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Experimentally Evaluating Statistical Patterns of Offending Typology For Burglary: A Replication Study

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Experimentally Evaluating Statistical Patterns of Offending Typology for Burglary:
A Replication Study

by

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A thesis submitted in partial fulfillment
of the requirements for the degree of
Master of Arts
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DEDICATION

This thesis is dedicated to my son, Jake.

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The completion of this thesis would not have been possible without the continued support of my wife, Melissa, who encouraged me to go back to school, Dr. Jones who made it possible, and Dr. Fox who allowed me to tag along during her research study and who kindly nudged me along the way. I would also like to thank the Pasco Sheriff's Office for their support and cooperation during the research study.

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ABSTRACT

This study used a quasi-experiment in order to evaluate the effect the SPOT-burglary profile on burglary arrest rates. A single police agency split into three different districts was used for the quasi-experiment. The SPOT-burglary profile was implemented in one district, while leaving the other two as control groups. The differences between the districts were controlled for using a statistical analysis. Burglary arrest rates were collected each month for all three districts for a period of one year before the implementation, and for six months after the implementation. Results show that the district who received the SPOT-burglary profile raised their burglary arrest rates by almost 75% in only 6 months, even after controlling for all relevant variables. This shows that the experimental intervention, the burglary profile, had a significant effect on the intended outcome- burglary arrest rates. The results of this study suggest that the SPOT-burglary profile may be able to provide law enforcement agencies with another tool to help increase burglary arrest rates in the future.

CHAPTER ONE: INTRODUCTION

Law enforcement agencies across the United States are tasked with providing a variety of different services to the communities they serve. Out of the many services that law enforcement provide, a few attract a great deal of attention from television shows and Hollywood, such as forensic analysis of the crime scene, offender profiling, and major crimes investigations. Hit TV shows including *The First 48*, *Forensic Files*, and *COPS* sensationalize major crime investigations that are rather uncommon or rare events. Furthermore, many of these shows end with the successful identification and apprehension of the person(s) suspected of committing that particular crime. Although murder, robbery, and sex crimes investigations are essential services provided to the community, they are far from being the most prevalent.

One crime that is relatively ignored by the media is residential and commercial burglary. These crimes go unnoticed by virtually everybody except the victim and the police agency that investigates them. Unfortunately, burglary is one of the most common crimes committed with approximately 2.1 million occurrences in 2010 (FBI, 2010). There were approximately 5,753 burglaries committed each day in the United States in 2010, or one burglary every 14.6 seconds (FBI, 2010). This staggering number only gets worse when paired with the average arrest rate for burglary in the United States, which is a dismal 12.4 percent (FBI, 2010).

The nature of this particular crime makes investigations by patrol officers and detectives extremely difficult. Usually, the act of entering and removing property from a residence requires

little effort on the part of the criminal, therefore, relevant evidence left behind during more complex and involved offenses such as DNA, fingerprints, and eyewitnesses are typically not present (Bennell & Canter, 2002). These factors, combined with the overwhelming amount of burglary cases that investigators typically handle, the process of closing burglary cases becomes extremely difficult. In many agencies, if a burglary report has no suspects or leads, the case becomes inactive pending any further information. These issues warranted a new technique to help law enforcement investigate burglary crimes.

One promising new way to investigate burglary is the use of a statistical profile. The implementation of the statistical profile will allow police agencies the opportunity to utilize the intelligence-led policing model (ILP) with a new focus. In fact, Fox and Farrington (2012) discovered a way to take offender profiling, which was developed by the FBI, and apply it to burglary investigations. By taking a method that was only used in violent crimes, such as murder and rape, and applying the same key ideas to burglary, they were able to provide the first ever statistically driven burglary profile, called the Statistical Patterns of Offending Typology (SPOT). The results categorized every burglary crime scene as either an organized, disorganized, opportunistic, or interpersonal style offense, depending upon the types of behaviors seen at the crime. Once the crime scene is identified as one of the four offense styles mentioned above, the traits of the offender who is most likely to commit that type of burglary can be used by investigators to narrow suspect pools, or point investigations in another, more statistically probable, direction. This allowed police agencies to provide suspect pools for every burglary that was committed, even in the absence of tangible evidence. In a crime that gets cleared by arrest an average of 12.4 percent of the time, the use of the burglary profiles is practical and advantageous for investigators.

The statistical burglary profiles above were later empirically tested by Fox and Farrington (2014) using an experimental field test, in order to measure the true value of the burglary profiles when applied in real world investigations. In this experiment, a quasi-experimental design was used to match four police agencies on key factors such as size, population, burglary rates, and burglary arrest rates. One agency was trained to use the statistical burglary profiles, while the other three agencies received no training. Results of this experiment showed that the treatment agency raised their burglary arrest rates by over 300 hundred percent, as compared to the other three agencies (Fox & Farrington, 2014).

Still, the statistical profile is a relatively new policing technique, and the effects on arrest rates are relatively unknown. The ILP model mandates that evidence-based policing practices must be evaluated for their effectiveness. To do this, collaboration between practitioners and academics must be formed, no matter the difficulties. Once this collaboration is formed, the use of a scientific experiment can be used in order to evaluate the new technique, in this case, the statistical profiles.

It is because of the ILP requirement that law enforcement should only utilize evidence-based and empirically tested policing techniques that the present research was undertaken, in order replicate the original experiment and conduct an additional test of the utility of the Fox and Farrington's SPOT profile for burglary in the field. Therefore, the principal research question guiding the present study is as follows:

1. Is there a statistically significant difference between the treatment district's burglary arrest rates as compared to the control districts' burglary arrest rates?

The replication of the results from the original Fox and Farrington (2014) study would further validate the effectiveness of the burglary profiles by evaluating their effect on an

agency's burglary arrest rate when used in real world investigations. As there is no additional literature on the use of SPOT and its effectiveness in police investigations, besides the original Fox and Farrington (2014) study, the present study will build on the first experiment of SPOT by adding another experimental evaluation in the field.

CHAPTER TWO: LITERATURE REVIEW

While very little literature currently exists on the offender profiling and its impact on police investigations, there has been extensive literature on the key issues that this line of research was derived from. Not only is it important to understand how experimental evaluations in criminology have been conducted over the years, but it is also important, especially in the current research, to understand the strengths, weaknesses and the limitations to collaborative research. Furthermore, the literature review will focus on the development and application of ILP, as this is the model which ultimately drives policing today. Finally, an extensive background on the field of offender profiling is discussed.

