented policing cases in the Lincoln Police Department. One of the earliest studies to have used this approach is the Leigh, Read & Tilley study (1998) which analyzed 340 problem-oriented policing cases in Cambridge and Leicestershire, England. Although this methodology is very similar, the nature of the coding scheme differed greatly due to our theoretical approach.

Results/Findings

Descriptive Findings

Table 2 shows the presence of core investigative practices in nonfatal shooting case files. Our findings reveal that event characteristics such as date, time, location, and type of incident were present in all 166 cases. However, crime scene setting characteristics were less likely to be included in the case files. Specifically, approximately 90% of cases contained information on where the crime occurred, whether it was indoor or outdoor. While the neighborhood dynamic variable, specifically the criminal activity of the neighborhood, was rarely present.

When it pertains to the presence of victim characteristics in investigative case files, our findings reveal that very minimal information is collected on the background of the victim. The

name, number, and status of victims were included in all cases, with the exception of one case that failed to mention the victim status. Contrary to this, the criminal history and gang association of the victim was rarely ever known. This suggests that documentation of information regarding the victim *only* at the time of the incident was prioritized during the course of the investigation.

Variables concerning the collection of evidence were found to be inconsistently reported in investigative files. Only 54.2% of cases mentioned if the scene was searched and only 47.6% of cases mentioned if the officer secured the scene. Furthermore, the documentation of checking for documentary evidence such as camera footage seemed to be prioritized over evidence found at the scene. Moreover, the collection of bullet evidence was most likely to be mentioned compared to physical evidence, DNA evidence, and firearm evidence. In cases where the evidence passed the collection stage, only 16.3% of case files contained a lab report of the results.

In terms of the presence of testimonial evidence in investigative files, the findings suggest that interviews were conducted in almost all cases, most being with a victim. Moreover, neighborhood canvases were mentioned in approximately 90% of cases, most resulting in additional information about the incident. Furthermore, persons with knowledge were more likely to be interviewed by officers than witnesses. Approximately a quarter of cases mentioned whether the case was dispute related and whether depositions were obtained. Officers that filled out case files were more likely to mention if the victim was cooperating compared to persons with knowledge and witnesses.

One of our most important findings is the measure of clearance in nonfatal shooting investigations. Only 18.1% (33 cases) were cleared by arrest in our sample of nonfatal shooting

investigations. The findings reveal that not all case files mention the method or date of clearance. There were four cases that neglected to mention the method or date of clearance in investigative files. Next, we turn to an examination of whether the presence of particular variables in the investigative file accounts for variation on case clearance outcomes.

Table 2. Frequency Distribution for Core Investigative Variables.

| Core Investigative Variables | Frequency | Percentage (%) |
|---|------------------|-----------------------|
| Event Characteristics | | |
| Does it mention the date of the incident? | 166 | 100% |
| Does it mention the time of the incident? | 166 | 100% |
| Does it mention the type of incident? | 166 | 100% |
| Does it mention the location of the incident? | 166 | 100% |
| Does it mention where the crime occurred? | 150 | 90.4% |
| Does it mention if the location is known for criminal activity? | 18 | 10.8% |
| Victim Characteristics | | |
| Does it mention the name of the victim? | 166 | 100% |
| Does it mention the number of victims identified? | 166 | 100% |
| Does it mention the victim status? | 165 | 99.4% |
| Does it mention if the victim has a criminal history? | 38 | 22.9% |
| Does it mention if the victim is associated with a gang? | 27 | 16.3% |
| Material Evidence | | |
| Does it mention if they checked for private cameras? | 109 | 65.7% |
| Does it mention if they checked for city cameras? | 108 | 65.1% |
| Does it mention if the scene was searched? | 90 | 54.2% |
| Does it mention if the officer secured the scene? | 79 | 47.6% |
| Does it mention if bullet evidence was collected? | 68 | 41.0% |
| Does it mention if photos were taken of the crime scene? | 67 | 40.4% |
| Does it mention if physical evidence was collected? | 50 | 30.1% |
| Does it mention if a lab report was submitted? | 27 | 16.3% |
| Does it mention if DNA evidence was collected? | 20 | 12.0% |
| Does it mention if the firearm was collected as evidence? | 16 | 9.6% |
| Does it mention if physical evidence tests were completed? | 6 | 3.6% |
| Testimonial Evidence | | |
| Does it mention if interviews were conducted? | 165 | 99.4% |
| Does it mention if a victim was interviewed? | 162 | 97.6% |
| Does it mention if a neighborhood canvas was conducted? | 149 | 89.8% |
| Does it mention if information was obtained during the neighborhood canvas? | 132 | 79.5% |
| Does it mention if a person with knowledge was interviewed? | 127 | 76.5% |
| Does it mention if the victim was cooperating? | 89 | 53.6% |
| Does it mention if a witness was interviewed? | 71 | 42.8% |

| | | |
|---|----|-------|
| Does it mention if depositions were obtained? | 46 | 27.7% |
| Does it mention if this case is dispute related? | 43 | 25.9% |
| Does it mention if the persons with knowledge were cooperating? | 25 | 15.1% |
| Does it mention if the witness is cooperating? | 21 | 12.7% |

Regression Analysis

Table 3 presents the results of the logistic regression of core investigative variables on clearance by arrest. The results indicate that evidence, interview, and event characteristic variables impacted the likelihood of clearance. No variables pertaining to victim characteristics were associated with whether an arrest was made in the case. The model found that variables concerning the collection of evidence were most likely to be associated with clearance. Controlling for all other variables, if the investigators mentioned whether a lab report was submitted, the odds of a suspect being apprehended would increase by a factor of approximately fifteen. While this variable was positively correlated to clearance rates, lab reports were rarely included in the case files (approximately 16.3%). Whether physical evidence was collected also increased the odds of an arrest being made by a factor of approximately 9, controlling for all variables. Interestingly, the mention of physical evidence tests being completed was associated with a decreased odds of an arrest being made by a factor of .074. Moreover, while checking for private cameras was prioritized in case reports, present in 65.7% of cases, this variable was negatively associated with the odds of a suspect being apprehended by a factor of 0.21, controlling for all variables.