Experimental Evaluations in Policing

There are two different types of experiments that can be conducted in order to measure the effect that a treatment has on a given outcome. These two types are randomized experiments or non-randomized experiments. Although these two types of experiments share the same goal of measuring a specific outcome caused by a treatment method, they go about it in very different ways. In a randomized experiment, the sample used in the study is assigned randomly to either a control group (does not receive the treatment) or experimental group (receives the treatment) (Farrington & Welsh, 2006). Due to the sample being randomly assigned to the two different groups, the researchers do not have to apply statistical controls for outside factors that may influence the desired change (Farrington & Welsh, 2006). With this experimental design, when

the result is captured researchers can be confident that the change in the experimental group was caused by the treatment. The most important thing in conducting randomized experiments is the ability to establish true causality.

The second type of experiment is called a non-randomized experiment. These experiments require researchers to assign the sample to either the control or experimental groups (Farrington & Welsh, 2006). Once they have been assigned to their respective groups, researchers must then use solid design features and statistical analyses to control for variables that may affect the two groups (Farrington & Welsh, 2006). However, as randomization is not utilized, a researcher cannot know for sure whether or not he or she has controlled for all outside variables that may be an influence on the outcome (Farrington & Welsh, 2006). Therefore, researchers must rely on their training, experience, and past studies and theories to help control for all possible variables in a non-randomized experimental design (Farrington & Welsh, 2006). If the two types of experiments are completed correctly then they are considered to be the most reliable and valid method of evaluating the effect of a given treatment on the outcome (Farrington & Welsh, 2006).

Conducting randomized experiments may be the best way to establish causality, but that does not mean they are the easiest to implement. In an evaluation of randomized experiments with at least 100 participants conducted in the criminal justice field, Farrington and Welsh (2006) discovered that between 1957 and 2004, there were only 122 randomized experiments conducted. Weisburd (2000) outlines three reasons why randomized experiments are a rarity in the criminal justice field. These reasons are as follows: 1) ethical problems, 2) political problems, and 3) practical problems (Weisburd, 2000). Ethical issues may revolve around whether or not it is okay to apply sanctions or treatments to a group of people based on a theory

rather than legal criteria. Political problems include communities becoming angry that a specific targeted patrol is in another neighborhood and not theirs. By far, practical problems are the most significant cause of hindering experimental studies in criminal justice (Weisburd, 2000).

Practical problems may include difficulty obtaining permission from law enforcement agencies and other criminal justice institutions (these reasons will be discussed further in a later chapter).

Although it may be difficult to conduct a randomized experiment in criminal justice, it has been done. The Minneapolis Domestic Violence Experiment (Sherman & Berk, 1984) is one randomized experiment involving police that has gained a lot of attention. In this study, a collaboration between the Police Foundation and the Minneapolis Police department was agreed upon in order to determine which of the three different types of police responses would reduce further domestic violence. When a domestic violence incident would occur, a lottery drawing would be done in order to select a response for the police to use in the situation; the three responses were arrest, removal of the scene for eight hours, or given advice or counseling. Furthermore, the incident would only be eligible if it were a misdemeanor battery and the police had the probable cause to make an arrest if their discretion warranted it. When a police officer responded to a call that matched the above criteria, the officer would pull out a form of papers that were constructed using the lottery system for the different response types. Whatever response that was indicated on the next form was the response the police officer used. The study was conducted for a little more than a year and resulted in 314 cases that matched all the criteria for the study and progressed to the police officer using one of the three response types (Sherman & Berk, 1984). It was discovered that arresting the suspects decreased the chance of re-arrest for the same type of crime by 56 percent; more than the other two methods (Sherman & Berk, 1984).

Although the study published convincing results regarding domestic violence recidivism, there were issues with the study when it came to working with the police department. For instance, officer participation rate was very low, and more officers had to be recruited throughout the entire study (Sherman & Berk, 1984). Furthermore, many officers that agreed to participate in the study failed to turn in the proper paperwork, calling into the question whether or not the officer was picking and choosing which domestic violence calls to report (Sherman & Berk, 1984). Another grave concern of the study was whether or not the officers were following the study design by using the lottery system to decide which response to use (Sherman & Berk, 1984). If the officers just picked which response to use regardless of the lottery, then it calls into serious question the validity of the findings. These concerns were thought of by the researchers, but they were unable to find a solution (Sherman & Berk, 1984).

When a researcher is unable to implement a randomized experiment in policing, which is often, then they must design a non-randomized experiment. The most popular would be the non-equivalent group design. This design entails collecting pretest and posttest measures of an outcome for both the control group and the treatment group. The inclusion of different variables in order to properly match the two groups as much as possible is also warranted. If the model is followed correctly then, this type of experiment can be confident that it has strong internal validity.

An example of a non-equivalent group design being used in policing is the Kansas City Gun Experiment (Sherman, Shaw, & Rogan, 1995). In this experiment, researchers used a pretest-posttest non-equivalent group design. For this experiment, the researchers wanted to test whether targeted patrols in certain areas would reduce gun crime. Two patrol beats were selected based on their similarity in gun crime. For 29 weeks, the Kansas City Police Department focused

their attention on the treatment patrol beat with the intention of targeting firearms and firearms crime. During the 29 weeks, the hot spot patrols were paused for a brief time in order to detect any rise in firearm crime. Officers were tasked with generating activity within the treatment beat in the hope of seizing firearms or preventing firearm crime. The results of the research were very promising. The treatment group saw a 49 percent decrease in firearms crimes (169 to 86), a slight increase in firearm crime in the control group was not statistically significant (Sherman, Shaw, & Rogan, 1995). It was also discovered that police agencies could increase the number of firearms seized in a high firearm crime area for little cost (Sherman, Shaw, & Rogan, 1995).

Randomized experiments and non-randomized experiments both have their pros and cons. Researchers should always prefer the use of a randomized experiment if possible in order to establish true causality. However, the use of actual randomized experiments in the field of Criminology or any other social science is extremely difficult. It is because research needs to employ these specific designs that the need for collaboration with law enforcement agencies is needed. As both parties recognized this fact, the willingness to work together and collaborate started to improve.

Policing and Collaborative Research

Collaborations between law enforcement agencies and academia provide both with endless amounts of data and tools for each to use in their respective fields. Knowing that this is true, one must ask themselves why is there so much friction when the two come together to develop new ways to improve their field of work? Unfortunately, when the topic of academic research in the field of policing is described as “a dialogue of the deaf” (Bradley & Nixon, 2009) one can imagine the past, present and future difficulties that will undoubtedly arise from attempts

to form collaborations to conduct academic evaluations of policing practices. This is to not say that the task of police and academic collaboration is impossible, but rather, it can and will at times cause strains in the relationships between all parties involved.