Interview characteristics also had a great impact on clearance, according to our regression model. When controlling for all other variables, the variable “Does it mention if depositions were obtained?” was significant at the .05 level ($p=.000$, $\text{Exp (B)}=19.585$). This means the odds of an arrest being made were approximately 20 times higher if the case file mentioned whether a

deposition was obtained. The results also indicate that the variable “Does it mention if the witness is cooperating?” was significant at the .05 level ($p=.028$, $\text{Exp (B)}=5.613$), suggesting that the likelihood of an arrest being made were 6 times higher if the case file mentioned whether a witness was cooperating. In this category, whether a neighborhood canvas was mentioned did not increase the odds of an arrest being made. While this variable was present in 89.9% of cases, the odds of clearance by arrest decreased by a factor of 0.154 if mentioned in the case file. Our regression model also indicated that the context in which the shooting occurred, whether it was indoor or outdoor, impacted the likelihood of clearance. The odds of an arrest being made were 7 times higher if the case file mentioned where the crime occurred when controlling for all variables.

Table 3. Logistic Regression for Core Investigative Variables.

| Independent Variable | B | S.E. | Wald | df | Sig. | Exp(B) |
|--|----------|-------------|-------------|-----------|-------------|---------------|
| Constant | -4.044 | 1.318 | 9.407 | 1 | .002 | .018 |
| Event Characteristics | | | | | | |
| Does it mention where the crime occurred? | 1.947 | 1.168 | 2.778 | 1 | .096 | 7.006 |
| Material Evidence | | | | | | |
| Does it mention if they checked for private cameras? | -1.546 | .706 | 4.796 | 1 | .029 | .213 |
| Does it mention if physical evidence was collected? | 2.243 | .728 | 9.502 | 1 | .002 | 9.421 |
| Does it mention if a lab report was submitted? | 2.707 | .741 | 13.346 | 1 | .000 | 14.984 |
| Does it mention if physical evidence tests were completed? | -2.601 | 1.275 | 4.159 | 1 | .041 | .074 |
| Testimonial Evidence | | | | | | |
| Does it mention if a neighborhood canvas was conducted? | -1.873 | .916 | 4.183 | 1 | .041 | .154 |
| Does it mention if depositions were obtained? | 2.975 | .694 | 18.352 | 1 | .000 | 19.585 |
| Does it mention if the witness is cooperating? | 1.725 | .783 | 4.856 | 1 | .028 | 5.613 |

Discussion & Conclusion

This study examined the link between the documentation of solvability factors and clearance by arrest for non-fatal shootings. The first portion of our analysis, which examined the

presence of core investigative variables, indicates that basic information regarding the incident and victim are the most documented pieces of information in the investigative process. Indeed, investigators reported the date, time, type, and location of the incident, and the name and number of victims identified in each case file. The consistent documentation of these variables implies that investigators prioritize this information because they view it as necessary for the formal processing of cases through the criminal justice system. In the same vein, supervisors may refuse to sign off on reports without this basic information. Certainly, without these details, it is practically impossible to prove a crime has occurred and subsequently obtain a conviction.

Other variables, particularly those relating to testimonial evidence, also appeared to be documented systemically. The recording of whether interviews were conducted, victims were interviewed, and a neighborhood canvas was conducted was present in 99.4%, 97.6%, and 89.9% of cases, respectively. The large presence of these variables in investigative case files suggests that the documentation of these variables are an institutionalized practice in the investigative process. Investigators may view it necessary to improve the solvability of the case and demonstrate their effort towards the investigation to supervisors.

While not documented as consistently, other variables pertaining to victim cooperation and video evidence were also among our significant findings. Whether the victim was cooperating was mentioned in 53.6% of cases. Though moderately documented, this presence of this variable implies that investigators perceive victim cooperation to be a significant component of investigations. Given that “most serious crimes [are] solved ... through information obtained by victims and witnesses,” investigators may decide the amount of effort and resources they devote to the investigation based on the willingness of the victim to cooperate (Braga et al., 2019, p.338). Similarly, whether private and city cameras were checked was mentioned in 65.7%

and 65.1% of case files, respectively. Investigators were also more likely to mention video evidence over physical evidence. This institutionalized practice may be in recognition that video evidence is often more cost effective for the department to process, is a lot more accessible, and could possibly confirm the identity of a suspect (Dowling, Morgan, Gannoni, & Jorna, 2019, p.1-5).

Perhaps the most anomalous finding in our systematic content analysis is the prevalence of the documentation of whether the case was dispute related and the victim was associated with a gang. In our analysis, 25.9% of cases mentioned if the incident was dispute related while 16.3% mentioned whether the victim was associated with a gang. Though moderately low when compared to other variables, the mere presence of these variables is sufficient evidence to suggest that disputes and gang involvement are of particular importance to investigators. In fact, the institution recognizes the relationship between violent crime and disputes and gang involvement. Indeed, through the “Retaliatory Disputes Project,” research revealed that “60 percent of the shootings that occurred [in our sample city] between 2010 and 2012 were associated with a previously identifiable dispute” (Klofas, Althiimer, & Petitti, 2019, p.6). Given that the project is unique to that city, one could expect that a similar analysis in a differing jurisdiction would not yield the same results.

In the second portion of our analysis, we found that only eight variables (24%) were associated with clearance by arrest. While five of those eight variables were found to be positively associated with clearance by arrest, only two variables stand out. The documentation of whether depositions were obtained impacted the likelihood of clearance the most, increasing the odds by a factor of nearly 20. Moreover, the odds of an arrest being made were approximately 15 times higher if the case file mentioned whether a lab report was submitted.

Interestingly, the variables negatively associated with clearance were largely related to material evidence. The documentation of whether investigators checked for private cameras and whether physical evidence tests were completed decreased the odds of clearance by a factor of .213 and .074, respectively. This may suggest that technological innovations aren't a panacea for improving the administration of justice. Indeed, this finding is consistent with Phillips, Drake, & Alzheimer's (2022) research which found that the presence of NIBINS lead was not related to clearance by arrest. The only other variable negatively associated with clearance pertained to whether a neighborhood canvas was conducted. This variable decreased the odds of clearance by a factor of .154. This finding may suggest that although documenting this variable is an institutionalized practice, present in 89.8% of case files, it is not positively associated with clearance by arrest.

When viewing investigative case files through a social artifact framework, the findings indicate that investigative case files as a data source are exceedingly unreliable. Our descriptive analysis reveals that investigators do not consistently document investigative practices and intelligence. And those that are consistently documented, are a part of institutionalized practices that are unique to their corresponding police department. This implication suggests that analyses relying on investigative case files to report outcomes are precarious and merit further consideration. Overall, social scientists interested in case clearance should spend more time considering how the process of creating social artifacts impacts data reliability and validity.