In order to better understand why these issues arise, one must look at the two different “worlds” in which policing and academia reside. Within these different “worlds,” policing and academia are a part of different cultures. For example, for police the primary concern is the collection of evidence, where a researcher is focused on data. Evidence and data are two completely different things. Evidence is used to build cases and is either valid or not. Data is what research is built around and can have varying degrees of reliability and by itself may not be valid (Canter, 2004). Furthermore, there are fundamental differences in many aspects of their professions and their lives, such as, vocabulary, engrained habits, thought processes, typical modes of action, and primary objectives of their particular institutions (Canter, 2004). By the very nature of the profession, law enforcement officers mostly deal with the “here and now” and must respond quickly and appropriately to many different types of situations, and then stand to be judged by others after the fact. This process when played out over and over in the course of a career pushes many law enforcement personnel to share the attitude that you cannot understand police work if you haven’t done it yourself (Perez & Shtull, 2002; Canter, 2004).

The issues hindering collaboration between law enforcement and academia do not stop there, but proceed into the top of the rank structure for both groups. Factors which may hinder collaboration in police work could be political, organizational, professional, cultural, or economical (Steinheider, 2012). The goals of the two may be similar in theory, but in practice law enforcement must obtain real results, which often means making arrests and ultimately lowering crime rates. If they fail to do this, the command staff and eventually the rank and file

begin to feel the pressure from the community and politicians. For academia, researchers feel the pressure to publish papers, teach, and do administrative work. As Canter (2004, p. 8) said, “Science is based in failures,” which is the essence of conducting experiments. This statement however does not hold true for law enforcement, thus making the command staff leery of implementing research that they do not know will be effective.

There are many obstacles for a successful collaboration between law enforcement and academia; however, this should not discourage either group. In order for these collaborations to be productive, Wood, Fleming, and Marks (2006) state, “... partnerships need to be embedded through knowledge generation processes that entail a central role for police in the identification of research problems, the conceptualization of research questions, as well as in the design and evaluation of intervention projects” (Wood et al., 2006, p. 13) These directions would allow law enforcement to be a part of the entire process and help develop a plan that best suits their agency’s policy and procedures and current needs. They further highlight that this would make law enforcement and researchers come together and dispel the stereotypes they have of each other. Furthermore, it would make law enforcement seriously question where they are at and the direction they want to go.

More and more law enforcement agencies around the country are beginning to request collaboration with researchers on topics that they believe could be better-informed by research, such as policies and practices (Fleming, 2010). With the technology of today and the ease to which one group can be joined with another, collaborations with both groups will only increase exponentially. Furthermore, like with anything else, the more law enforcement and academia come together, the easier it will become; hopefully growing into a close working relationship between the two. With this growing relationship between the two, ideas can be shared and

created together to further both fields. The creation of the intelligence-led policing model is an example of exactly that.

Evidence-Based Policing Practices

Over the years there has been a substantial amount of research on policing and the effectiveness of the strategies they implement in order to prevent crime. The continuous scrutiny from academics, community members, and politicians pushed law enforcement to reshape the way they police their communities. Gone are the days of only reactive policing where investigators wait for a crime to be committed and then start the investigative process. As more and more pressure was placed on law enforcement, it became apparent that crime reduction by only targeting a particular crime was not the most efficient way to reduce crime.

Then in the 1990's, a new way to police began to emerge in the United Kingdom called intelligence-led policing (ILP), defined by its founder, Dr. Jerry Ratcliffe, as “the application of criminal intelligence analysis as an objective decision-making tool in order to facilitate crime reduction and prevention through effective policing strategies and external partnership projects drawn from an evidential base” (2002, p. 3). Ratcliffe (2002) further outlined the three stages to intelligence-led policing: interpret, influence, and impact.

Interpret refers to the need to collect empirical data regarding criminal behavior or crime elements, explain the data adequately, and turn the data into useful information to be acted on (Ratcliffe, 2002). The core concept of the interpretation stage is to focus on the criminal and not just the crime. This step also requires an abundance of resources such as data, computers, and analytical tools, but also cooperation and teamwork. If the data and intelligence gatherers are not working together, then the correct information may be missed.

Influence refers to the need for the people interpreting the data to be able to identify the decision makers and be able to change their opinion (Ratcliffe, 2002). Many different factors come into play in this stage. Not only does the person who gathers and interprets the information have to “sell” their ideas and data to the decision-maker (usually a police commander) but the decision-maker must also weigh many factors as well. These factors could be anything from public opinion of a particular type of policing strategy to financial reasons.

Impact refers to behavior of the decision makers and that they must be willing to adapt and develop new ways in order to have an impact on crime. The primary goal of the model is to effect crime in a positive way. If the strategy is implemented in the field and there is not reduction in the crime that is targeted, then the intelligence-led policing model has failed.

Another way to view the intelligence-led policing model is by viewing it as a linear intelligence process described as follows: 1) Acquisition of information; 2) Analyzing intelligence; 3) Review and prioritizing; 4) Action, intelligence analysis through tasking meetings (allocation of police resources) and 5) Evaluation, or the analysis of impact of action (Cope, 2004). In order to successfully implement the ILP model, all of the above-listed steps must be properly completed. ILP must be able to collect raw data to be used in the analysis and should focus on identifying risks within the jurisdiction (Carter & Carter, 2009). It should use inductive and deductive reasoning to define requirements and predict threats (Ratcliffe, 2002). Most important of all, it must create actionable intelligence, and personnel must be able to disseminate that knowledge properly to the individuals or groups who can use it effectively (Carter & Carter, 2009). If a law enforcement agency properly implements all aspects of the intelligence-led policing model, then it becomes the single biggest contribution that law enforcement can make to crime prevention and reduction (Ratcliffe, 2002).

Along with the emergence of the intelligence-led policing model, another data-driven policing model that has been rising in popularity among some agencies is the Compstat model. Walsh (2001) defines Compstat as "...a goal-oriented strategic management process that builds upon the police organizational paradigms of the past and blends them with strategic management fundamentals of the business sector" (Walsh, 2001, p. 347). Compstat can be described as a four-step process which includes, 1) the collection of accurate and timely intelligence; 2) rapid deployment of resources; 3) the use of effective tactics; and 4) proper follow-up and assessment (Walsh & Vito, 2004; Mazerolle, Rombouts, & McBroom, 2006). The entire Compstat process culminates in a system that involves the collection, mapping and analysis of weekly crime statistics for each of the agencies' districts or precincts. Once this information is collected, district commanders must go before the leader of the agency (police chief or sheriff) and answer pointed questions regarding the crime within their district or precinct. During this process, commanders are held accountable for how they deploy their resources when addressing the crime that occurs within their control (Willis & Weisburd, 2007). Furthermore, in the weekly Compstat meetings, ideas and strategies on how to effectively combat a problem can flow freely between all present. This not only opens up a myriad of information sharing about crime within their specific areas, but also the sharing of tactics that may have worked for one precinct that the others did not know about. Research on the impact of Compstat has been promising with findings of decreased reported offenses and reduction in certain types of crimes. Furthermore, Compstat was shown to decrease property and total index crime rates. (Mazerolle, Rombouts, & McBroom, 2006; Chilvers & Weatherburn, 2004; Jang, Hoover, & Joo, 2010).

Along with intelligence-led policing and Compstat, the rise of place-based policing (Weisburd, 2008) has encouraged the collection and processing of data regarding crime and the

locations it is most prevalent in, in an effort to use data to pinpoint rising hot spots, or high crime areas, in the agency's jurisdiction. These place-based techniques have allowed agencies to implement policies and directed interventions within the rising hot spot areas to strategically target and reduce crime. A mere increase in officers in a location of high crime can be one type of response, or a multi-pronged and multi-staged intervention could also be used as a way to target and deter crime in an area identified by data analysis as a rising hot spot (Weisburd & Telep, 2014). The presence of law enforcement can have a positive effect not only on a particular type of crime, but on crime in general. For instance, in the San Diego field interrogation study it was found that when field interrogations were introduced, the area saw a reduction of crime (Boydston, 1975). After reviewing multiple studies, McGarrell et al. (2001), suggested that directed police attention to high crime areas (hot spots) can lead to the reduction of crime.

A previously mentioned study, the Kansas City Gun Experiment, is also an example of a hot spot intervention. The Kansas City Police Department targeted known hot spots of gun crime within their jurisdiction and added extra patrols to the area. The targeted area saw a 49% drop in gun crime from 169 to 86, while the comparison area saw a slight increase of 4% of gun crime from 184 to 192 (Sherman et al., 1995). With the findings of the Kansas City Gun Experiment, it is now believed that directed law enforcement patrol is an effective crime control tool when it is applied to high crime areas (Sherman et al., 1997).

A more complicated and multi-pronged hot spot approach can be seen in the Jersey City Drug Market Analysis Experiment (Weisburd & Green, 1995). This study incorporated many different policing techniques such as engaging business owners and citizens, the use of police crackdowns, and a maintenance program. The experiment demonstrated that there are consistent and reliable effects on disorder-related emergency calls for service and the authors

discovered that there was little evidence of crime being displaced to other areas outside of the experimental location. Furthermore, the study supported past research that specific, targeted policing strategies can prevent or reduce crime (Weisburd & Green, 1995). Also their findings suggest the importance of focusing on specific types of crime and along with specific places in order to deal more effectively with crime. (Weisburd & Green, 1995).

Evidence-based policing practices, such as intelligence-led policing, Compstat, and the place-based policing model, are being adopted by an increasing number of agencies around the world. Due to this, the opportunity for law enforcement agencies to use new and innovative ways to tackle crime is climbing. With the pressure to utilize new ways to reduce crime coming from the community and politicians, agencies are willing to adopt new ways and methods to do just that. One example is the use of evidence-based offender profiles to help identify unknown offenders simply from the crime scenes they leave behind.

Offender Profiling

Offender profiling is by no means a mystery to the majority of the people in this country. With the success of the concept in blockbuster Hollywood movies and a growing number of television shows, it has allowed the term to circulate like wildfire across the nation. However, like many things in Hollywood, the real method in which things occur is quite different than on screen, and offender profiling is no exception. This is particularly true with the advent of a new profiling method, known as statistical or evidence-based offender profiling. The long road leading to this new policing technique, and research that has taken place on it, are discussed in detail below.

The Federal Bureau of Investigation (FBI) defines offender profiling “as a technique for identifying the major personality and behavioral characteristics of an individual based upon an analysis of the crime he or she has committed” (Douglas et al., 1986, p. 405). In other words, law enforcement officials study a crime scene and attempt to infer traits of an offender who is most likely to commit that type of crime. To help them do this, Special Agents have classified violent offenders into two different types, organized or disorganized. An organized offender is described as someone who plans the crime and takes control during the commission of the crime. A disorganized offender is described as the one who does not plan their crime and often leaves clues to be discovered at the crime scene. The reasoning behind this dichotomy is that a criminal will leave clues of their personality in the offense he or she commits and the crime scene left behind (Ressler et al., 1986).

To test this method of organized/disorganized dichotomy, Special Agents of the FBI used their experience in the field, interviews, and case information from 36 convicted sexual murderers (Ressler et al., 1986). During the interviews, the Special Agents inquired about all aspects of the offender’s life, including details regarding their entire criminal history. Through the details discovered and recorded, they were able to run independent t-tests and determined that there were significant differences between an organized and disorganized offender. With scientific evidence that the organized/disorganized dichotomy is valid, Special Agents began incorporating it into their profiling process.

Douglas et al. (1986) outlines a six stage criminal profile-generating process that the FBI’s Behavioral Science Unit has used since the 1970’s. The first stage is the Profiling Inputs Stage. In this stage all of the evidence connected to the case is turned over to the profilers, except possible suspect information in order to keep the process impartial. The second stage is the

Decision Process Models Stage. In this stage, the profilers attempt to sift through the evidence and organize it and form a structure for the actual profiling. To do this, they look at seven key points. These points are homicide type and style, primary intent of the murderer, victim risk, offender risk, escalation, time factors, and location factors. The third stage is the Crime Assessment Stage. In this stage, the profiles attempt to piece together what occurred during the crime. Details of the crime include the victim and offender's behavior leading up to the crime, and what occurred during the crime. In this stage, the heart of the criminal profile is determined; whether it receives a classification as an organized or disorganized crime. Furthermore, they attempt to determine the motivation for the crime, and other crime scene dynamics are studied. The fourth stage is the Criminal Profile Stage. In this stage, the profiler attempts to build a profile of the type of person who most likely committed that crime. The offender profile will include demographics, physical characteristics, habits, beliefs, behavior leading up to the crime, and behavior after the crime. With the completed profile, law enforcement officials can formulate investigative strategies. The fifth stage is the Investigation Stage. As mentioned above, once the officials have received the written profile, it is used to narrow suspect pools or generate new suspect leads. The sixth stage is the Apprehension Stage. If a suspect is arrested, the entire profiling process is re-examined and checked for accuracy. Furthermore, if a suspect admits guilt, a detailed interview is needed in order to validate the original profile (Douglas et al. 1986).

However, there are many issues concerning the validity of the study that introduced the organized/disorganized dichotomy. Issues were raised concerning the sample size used in the original validity test, the sample selection method, and the lack of structure in the offender interviews. Furthermore, Ressler et al. (1986) have been open that their study was only

exploratory in nature, and not designed to test the discriminatory power of the organized/disorganized dichotomy (Canter et al., 2004). Muller (2000) highlights the issue of falsifiability of the information acquired from the 36 offenders interviewed in the FBI study. He points out that in many cases, the FBI agents assumed what an offender was thinking based not on admission by the offender but by interpreting the description of the murder given by the offender. Muller further highlights this issue by saying, “We may be left wondering when FBI agents became experts in interpreting the unconscious fantasies of others” (Muller, 2000, p. 249).