Chapter 3

A Descriptive Analysis of Aggravated Assault Clearance Rates for 49 U.S. Cities from 2007 to 2016

Introduction

Despite its' significance, clearance rates for certain types of crimes, particularly those that do not result in a death, are often left unexplored. And while it is important to study the clearance of homicides, the literature has largely neglected the gravity of solving gun-related incidents. Overall, the literature suggests that solving gun-related incidents, specifically aggravated assaults, may deescalate ongoing disputes, and consequently prevent future homicides. Indeed, "in Rochester, New York, ... as many as 75% of homicides in any given year are the direct result of a violent dispute" (Klofas, Altheimer, & Petitti, 2019, p.8). Not to mention, the vast majority of homicides are committed with a gun (Philadelphia Office of the Controller, 2022, p.1), suggesting that the apprehension of a suspect may lead to the seizure of a weapon in circulation. In recognizing this gap in the literature, we aim to explore clearance rates for aggravated assaults over a ten-year period.

Methodology

The data for this analysis was obtained from the National Incident-Based Reporting System (NIBRS) and reports clearance figures for 49 cities from 2007 to 2016. The cities represented within our sample met the following criteria: (1) reported a population of over 100,000 from 2007 to 2016, and (2) provided clearance data for aggravated assaults for each year from 2007 to 2016. Cities with populations below 100,000 residents were excluded from this analysis for several reasons. First, smaller cities often lack their own police departments and instead are policed by larger county or state agencies. Second, because these cities are smaller in size, violent crime is a rare occurrence, and thus, cases are conceivably more likely to be solved. Due to the possibility of inflated clearance rates, they were omitted from this analysis.

Unlike the traditional Uniform Crime Reporting (UCR) Program, which reports aggregate crime statistics, NIBRS provides a detailed case report for each crime incident. Specifically, NIBRS enhances our understanding of these crimes by providing “information on victims, known offenders, relationships between victims and offenders, arrestees, and property involved in crimes” (FBI, 2018).

Given its richer form of data reporting, we exclusively used NIBRS data to explore aggravated assault incidents that involved a firearm. To extract only firearm related incidents, we filtered the results in the “Type Weapon/Force Involved” variable to include only those that stated “firearm - type not stated,” “firearm - automatic,” “handgun,” “handgun - automatic,” “rifle,” “rifle-automatic,” “shotgun,” “shotgun-automatic,” “other firearm,” and “other firearm-automatic” as the weapon type. This approach provided an isolated dataset of all aggravated assault incidents that were firearm related.

It is worth noting, however, that although firearm-involved assaults are colloquially referred to as “non-fatal shootings,” this is not always the case. NIBRS defines aggravated assaults as “an unlawful attack by one person upon another wherein the offender uses a weapon or displays it in a threatening manner, or the victim suffers obvious severe or aggravated bodily injury ...” (FBI, 2018). Due to this definition, it is impossible to disentangle between the categories of “shootings,” where a victim is shot but survives, and “menacing,” where an offender threatens the victim with a firearm. Despite this limitation, the dataset still provides valuable insight into gun violence.

Finally, to identify which cases were cleared by arrest, we referred to variable “V1011” labeled “Total Arrestee.” If the variable showed a value greater than 0, the case was closed by arrest and therefore extracted for this analysis.

Results

Given that year-to-year fluctuations in clearance rates are common, we begin our analysis with an examination of clearance data from 2007 to 2016. While this approach may conceal long-term variation in clearance figures, an aggregation of ten years of data allows us to gauge where each jurisdiction stands over time. Moreover, to allow for accurate comparison across cities, we controlled for differences in population size and crime levels by calculating rates. Table 1 reports the 10-year population and clearance rate average, range, percent change rate, and standard deviation of 49 U.S. cities. The cities are ranked by clearance rates in descending order. There are three general conclusions that Table 1 supports:

1. Clearance rates for aggravated assaults varied significantly across the U.S. cities in our sample. The highest and lowest reporting clearance rates marked a difference of 45.5.
2. A significant amount of fluctuation occurred from 2007 to 2016 in each city. The average range of all cities was 20.56.
3. Most cities experienced a decrease in clearance rates from 2007 to 2016. Only 38.77% of cities (19/49) experienced an increase in the ten years.

Table 1. Population Average, Clearance Rate Average, Range, Percent Change Rate, and Standard Deviation of 49 U.S. Cities.

| City | Population Average | Clearance Rate Average | Range | Standard Deviation | Percent Change Rate |
|-------------------------|--------------------|------------------------|-------|--------------------|---------------------|
| 1. Salem, OR | 134,601 | 53.62 | 34.07 | 9.65 | 20.83% |
| 2. Clarksville, TN | 134,874 | 52.47 | 20.84 | 6.17 | 20.42% |
| 3. Fort Collins, CO | 146,756 | 44.36 | 50.88 | 15.11 | -42.86% |
| 4. Denton, TX | 123,426 | 44.19 | 32.44 | 11.53 | 16.87% |
| 5. West Valley, UT | 130,011 | 41.36 | 29.37 | 9.5 | 16.05% |
| 6. Colorado Springs, CO | 420,557 | 39.8 | 15.89 | 5.08 | -6.40% |
| 7. Worcester, MA | 181,342 | 39.69 | 27.51 | 9.3 | -38.78% |
| 8. Charleston, SC | 114,317 | 38.59 | 43.2 | 14.85 | 95.94% |
| 9. Boise, ID | 210,491 | 38 | 33.66 | 10.64 | 4.65% |
| 10. Alexandria, VA | 147,279 | 37.59 | 28.95 | 10.26 | 137.50% |
| 11. Sioux Falls, SD | 141,993 | 36.99 | 33.33 | 11.28 | 4.35% |

| | | | | | |
|------------------------|---------|-------|-------|-------|---------|
| 12. Cedar Rapids, IA | 128,407 | 36.15 | 33.16 | 10.27 | -13.04% |
| 13. Chattanooga, TN | 171,188 | 33.6 | 23.63 | 8.02 | -44.90% |
| 14. Aurora, CO | 291,467 | 33.29 | 10.4 | 3.98 | 8.78% |
| 15. Beaufort, SC | 129,015 | 32.99 | 20.9 | 6.96 | -9.56% |
| 16. Hampton, VA | 140,327 | 32.02 | 23.08 | 8.65 | -21.33% |
| 17. Denver, CO | 631,317 | 31.48 | 11.79 | 3.3 | 27.62% |
| 18. York, SC | 132,786 | 30.6 | 28.94 | 9.55 | -23.10% |
| 19. Stamford, CT | 124,068 | 30.47 | 45.71 | 13.97 | -5.88% |
| 20. Lakewood, CO | 145,172 | 29.74 | 24.98 | 7.8 | -24.81% |
| 21. Virginia Beach, VA | 444,057 | 29.69 | 20.43 | 5.92 | -10.30% |
| 22. Des Moines, IA | 203,663 | 29.32 | 14.35 | 5.01 | 31.01% |
| 23. Greenville, SC | 331,642 | 29.3 | 16.49 | 4.73 | -33.81% |
| 24. Plano, TX | 269,385 | 29.2 | 34.78 | 10.64 | -39.53% |
| 25. Salt Lake City, UT | 186,859 | 29.17 | 16.18 | 5.36 | -17.97% |
| 26. Murfreesboro, TN | 112,421 | 28.42 | 17.74 | 5.87 | -6.54% |
| 27. Wichita, KS | 379,182 | 25.78 | 9.31 | 3.02 | -15.94% |
| 28. Fort Worth, TX | 758,266 | 25.72 | 10.61 | 3.35 | -19.42% |
| 29. Knoxville, TN | 184,186 | 25.65 | 16.2 | 4.93 | -15.54% |
| 30. Anderson, SC | 147,805 | 25.46 | 12.77 | 3.9 | -43.54% |
| 31. Tacoma, WA | 201,981 | 25.25 | 12.9 | 4.49 | -14.14% |
| 32. Dayton, OH | 146,413 | 24.26 | 17.94 | 5.69 | -32.68% |
| 33. Cincinnati, OH | 311,581 | 22.7 | 12.73 | 4.86 | 29.50% |
| 34. New Haven, CT | 127,924 | 21.8 | 26.37 | 7.11 | -54.85% |
| 35. Richmond, VA | 208,784 | 20.57 | 18.27 | 7.32 | -9.97% |
| 36. Milwaukee, WI | 598,426 | 20.39 | 23.22 | 7.5 | 95.38% |
| 37. Akron, OH | 201,659 | 19.36 | 20.01 | 6.29 | 43.78% |
| 38. Memphis, TN | 661,953 | 19.01 | 8.04 | 2.65 | -17.75% |
| 39. Cleveland, OH | 407,149 | 17.39 | 18.64 | 6.16 | -76.89% |
| 40. Newport News, VA | 182,383 | 17.37 | 14.9 | 3.94 | -21.74% |
| 41. Detroit, MI | 772,246 | 17.32 | 6.27 | 1.96 | -24.82% |
| 42. Columbia, SC | 129,508 | 16.2 | 20.79 | 6.89 | 149.69% |
| 43. Grand Rapids, MI | 192,419 | 14.6 | 12.14 | 4.26 | 61.29% |
| 44. Springfield, MA | 153,423 | 13.39 | 6.36 | 2.21 | -41.43% |
| 45. Columbus, OH | 781,031 | 10.59 | 5.02 | 1.65 | 4.94% |
| 46. Chesapeake, VA | 228,010 | 10.47 | 7.88 | 2.47 | -45.50% |
| 47. Rockford, IL | 152,805 | 10.33 | 10.07 | 3.57 | -51.32% |
| 48. Norfolk, VA | 240,869 | 8.48 | 10.29 | 2.96 | 13.00% |
| 49. Providence, RI | 176,001 | 8.12 | 14.25 | 3.8 | 620.61% |

Measures of Central Tendency

Mean & Median

Perhaps the most simplistic approach to summarizing data is through measures of central tendency. According to Bachman and Paternoster (2009), “a measure of tendency is a summary descriptive statistic that captures the most typical score in a distribution of scores or the most typical value of a variable” (p.112). Though several measures of central tendency exist, the most suitable measures for our data are the mean and median. The mean, also called the arithmetic

average, “is calculated by summing all of the scores and then dividing by the total number of scores” (Bachman & Paternoster, 2009, p.126). While advantageous, the mean may provide an inaccurate description of the data as it is highly susceptible to outliers. To determine whether the mean is an accurate measure of central tendency, the median is often used as a standard of comparison. The median locates the center value of a rank-ordered distribution of scores, meaning that “one-half of a variable’s values are less than the median and one-half are greater than the median” (Bachman & Paternoster, 2009, p.119). If the difference between the mean and median are relatively low, the mean may be used as an efficient measure of central tendency.

To determine the average clearance rate of each city in our sample, we calculated the mean and median using clearance rates from 2007 to 2016. Though not detailed in Table 1, an initial comparison review between the two measures determined that the mean provided an accurate measure of central tendency. When viewed collectively, our analysis suggests that there is large variability in clearance rates between each city. Salem, Oregon experienced the highest clearance rate in our sample, solving over 53% of cases while the lowest scoring city, Providence, Rhode Island only solved 8.12% of cases. Moreover, when viewed within the national context, we see that only two cities within our sample (i.e., Salem, Oregon & Clarksville, Tennessee) hovered around the national clearance rate average for aggravated assaults which was 52.3% in 2019 (Federal Bureau of Investigations, 2019, para.7). This finding implies that most cities within our sample are significantly underperforming. Lastly, we found that the average clearance rate for all cities within our sample was 27.6.