Another issue is the fact that there has never been a study done to confirm the validity of the findings of the dichotomy (Canter et al., 2004; Muller, 2000). The issue of the FBI profiles never being tested in the field may not be due to lack of want, but the FBI’s unwillingness to subject its method to scientific tests (Muller, 2000).

Although the FBI’s offender profiling method is certainly the most widely known and used method of offender profiling, it is not the only one. Investigative Psychology (IP) is a term coined by David Canter, an environmental psychologist by training. IP attempts to use behavioral sciences to aid in the detection of offenders or help defend or prosecute suspects through various investigative techniques (Canter, 1994; Canter, 2004). IP is unique from other profiling methods, as it is a collection of related theories and hypotheses and not just a methodology (Muller, 2000). Furthermore, Canter (2004) describes this method of offender profiling as an A to C equation. The A in the equation represents the details of the crime that are known to the police. The C refers to the characteristics of the offender who is responsible. In order to get from A to C, the profiler must infer specific offender characteristics based only on the details of the crime (Canter, 2004).

Canter highlights five broad approaches to use in offender profiling. The first approach is interpersonal coherence, which states that an offender will most likely select their victim based on important characteristics of people that are important to the offender. The second approach is the significance of place and time, which means that the offender takes into account the time and place in which they will commit their crimes. This could be due to the offender being comfortable in the area because he or she lives in the area. The third approach is criminal characteristics, which entails classifying offenders into categories based on the characteristics of the crime and offender. The fourth approach is criminal career, which highlights the fact criminals do not change the way they commit crimes. The last approach, forensic awareness states that offenders who are aware of their forensic evidence at crime scenes most likely had past interaction with police (Canter, 1994; Canter, 2004; Muller, 2000).

Unlike the profiling method of the FBI, IP was designed in order to be empirically tested before use. However, the way in which IP is designed, makes it difficult for the entire paradigm to be tested all at once (Muller, 2000). Instead, it is much simpler to test a single approach in each study.

In 2012, a new scientific and objective profiling method was created. With the extensive amount of literature available for profiling serial murders, rape and other violent crimes, Fox and Farrington (2012) discovered a way to extend the use of profiles to the crime of burglary. Even though this type of research had not been conducted before, the line of thought was very simple. If a criminal's personality and traits can be derived from a violent crime scene via profiling, why is that not able to extend to burglary crime scenes and offenders as well?

The data used in the development of the burglary profiles came from 405 solved burglary cases, which were selected randomly from approximately 950 solved cases in a county

in Florida between 2008 and 2009. These cases produced 380 different offenders and 400 different burglary locations. These records came from multiple law enforcement agencies within a specified area. Due to these cases being cleared by an arrest, the offender's information was available, and with that a criminal history check was conducted for prior arrests and charges.

After extracting all of the information from the burglary cases and offenders who committed those burglaries, they divided the information into various categories that are relevant to profiling. These are criminal behavior/history, offender traits, and offense characteristics. These groups were further broken down in order to extract the necessary information in order to complete a profile. Within the offender's criminal behavior/history category, important factors such as their criminal record, criminal career, total offenses, past burglaries, past violent crimes, past drug offenses, past thefts, age of onset, co-offending, and whether or not the offender knew the victim, were collected for analysis. The offender traits included demographic information and identifiable traits included in standard police reports and driver's license records, such as age, gender, race, and more. Finally, for offense characteristics, motivation, time and place of the offense, and the scene of the crime was documented. With all of this information recorded, Fox and Farrington (2012) used a statistical technique called Latent Class Analysis (LCA) to identify the number of sub-groups within these categories of data. Results of the LCA showed that there were four sub-groups, or "styles" of burglary, based upon the offense behaviors seen at the crime scenes. These four styles of offense characteristics were labeled opportunistic, organized, disorganized, and interpersonal burglaries. Four types of burglars were also identified, based upon their traits and criminal behaviors/histories.

After using LCA to discover the four classes within the offender and offense features, Fox and Farrington (2012) then analyzed the relationship between each of the groups using

contingency analysis in 4 x 4 tables. Results of this study showed that there were statistically significant relationships between the four offense styles and offender traits and criminal history of the offenders. In other words, certain types of burglars (with certain traits and criminal behaviors/histories) were statistically more likely to commit a certain style (with certain crime scene behaviors) of burglary (Fox & Farrington, 2012).

Using these four different styles of burglaries— organized, disorganized, opportunistic, and interpersonal offenses—it was suggested that law enforcement investigators could categorize the burglaries into these four profiles based upon the crime scene behaviors, and then generate or eliminate suspects based upon the criminal behavior/history and offender traits that are most likely to be associated with such crime behaviors. For example, if a detective recognizes that a burglary crime scene is organized, they could assume that the offender is most likely older, with a high rate of criminal behavior, and a long criminal career (Fox & Farrington, 2012).

Evaluations of Offender Profiling

As stated, the best way to properly evaluate any method or practice is by the use of a well-developed scientific experiment. A meta-analysis conducted by Dowden et al. (2007) looked at all of the studies published on offender profiling from 1976 to 2007, in order to evaluate the state-of-the-art and how effective profiling has been in the research. Dowden and his colleagues discovered that out of the 132 studies conducted; only 62 of the studies included any form of statistical analysis. Although the number of overall studies using statistical analyses is low, they highlight the fact that since 1995, the number is on the rise.

However, very few studies have attempted to evaluate the effectiveness of offender profiling, as it is difficult to implement and isolate the effects of the profiles on a specific

outcome. As stated previously, the most effective evaluative techniques involve randomized experiments, as these studies can isolate the impact of a treatment implemented in an agency on a specific outcome, but these are also very difficult to implement in a criminal justice setting. Consequently, most studies designed to evaluate OP have been conducted in different, less rigorous, ways. The most common ways in which OP are evaluated are consumer satisfaction surveys and comparative tests of profiler accuracy (Fox & Farrington, 2014). Consumer satisfaction surveys ask investigators who have used an OP to describe whether or not they were satisfied with it, and what, if any, success resulted from its' use. Pinizzotto (1984) conducted an exhaustive consumer satisfaction survey of all 192 profiles the FBI created for US law enforcement agencies from 1971 to 1981. They discovered that the majority (77%) felt that the profiles helped their investigations in some way. Only 17% acknowledged that the profiles directly led to the identification of a suspect, though another 17% stating that they were not useful at all.

However, as mentioned above, there are other ways in which to judge the effectiveness of an offender profile. This is especially true when researchers cannot implement or isolate the effects of OP in the field, and therefore the identification of a suspect is not the outcome measure to demonstrate a profile's utility and/or accuracy. In other words, some researchers aim to assess the accuracy of the profiler's predictions about an offender compared to the "true offender", or compare how accurate a profiler is when compared to people who are not trained as profilers in any way. These studies are called comparative tests of profiler accuracy, and are the second most common method used to evaluate the accuracy of offender profilers.