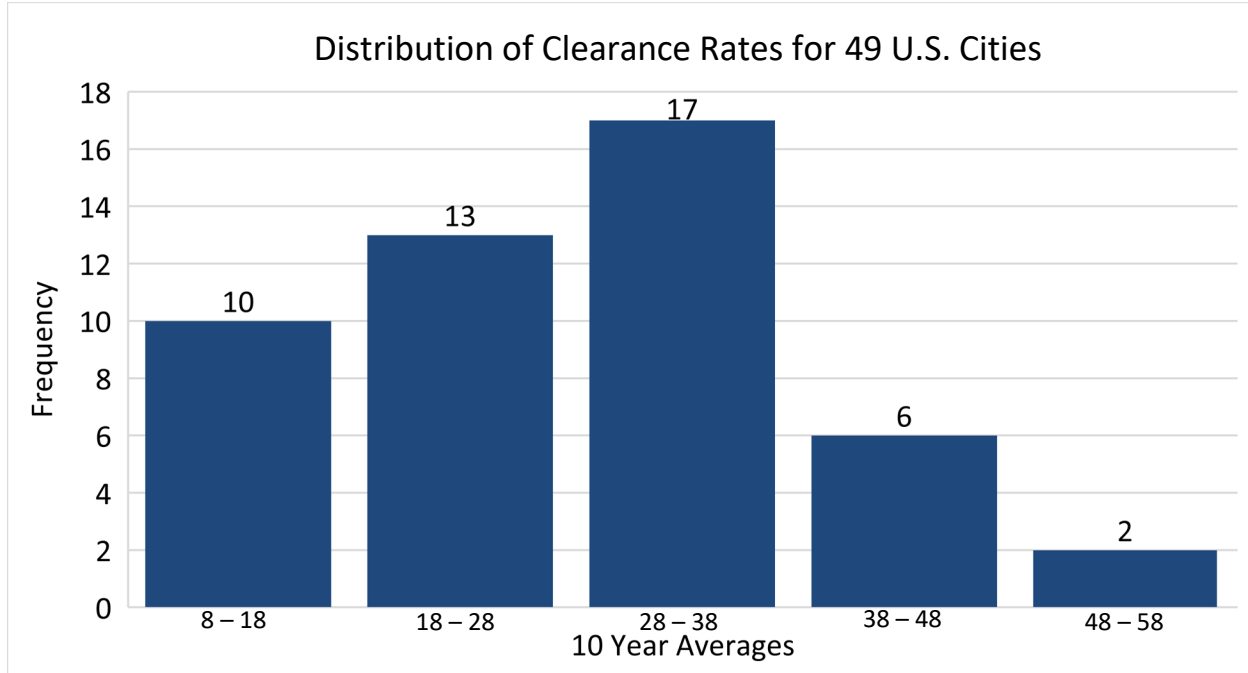
Skewness & Kurtosis

An additional feature of descriptive statistics that is integral to understanding a dataset is the measurement of symmetry and sharpness of a peak in a given distribution. The shape of a

distribution is quantified in a skewness and kurtosis value. A skewness statistic measures the degree to which the distribution deviates from a normal distribution or lacks symmetry (Bachman & Paternoster, 2009, p.86). The shape of a distribution may be negatively (i.e., left-tailed) or positively (i.e., right-tailed) skewed. In other words, a skewness statistic helps determine whether outliers exist and their location in the distribution. Conversely, kurtosis measures “whether the data are heavily-tailed or light-tailed relative to the normal distribution” (National Institute of Standards and Technology, n.d., para.3). A high kurtosis value indicates the presence of significant outliers, or heavy tails, while a low kurtosis value implies a lack of outliers, or light tails. Together, the measurement of skewness and kurtosis provide a descriptive picture of the shape of your distribution.

Our skewness and kurtosis values indicate that our distribution is relatively close to a normal distribution. The general rule of thumb for skewness is that values that fall between -0.5 and 0.5 are fairly symmetrical. Conversely, a kurtosis value that is near 0 is a mesokurtic or normal distribution. Our data produced a skewness value of .21 and a kurtosis value of -.25, both indicating an acceptable range of skewness and kurtosis relative to a normal distribution. Figure 1 provides a visual representation of the distribution of clearance rate average for all 49 cities. According to the histogram, the distribution goes as follows: (1) 22.44% of cities are between 8 and 18, (2) 24.49% of cities are between 18.01 and 28, (3) 36.73% of cities are between 28.01 and 38, (4) 10.2% of cities are between 38.01 and 48, and (5) 4.08% are between 48.01 and 58.

Figure 1. Distribution of 10 Year Averages for 49 U.S. Cities.



Measures of Dispersion

Range & Standard Deviation

Though measures of central tendency are a crucial feature to understanding our data, they do not have the capability to tell you how similar the values of a variable are. Measures of dispersions are “summary measures that reflect how different scores are from each other or from one central score..., [and] tell us how dispersed, or scattered, the scores in a distribution are” (Bachman & Paternoster, 2009, p.146). The most straightforward measure of dispersion is called the range. The range “is calculated as the difference between the highest value or score and the lowest: $\text{Range} = \text{Highest value} - \text{Lowest value}$ ” (Bachman & Paternoster, 2009, p.146). Though insightful, a significant disadvantage of the range is that it does not account for all values in the dataset, only the highest and lowest. To provide additional context, the standard deviation is often referred to. The standard deviation calculates “the typical distance of each score from the mean” by taking “the square root of the mean of the deviation scores” (Bachman & Paternoster,

2009, p.166). The range and standard deviation yield a distinct yet insightful understanding to the dispersion of a given dataset.

To determine the variability in clearance rates for each city, we calculated the range and standard deviation using clearance rates from all ten years. Fort Collins, Colorado had the highest range in our sample, with a difference of 50.88 between their highest and lowest reporting clearance rates. A further review of the data revealed that this substantial range can be attributed to only one year of change. In fact, Fort Collins's clearance rate leaped from 15.79 in 2009 to 66.67 in 2010. The significant variability seen in Fort Collins's clearance rate is further supported by a standard deviation of 15.11. This finding signifies that their clearance rates from 2007 to 2016 are further spread out and thus, the most inconsistent city in our sample. In contrast, the lowest range within our sample corresponds to Columbus, Ohio, with a range of 5.02 and standard deviation of 1.65. This finding indicates that clearance rates from 2007 to 2016 for Columbus, Ohio were clustered around the mean (10.59), signifying that they had the most stable clearance rates in our sample.

When viewing all cities collectively, we found significant dispersion of clearance rates between cities. Indeed, the range between the highest and lowest clearance rate averages was 45.5. Moreover, we found a standard deviation of 10.96. This means that 68% of cities had an average clearance rate between 16.63 and 38.56, or within one standard deviation of the mean. Approximately 95% of cities had an average clearance rate between 5.67 and 49.53, or within two standard deviations from the mean. Lastly, 99% of cities had an average clearance rate between 0 and 60.49, or within three standard deviations from the mean.

Measure of Trend Over Time

Percent Change

Considering that fluctuations in clearance rates are common, we were particularly interested in the extent to which clearance rates have changed or remained stable over a decade. By far the most widespread approach to examine trends over time is an examination of percent change. To calculate percent change, we first determined the difference between the city's clearance rate from 2016 to 2007. We then divided the difference by the 2007 clearance rate. Finally, to obtain a percentage, we multiplied the result by 100. It is important to consider, however, that percent change only accounts for the starting and finishing values only. Despite it not being an appropriate measure of year-to-year fluctuations, percent change is still an acceptable method to examine trends over time.

Over 61.22% of cities within our sample witnessed a decrease in clearance rate from 2007 to 2016. Cleveland, Ohio experienced the largest decrease in clearance rate from 2007 to 2016. From 2007 to 2016, Cleveland's clearance rate dwindled from 20.65 to 4.77, resulting in a 76.89% decrease. After a closer examination, we found that Cleveland's clearance rate was relatively stable from 2007 to 2014, never falling below 16.93. However, in 2015, the clearance rate dropped to 7.22, and in 2016, down to 4.77. Though a substantial change in clearance rate has occurred since 2015, there is insufficient data to determine whether they are simply outliers. When compared to the rest our sample, Cleveland's clearance percent change rate reflects an abnormally high decrease. All other cities that experienced a decrease reported a percent change below 54%.