One of the most well-known studies of this kind was conducted by Pinizzotto and Finkel (1990), in which they attempted to answer two questions. The first question was if professional

(i.e. FBI) profilers are more accurate than non-profilers when predicting offender features from details of a crime scene. The second question was if the process used by profilers is qualitatively different from that of non-profilers, and if the process itself may be the key to profiling, not the profilers themselves. The study found that FBI profilers indeed scored significantly better on a variety of measures when compared to the other three comparative groups in the study (psychologists, detectives, and college students). However, the profilers and the other groups seemed to process the material in the same exact way.

However, there are many questions raised by this line of profiling evaluation research. For instance, Alison et al. (2003) discovered that when two groups of police officers were given a “real” profile and a fake profile, both profiles received the same accuracy ratings from police, regardless of how accurate they actually were. Kocsis and Hayes (2004) found very similar results in their replication study, but they also found that as a person’s initial belief in profiling increases, their perceived accuracy of the profile also increases. In other words, individuals may be susceptible to the “mystique” of profiling and increase its accuracy rating. Therefore, more objective measures of profiling’s accuracy and utility in the field are needed.

The statistical and objective profiling method outlined in Fox and Farrington (2012) led to the first profiling experiment testing the effect of a profile when used by law enforcement in real investigations. Fox and Farrington (2014) designed an experiment to test the effectiveness of the statistical profile for burglary developed in 2012 by comparing burglary arrest rates between law enforcement agencies that used the burglary profile in their investigation, and those that did not. These agencies participating in the experiment were selected based on their similarity to the experimental agency in important factors such as, agency location, size, crime rates, number of burglaries, and current burglary arrest rate. Then for three years before the implementation of the

profile and one year after, the burglary arrest rates, burglary incidence rates, and prior arrest rates were collected from each of the four law enforcement agencies.

While the three control agencies received no intervention, the entire treatment agency received specialized training from the Statistical Patterns of Offending Typology (SPOT) for burglary developed by Fox and Farrington (2012). This task was completed by providing training sessions to all officers in the agency. In these training sessions, officers learned what the profiles are, how to use them, and limitations to their use. Furthermore, detectives received more in-depth training as they would have the largest involvement in the process. Next to receive the training were the crime analyst who had the responsibility to search their respective databases and record management systems to populate possible offender pools and provide leads to detectives. Finally, the command staff were trained in order to carry on the use of the profile after the conclusion of the experiment.

The study used two types of statistical analysis, ANCOVA and conditional multivariate regression. The ANCOVA results revealed that an agency's prior arrest rate for burglary is a significant predictor of future burglary rate, and the interaction effect between treatment/control agency and pretest/posttest arrests had almost 1.5 times more effect on burglary arrest rates than the experimental condition (control or treatment). The ANCOVA also suggested that the use of the burglary profiles had a large effect on the burglary arrest rates during the experiment. The conditional multivariate regression results confirmed that there was no significant difference in burglary arrest rates between the treatment and control groups before the experiment. Furthermore, it was discovered that the experimental treatment was a strong and significant predictor of burglary arrest rates after the implementation. In other words, the agency which received the statistical burglary profiling training raised their arrest rates by three times as

compared to the other agencies (30.1% vs. 10.9%, respectively). Furthermore, the treatment agency solved 260% more burglaries during the posttest period than the other three agencies.

As with any study in science, the need to test and retest the effects profiling is paramount. If indeed, the profile helps agencies significantly raise their burglary arrests rates, then it is very promising news for all, as a new evidence-based crime analysis and investigation technique is always needed by police.

CHAPTER THREE: METHODOLOGY

Study Design

In this study, a non-equivalent groups experimental design was used to objectively evaluate the effect of the burglary profiles on burglary arrest rates when applied in field investigations. This design allows researchers to select the experimental and control groups based on their similarity to one another when randomization is not possible, to fairly and accurately compare results. This design was most suitable for this study because the groups shared very similar characteristics with each other, and all three groups fall under the same police agency with the same policy, procedures, and training.

Ideally, a randomized controlled trial (RCT) experiment is the preferred method to use in an evaluation study to establish true causality between a treatment and an outcome. However, the use of RCT experiments in social science research is extremely difficult for a number of reasons, which have been previously described, and the use of quasi-experiments not involving randomization are usually the only feasible alternative (Farrington & Walsh, 2006). If multiple pre- and posttest measures are collected for both the control and experimental groups in the study, and the right measures are controlled for in the statistical analysis, a non-randomized experiment may be a very useful and accurate alternative to the RCT.

Treatment and Control Groups

The study took place in Pasco County, Florida utilizing the Pasco Sheriff's Office law enforcement agency. This particular agency was not selected at random for participation in this experiment, as commanders at the PSO sought out the SPOT-burglary training program in order to implement it within their agency. Due to this, the study's treatment and control groups were limited to the districts of the Pasco Sheriff's Office in order to provide a more balanced comparison of the impact of the profiles on arrest rates, given that the profiling training was solicited by the PSO command staff. Pasco Sheriff's Office is divided into three patrol districts: District 1 (Northwest), District 2 (East), and District 3 (Southwest). District 1 consists of 140 square miles and is divided into 10 specific patrol zones, with an average of 14 square miles per zone. District 2 consists of 490 square miles and is divided into 10 specific patrol zones, with an average of 49 square miles per zone. District 3 consists of 135 square miles and is divided into 10 specific patrol zones, with an average of 14 square miles per zone. See Figure 1 for a map of the county.



Figure 1. Map of Pasco County Broken Down Into PSO districts.

District 1 was arbitrarily selected as the experimental group, with District 2 and 3 as the control groups. A summary of the descriptive statistics of the three districts are presented in Table 1.

Table 1. Descriptive Statistics of Sample

Variable	M	SD	Min	Max	Range
Burglaries	70.78	12.93	51	103	52
Population of district	193453	63853	111333	265247	153914
Officers per district	78.00	4.282	75	84	9
Average pre-arrest rate for Burglary	14.22	1.99	12.03	16.80	4.77
Number of arrests	10.09	4.42	4	21	17
Arrest rate	14.25	5.77	5.30	35.08	29.78

Note: N = 54, total number of districts = 3.

The Experimental Treatment

The independent variable in this study is the experimental treatment, which involved the implementation of the statistical burglary profile by deputies, detectives, and crime analysts within District 1 of the Pasco Sheriff's Office. The experimental treatment consisted of the implementation of the Statistical Patterns of Offending Typology (SPOT) for burglary developed by Fox and Farrington (2012). The four classes of burglary offense styles identified are the opportunistic, organized, disorganized, and interpersonal burglaries. By doing this, Fox and Farrington (2012) provided a statistically developed tool to assist law enforcement with a very

common type of crime, burglary. A more detailed description of the four burglary styles and the corresponding traits of offenders shown to be most likely, statistically, to commit each style of burglary is provided in Table 2.

Table 2. Summary of SPOT-Burglary Profiles.

Profile	Offense	Offender	
ORGANIZED	<ul style="list-style-type: none"> ▪ Forced entry ▪ Brought tools ▪ No evidence ▪ High value stolen 	<ul style="list-style-type: none"> ▪ Older ▪ High rate ▪ Long criminal career 	<ul style="list-style-type: none"> ▪ Burglary expert ▪ May know victim
DISORGANIZED	<ul style="list-style-type: none"> ▪ Forced entry ▪ Scene in disarray ▪ Evidence left 	<ul style="list-style-type: none"> ▪ Young ▪ Long criminal career 	<ul style="list-style-type: none"> ▪ Early onset ▪ High rate ▪ Past drug offenses
OPPORTUNISTIC	<ul style="list-style-type: none"> ▪ Unlawful entry ▪ No tools/planning ▪ Unoccupied ▪ Low value stolen 	<ul style="list-style-type: none"> ▪ Young ▪ Low rate ▪ Short criminal career ▪ Past petty offenses 	<ul style="list-style-type: none"> ▪ Male & female ▪ No car ▪ Don't know victim
INTERPERSONAL	<ul style="list-style-type: none"> ▪ Occupied home ▪ Victim is the target-not objects 	<ul style="list-style-type: none"> ▪ Adult aged ▪ Late onset ▪ Solo offender 	<ul style="list-style-type: none"> ▪ Live alone ▪ Know of victim ▪ History of control/power crimes, such as domestic violence or stalking

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SPOT-Burglary Training

On February 7th, 2014, a meeting with the commander and lieutenant of PSO District 1 was conducted at the University of South Florida. In this meeting, ideas and questions regarding the implementation of the SPOT-burglary profile were discussed. The fact that the implementation of the profile was for an academic research study was also discussed with the commander. In order to ensure that the control groups was not influenced by any of the experimental treatment the experimental group received, we requested that the personnel of District 1 not share what they learn from the training with any other personnel outside of District 1 and that the training remain only within District 1 for the length of at least six months. These requests were agreed upon by the commander of District 1 and PSO Sheriff Chris Nocco.

To conduct the profiling training, a PowerPoint presentation consisting of 31 slides was developed to train personnel in District 1 of the Pasco Sheriff's Office. These training slides consisted of all the necessary information to properly instruct deputies, detectives, and crime analysts to effectively apply the burglary profiles in the PSO investigations. By ensuring proper training, the actual effectiveness of the burglary profile could be measured more accurately, because in the end, the overall effectiveness of the burglary profile completely depends on how well the personnel understand and properly implement it.

In an effort to provide visual aids of what PSO personnel should look for in a burglary crime scene and properly identify it as either an organized, disorganized, opportunistic, or interpersonal burglary, I provided actual photographs of burglary crime scenes to be included in the PowerPoint training presentation. These photographs of burglary crime scenes were obtained by researching closed and cleared burglary cases committed within the jurisdiction of the Hillsborough County Sheriff's Office in Hillsborough County, Florida, where I am currently

employed as a sheriff's deputy. I reviewed numerous written police reports and viewed the photographs included to determine which one of the four different classes of burglaries they should be classified as. Only after extensively reviewing the police reports and the photographs contained within did I assign one of the four burglary class labels to each of the included photographs. This process incidentally allowed me to put into practice the burglary profile which I had previously learned. After collecting the required number of photographs for the presentation, I submitted an information request to the Photograph Lab at the Hillsborough County Sheriff's Office and obtained the photographs.

In order to provide a training aid that could be used in the "field", I created four different scenarios for the four different classes of burglaries (organized, disorganized, opportunistic, and interpersonal). Using my experience as a law enforcement officer and my knowledge of the burglary profile, I was able to provide detailed scenarios which would accurately depict actual burglary calls a law enforcement officer would respond to. These scenarios were provided to the personnel as a training tool to assist them in classifying burglaries correctly while at the actual burglary call. The scenarios are provided in Table 3.

The SPOT training took place on February 25th and 26th, 2014 at the District 1 headquarters of the Pasco Sheriff's Office, located at 7432 Little Road in New Port Richey, Florida. Training on the burglary profiles was provided to each of the patrol shifts for the entire district.

These shifts included the morning shift at 0600 HRS, the afternoon shift at 1300 HRS, and the evening shift at 1800 HRS on the 25th and 26th of February. In between the afternoon shift and evening shift on the 25th, the property crimes detectives and crime analysts also received an extended version of the SPOT-burglary profiling training. The deputy training

consisted of a one hour long PowerPoint presentation, and the detective and crime analyst training consisted of the training presentation plus field instruction, including ride-alongs, records management system training, database training and analysis, and more.

During the profiling training presentation, Dr. Fox and I explained the use of the burglary profile, along with detailed descriptions of the burglary profile and the traits of the offenders who are most likely to commit one of the four classes of burglary.

Table 3. Burglary Offense Scenarios.

Burglary Profile	Offense Scenario
ORGANIZED	You arrive and meet with the victim. You learn that the suspect gained entry to the residence through a door located in the rear of the residence. The victim insisted the door is always kept locked. You observe clean pry marks on the rear door. You search around the entry point for the tool used but are unable to locate it. You note the residence is in tidy condition. You learn that the victim is missing valuable jewelry and expensive gold coins. You dust for fingerprints but are unable to locate any prints near the entry point or area around the items which were taken.
DISORGANIZED	You arrive and meet with the victim. You learn that the suspect entered the residence by breaking the patio door with a large brick which was still located in the residence. You observe a shattered patio door and a large brick just inside the door. The residence is in complete disarray. In the bedroom you observe dresser drawers pulled completely out and clothes lying all over the floor. The mattress has been removed from the bed. All of the clothes in the closet have been removed and thrown on the floor. In the living room, furniture has been moved or upended. Near the entertainment center, miscellaneous items are scattered around the floor. A gaming console, TV, and a laptop are missing. In the middle of the backyard, you locate a black glove and t-shirt which most likely was left by the offender.
OPPORTUNISTIC	You arrive and meet with the victim. You learn that the suspect entered the residence through the front door, which the victim believes was accidentally left unlocked. You do not observe any damage to the door or any other indications of forced entry anywhere else in the residence. The victim advised she was at work when the incident occurred. The victim advised her laptop which was located on her dining room table and a few dollars in cash which was next to the laptop were the only items taken. You notice that nothing else in the residence has been disturbed. You dust for fingerprints and lift a possible print from the glass panel on the front door.
INTERPERSONAL	When you arrive and meet with the victim, you learn that the single offender did not remove any property from the residence. The victim was the target of the offender's attention. The victim advised the offender struck him/her multiple times in the face with a close fist before fleeing the residence. The victim believes the offender was an older male and she may know him.