Only 38.77% of cities experienced an increase in clearance rate from 2007 to 2016. Providence, Rhode Island experienced the largest increase within our sample. From 2007 to 2016, Providence's clearance rate went from .85 to 6, resulting in a 620.61% increase. While a considerable increase in clearance rate, this change may be due to a small initial value (.85). In

other words, small changes to an already low value can result in a high percent change, and thus, an overestimation of change. The only other cities to witness an increase remotely close to Providence's is Columbia, South Carolina and Alexandria, Virginia, with an increase of 149.69% and 137.50%, respectively. Besides these few anomalies, the remaining cities that experienced an increase reported a percent change below 95%.

Comparing Clearance Rates by Population Size

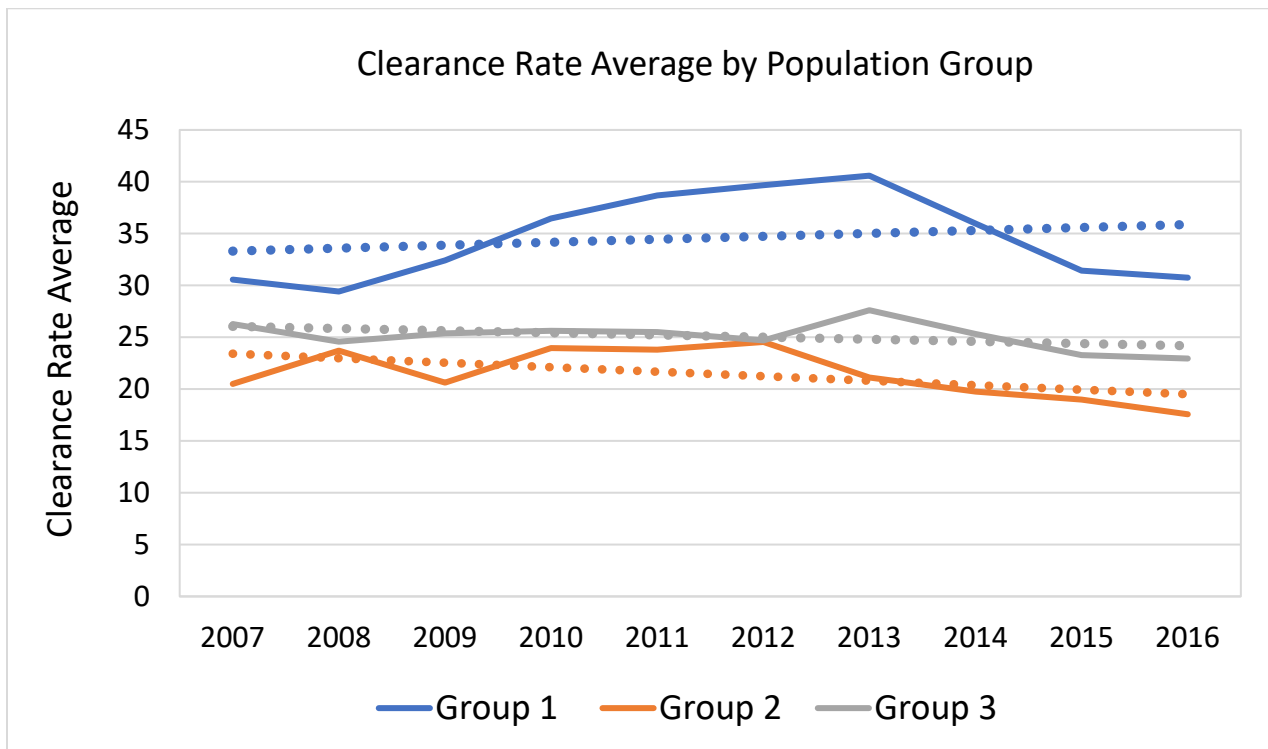
To explore whether population size and clearance rates are temporally linked, we grouped the 49 cities into three population classes and graphed their trajectory from 2007 to 2016. Group 1 is comprised of 19 cities with a population size below 150,000. Group 2 is comprised of 16 cities with a population size between 150,000 and 300,000. Group 3 is comprised of 14 cities with a population size over 300,000. A linear trend line for each group was included in the chart to illustrate the overall trend of each class.

Three key findings emerge from the time plot. First, the cities with the smallest population size in our sample (i.e., Group 1), on average, have substantially higher clearance rates than the other cities. Moreover, despite the clearance rate decreasing in the last few years, Group 1's clearance rate has been overall increasing from 2007 to 2016. This finding may be attributed to the fact that aggravated assaults are historically more prevalent in urban areas, particularly those with large populations (Duhart, 2000, p.2-3). When coupled with the possibility that smaller cities may be more interconnected (i.e., everyone knows everyone), it is reasonable to assume that there may be a more aggressive push to solve these cases.

The second, and perhaps most surprising, finding is that Group 3 had the second highest clearance rate average. The trend line suggests that clearance rates for cities with a population size over 300,000 have slightly decreased but have been relatively stable from 2007 to 2016.

This is a surprising finding given that one could conceivably assume that cities with a larger population have more resources to investigate cases, and thus, be more apt to solve them. However, that is not the case for cities within our sample. Lastly, Group 2 had the lowest clearance rate average of each population class. Similar to Group 3, they experienced a slight decline from 2007 to 2016, but have remained overall stable, and not too far off from Group 3.

Figure 2. Time Plot of Clearance Rate Average by Population Group



Conclusion

The overall objective of this report was to describe and summarize clearance rates for aggravated assaults committed with a firearm from 49 U.S. cities from 2007 to 2016. We found that clearance rates varied significantly across jurisdictions in our sample. In fact, only two cities, namely, Salem, Oregon, and Clarksville, Tennessee, yielded clearance rates comparable to the national average of 52.3%. Other cities, however, underperformed immensely from 2007 to 2016. Providence, Rhode Island and Norfolk, Virginia, had the lowest clearance rates in our

sample - each reporting a clearance rate of 8.12 and 8.48, respectively. We also found that many cities experienced a significant amount of fluctuation from 2007 to 2016. Indeed, the average age of all cities was 20.56. Finally, we found that nearly two-thirds of cities within our sample experienced a decrease in clearance rates from 2007 to 2016. Collectively, these findings are quite surprising given that there have been many advances in investigative technologies and variability in crime rates over the last half century (Scott, Wellford, Lum, & Vovak, 2019, p.82). Therefore, additional research is needed to determine the causes of these findings.

While insightful, our analytical approach has a significant limitation that merits consideration. Given that variability in clearance rates is typical, analyzing using clearance rate averages may often “mask the substantial long-term variation in crime clearance among police agencies” (Scott et al., 2019, p.83). Therefore, other methods, such as group-based trajectory modeling, may be more appropriate to examine fluctuations in clearance rates. Future working papers should work to provide an explanation for the fluctuations in clearance rates, how cities can be better grouped according to their clearance rates over time, and what factors contribute to the solvability of aggravated assault cases.

References

- Abt, T. (2019) *Bleeding Out: The Devastating Consequences of Urban Violence – and a Bold New Plan for Peace in the Streets*. Basic Books.
- Addington, L. A. (2006). Using national incident-based reporting system murder data to evaluate clearance predictors: A research note. *Homicide Studies*, 10(2), 140-152.
<https://doi.org/10.1177/1088767905285439>
- Alderden, M. A., & Lavery, T. A. (2007). Predicting homicide clearances in Chicago: Investigating disparities in predictors across different types of homicide. *Homicide Studies*, 11(2), 115-132. <https://doi.org/10.1177/1088767907300505>
- Annapolis Police Department. (2001). *General order number J.5: case clearance and administration designation*. Retrieved from
<https://www.annapolis.gov/DocumentCenter/View/4866/J-05-Case-Clearance-and-Administrative-Designation-October-2001-PDF>
- Bachman, R., & Paternoster, R. (2009). *Statistical Methods for Criminology and Criminal Justice*. Mc-Graw Hill.
- Barao, L., Braga, A. A., Turchan, B., & Cook, P. J. (2021). Clearing gang- and drug-involved nonfatal shootings. *Policing : An International Journal of Police Strategies & Management*, 44(4), 577-590. <https://doi.org/10.1108/PIJPSM-01-2021-0011>
- Black, D. (2010). *The Behavior of Law*. United Kingdom: Emerald Group Publishing Limited.
- Braga, A. A., & Dusseault, D. (2018). Can homicide detectives improve homicide clearance rates? *Crime and Delinquency*, 64(3), 283-315.
<https://doi.org/10.1177/0011128716679164>
- Braga, A. A., Pierce, G. L., McDevitt, J., Bond, B. J., and Cronin, S. (2008). The strategic

- prevention of gun violence among gang-involved offenders. *Justice Quarterly*, 25(1): 132–162.
- Braga, A. A., Turchan, B., & Barao, L. (2019). The influence of investigative resources on homicide clearances. *Journal of Quantitative Criminology*, 35(2), 337-364. <https://doi.org/10.1007/s10940-018-9386-9>
- Cordner, G. (2010). Reducing fear of crime strategies for police.
- Crank, J. P. (2003). Institutional theory of police: a review of the state of the art. *Policing: an international journal of police strategies & management*.
- Crank, J. P., & Langworthy, R. (1992). An institutional perspective of policing. *The Journal of Criminal Law & Criminology*, 83(2), 338-363. <https://doi.org/10.2307/1143860>
- Davis, R. C., Jensen III, C. J., Burgette, L., & Burnett, K. (2014). Working smarter on cold cases: Identifying factors associated with successful cold case investigations. *Journal of Forensic Sciences*, 59(2), 375-382. <https://doi.org/10.1111/1556-4029.12384>
- Dowling, C., Morgan, A., Gannoni, A., & Jorna, P. (2019). How do police use CCTV footage in criminal investigations? *Trends and Issues in Crime and Criminal Justice*, (575), 1-15. <https://doi.org/10.3316/agispt.20190502009783>
- Duhart, D. T. (2000). *Urban, suburban, and rural victimization, 1993-98*. US Department of Justice, Office of Justice Programs.
- FBI. (2018). *NIBRS 2018*. FBI. Retrieved from <https://ucr.fbi.gov/hate-crime/2018/resource-pages/nibrs-2018>
- FBI. (2018). *NIBRS*. FBI. Retrieved from <https://www.fbi.gov/how-we-can-help-you/need-an-fbi-service-or-more-information/ucr/nibrs>
- Federal Bureau of Investigations. (2018). *Clearances*. FBI. Retrieved from

<https://ucr.fbi.gov/crime-in-the-u.s/2018/crime-in-the-u.s.-2018/topic-pages/clearances>

Federal Bureau of Investigations. (2018). *Crime in the U.S. 2018: Data Declaration Table 25*.

FBI. Retrieved from <https://ucr.fbi.gov/crime-in-the-u.s/2018/crime-in-the-u.s.-2018/tables/table-25/table-25-data-declaration.pdf>

Federal Bureau of Investigations. (2019). *Crime in the U.S. 2019: Table 27*. FBI. Retrieved from

<https://ucr.fbi.gov/crime-in-the-u.s/2019/crime-in-the-u.s.-2019>

Federal Bureau of Investigations. (2019). *2019 Crime in the United States: Clearances*. FBI.

Retrieved from <https://ucr.fbi.gov/crime-in-the-u.s/2019/crime-in-the-u.s.-2019/topic-pages/clearances>

Friedman, M., & Cullen, J. (2016). *Justfacts: What clearance rates say about disparities in crime and prosecution*. Brennan Center for Justice. Retrieved from

<https://www.brennancenter.org/our-work/analysis-opinion/justfacts-what-clearance-rates-say-about-disparities-crime-and>

Gagliardi, P. (2010). Artifacts as pathways and remains of organizational life. In P. Gagliardi (Ed.), (Originally published 1990 ed., pp. 3-38). De Gruyter.

<https://doi.org/10.1515/9783110874143.3>

Gau, J. M., & Brunson, R. K. (2010). Procedural justice and order maintenance policing: A study of inner-city young men's perceptions of police legitimacy. *Justice Quarterly*, 27(2), 255-

279. <https://doi.org/10.1080/07418820902763889>

Gun Violence Archive. (2021). *Past Summary Ledgers*. Gun Violence Archive. Retrieved from

<https://www.gunviolencearchive.org/past-tolls>

Indiana State Coroners. (n.d.). *Section 301 the roles of police officers and coroners*. Retrieved

from <https://www.in.gov/ctb/files/section301.pdf>.

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. <https://doi.org/10.1177/1088767908326903>

King, W. R. (2009). Toward a life-course perspective of police organizations. *The Journal of Research in Crime and Delinquency*, 46(2), 213-244.
<https://doi.org/10.1177/0022427808330874>

Kirk, D. S., & Papachristos, A. V. (2011). Cultural mechanisms and the persistence of neighborhood violence. *The American Journal of Sociology*, 116(4), 1190-1233.
<https://doi.org/10.1086/655754>

Kirk, D.S., & Matusda, M. (2011). Legal cynicism, collective efficacy, and the ecology of arrest. *Criminology (Beverly Hills)*, 49(2), 443-472. <https://doi.org/10.1111/j.1745-9125.2011.00226.x>

Klofas, J., Alheimer, I., & Petitti, N. (2019). Retaliatory violent disputes. *Problem-Oriented Guides for Police, Problem-Specific Guide Series*, (74).

Kubrin, C. E., & Weitzer, R. (2003). Retaliatory homicide: Concentrated disadvantage and neighborhood culture. *Social Problems (Berkeley, Calif.)*, 50(2), 157-180.
<https://doi.org/10.1525/sp.2003.50.2.157>

Lilly, R., Cullen, & Ball (2019). *Criminological Theory: Contexts and Consequences*. 7th ed. CA: Sage. ISBN: 9781506387307

Litwin, K. J. (2004). A multilevel multivariate analysis of factors affecting homicide clearances. *The Journal of Research in Crime and Delinquency*, 41(4), 327-351.
<https://doi.org/10.1177/0022427803260269>

- Litwin, K. J., & Xu, Y. (2007). The dynamic nature of homicide clearances: A multilevel model comparison of three time periods. *Homicide Studies*, 11(2), 94-114.
<https://doi.org/10.1177/1088767907300759>
- McEwen, T., & Regoeczi, W. (2015). Forensic evidence in homicide investigations and prosecutions. *Journal of Forensic Sciences*, 60(5), 1188-1198.
<https://doi.org/10.1111/1556-4029.12787>
- Mendez, A. M. (2018). *Police high-profile critical incidents and the resulting effects on police and community resilience: A case study*
- Meyer, J. W., & Rowan, B. (1977). Institutionalized organizations: Formal structure as myth and ceremony. *The American Journal of Sociology*, 83(2), 340-363.
<https://doi.org/10.1086/226550>
- Mohanty, S., & Mohanty, R. K. (2014). *Community policing as a public policy: Challenges and recommendations* (1st ed.). Cambridge Scholars Publishing.
- National Institute of Standards and Technology. (n.d.). *Measures of Skewness and Kurtosis*.
1.3.5.11. measures of skewness and Kurtosis. Retrieved from
<https://www.itl.nist.gov/div898/handbook/eda/section3/eda35b.htm>
- Philadelphia Office of the Controller. (2022). Data Release: Gun Violence Clearance Rates and Case Outcomes. Retrieved from <https://controller.phila.gov/wp-content/uploads/2022/01/Gun-Violence-Review-Data-Release.pdf>
- Phillips, S., Drake, G., and Altheimer, I. (2022). The effectiveness of standardized investigative tactics in clearing non-fatal shooting investigations. *Police Science & Management*, 1, 1-11.
- Pizarro, J. M. (2008). Reassessing the situational covariates of homicides: is there need to

- disaggregate?. *Homicide Studies*, 12(4), 323-349.
- Pizarro, J. M., Terrill, W., & LoFaso, C. A. (2020). The impact of investigation strategies and tactics on homicide clearance. *Homicide Studies*, 24(1), 3-24.
- Price, M. C. (2016). The process and partnerships behind insight policing. *Criminal Justice Policy Review*, 27(5), 553-567. <https://doi.org/10.1177/0887403415610627>
- Puckett, J. L., & Lundman, R. J. (2003). Factors affecting homicide clearances: Multivariate analysis of A more complete conceptual framework. *The Journal of Research in Crime and Delinquency*, 40(2), 171-193. <https://doi.org/10.1177/0022427803251125>
- Regoeczi, W. C., Jarvis, J., & Riedel, M. (2008). Clearing murders: Is it about time? *The Journal of Research in Crime and Delinquency*, 45(2), 142-162. <https://doi.org/10.1177/0022427807313706>
- Regoeczi, W. C., Kennedy, L. W., & Silverman, R. A. (2000). Uncleared homicide: A Canada/United States comparison. *Homicide Studies*, 4, 135–161.
- Remington, F. J. (1975). the standards relating to the urban police function. *The American Criminal Law Review*, 12(3), 459.
- Sampson, R. J., & Bartusch, D. J. (1998). Legal cynicism and (subcultural?) tolerance of deviance: The neighborhood context of racial differences. *Law & Society Review*, 32(4), 777-804. <https://doi.org/10.2307/827739>
- Schroeder, D. A., & White, M. D. (2009). Exploring the use of DNA evidence in homicide investigations: Implications for detective work and case clearance. *Police Quarterly*, 12(3), 319-342. <https://doi.org/10.1177/1098611109339894>
- Scott, T. L., Wellford, C., Lum, C., & Vovak, H. (2019). Variability of crime clearance among police agencies. *Police Quarterly*, 22(1), 82-111.

Simon, T. R., Kegler, S. R., Zwald, M. L., Chen, M. S., Mercy, J. A., Jones, C. M., Mercado-Crespo, M. C., Blair, J. M., & Stone, D. M. (2022). *Notes from the field: Increases in firearm homicide and suicide rates - United States, 2020-2021*. Centers for Disease Control and Prevention. *71*(40), 1286-1287.

<https://dx.doi.org/10.15585/mmwr.mm7140a4>

Smythe, A. B. (2009). *Homicide investigations*. Nova Science Publishers, Incorporated.

Suchman, M. C. (2003). The contract as social artifact. *Law & Society Review*, *37*(1), 91-142.

<https://doi.org/10.1111/1540-5893.3701003>

Thompson, D. (2022). *Six reasons the murder clearance rate is at an all-time low*. The Atlantic.

Retrieved from <https://www.theatlantic.com/newsletters/archive/2022/07/police-murder-clearance-rate/661500/>

Tomlinson, K. D. (2016). *An examination of deterrence theory: Where do we stand?* Retrieved

from https://www.uscourts.gov/sites/default/files/80_3_4_0.pdf

U.S. Department of Justice. (2014). *Investigation of the Cleveland Division of Police*. Retrieved

from https://www.justice.gov/sites/default/files/opa/press-releases/attachments/2014/12/04/cleveland_division_of_police_findings_letter.pdf

Vaughn, P. E. (2020). The effects of devaluation and solvability on crime clearance. *Journal of*

Criminal Justice, *68*, 101657-15. <https://doi.org/10.1016/j.jcrimjus.2020.101657>

Zucker, L. G. (1987). Institutional theories of organization. *Annual Review of Sociology*, *13*(1),

443-464. doi:10.1146/annurev.so.13.080187.002303