In order to ensure that each patrol shift received the same quality of training, the lectures were always completed from the same PowerPoint with the same overall teaching style. However, due to the much larger role detectives and crime analyst play in the utilization of the profiles (i.e., latent investigations, building suspect pools), a more in-depth lecture was provided, as discussed above.

Profiling training at the PSO was completed on the February 26th, 2014, when all deputies, detectives, crime analysts, and command staff in District 1 received the necessary training. The experimental period began on March 1, 2014.

Pretest and Posttest Measures

The dependent variable in this study is the number of burglaries that were cleared by arrest in each district of the Pasco Sherriff's Office. Pretest measures of the outcome variable were collected for one year before the implementation of the burglary profile, and posttest measures of monthly arrest rates were collected for each PSO district for six months that followed the implementation of the experimental treatment. The data on burglary arrest rates were provided by the PSO crime analysts for this project. It is important to note at this point the difference between the different types of clearances law enforcement agencies use when classifying a completed investigation for a crime, in this case, burglary. A burglary case may appear cleared for the purposes of the Uniform Crime Reports (UCR), but an actual arrest never took place. This can occur when there is insufficient evidence to support the reported crime, the victim no longer wants to be a victim (report a crime), or the likely suspect(s) dies in the course of the investigation. Even though these three examples resulted in the closure of the burglary case, they did not result in an actual arrest of a suspect for that particular burglary. In this

experiment, only burglary cases that were cleared by a physical arrest will count towards the successful use of the implemented profile.

Pretest measures were collected from each of the three districts from March 1, 2013 until February 28th, 2014. The posttest measures were collected from March 1, 2014 until August 28th, 2014.

Additional Control Variables

Additional measures were added to the model in order to statistically control for certain variables. These controls were needed to be able to compare the experimental district to the other two control districts, as they are different in some ways. These variables are burglary incidence rates, the population size, the number of deputies, and burglary arrest rate. Each of these controls was recorded for each of the three districts.

Analytical Approach

Analysis of covariance (ANCOVA) was used in order to observe the impact the experimental treatment (SPOT-burglary profile) had on the burglary arrest rates for the treatment and control groups. ANCOVA was chosen because it is able to control for covariate factors in a non-randomized, quasi-experiment. Furthermore, with the use of nonequivalent groups, it is able to statistically control for their preexisting differences by using covariates and predictor variables. In the current analysis, the outcome variable is the sheriff's office's burglary arrest rate for each of its three districts for each 1-month period throughout the 1 ½ - year experiment (n=18). The unit of analysis is the monthly collection of the data (n =18 per district), for a total sample size of 54 for all three districts. The main predictor variables are the sheriff's office's

experimental condition (control = 1, treatment = 2) and the evaluation testing status (1 = pretest, 2 = posttest). The interaction term treatment condition by testing status is included in the analysis in order to directly measure the effect of the SPOT on the outcome, while holding all other covariates constant. In other words, the interaction term is needed to isolate the effects of the treatment on the outcome in the posttest period alone. The average burglary incidence rate and average arrest rate prior to the experiment are included as covariates in the model.

The assumption of equal variances in the sampled data was not violated, as shown by a Levene's test of variance homogeneity with all main effect variables included ($F = .543$, $p = .655$). The non-significant outcome means that the null hypothesis of equal variances cannot be rejected, and the use of the ANCOVA is allowed.

CHAPTER FOUR:

RESULTS

To determine if there were any initial significant differences between the PSO districts comprising of the treatment and control conditions in the experiment, the number of burglaries per district, relationship between deputies and burglary arrest rates, and burglary arrest rate per district, three cross-tabulations with Chi-Square values were completed. It should be noted as the range on many of the continuous variables were larger than the size of the sample, the variables were condensed to allow for better patterns to be evaluated. It was found that there was no significant difference between the number of deputies in each district and the burglary arrest rate ($\chi^2(4, N=54) = 9.25, p = .055$). Furthermore, it was found that there was no significant difference between the three PSO districts and their burglary arrest rates ($\chi^2(8, N=54) = 13.07, p = .110$). Lastly, it was found that there was no significant difference between the number of burglaries per district ($\chi^2(10, N=54) = 12.87, p = .231$). (See Tables 4, 5, and 6.)

The burglary arrest rates for the treatment and control groups in both the pre- and posttest periods were collected and analyzed in order to determine how the arrest rates in each district differed after the experimental treatment was implemented. Table 7 shows that the control and treatment pre- burglary arrest rates were similar to each other, with the treatment group being slightly less (14.42% vs. 13.83%, respectively), these values were statistically significant.

However, after the experimental period of 6 months, the treatment group raised their arrest rates to 18.66%, while the control districts arrest rates lowered to 12.13%. The change between pre-test to post-test can be observed in Figure 2. An ANOVA was also conducted and it showed no significant differences in the mean value of burglary across districts.

Table 4. Cross-tabulation for Number of Burglaries per PSO District

PSO District	Number of Burglaries						Total
	50-59	60-69	70-79	80-89	90-99	100-109	
District 1 # of Months	2	3	5	6	2	0	18
% within District	11.1%	16.7%	27.8%	33.3%	11.1%	0.0%	100%
% of Total	3.7%	5.6%	9.3%	11.1%	3.7%	0.0%	33.3%
District 2 # of Months	7	4	4	1	1	1	18
% within District	38.9%	22.2%	22.2%	5.6%	5.6%	5.6%	100.0%
% of Total	13.0%	7.4%	7.4%	1.9%	1.9%	1.9%	33.3%
District 3 # of Months	5	7	3	3	0	0	18
% within District	27.8%	38.9%	16.7%	16.7%	0.0%	0.0%	100.0%
% of Total	9.3%	13.0%	5.6%	5.6%	0.0%	0.0%	33.3%
Total # of Months	14	14	12	10	3	1	54
% within all Districts	25.9%	25.9%	22.2%	18.5%	5.6%	1.9%	100.0%
% of Total	25.9%	25.9%	22.2%	18.5%	5.6%	1.9%	100.0%

Note: $\chi^2 (10, N=54) = 12.87, p = .231$.

Table 5. Cross-tabulation for Deputies per District by Burglary Arrest Rate

Deputies Per District	Burglary Arrest Rates in Categories					Total
	5.0-9.9	10.0-14.9	15.0-19.9	20.0-24.9	30.0-35.9	
District 1 & 3 (75 Deputies)						
# of Months	5	11	12	7	1	36
% within District	13.9%	30.6%	33.3%	19.4%	2.8%	100.0%
% of Total	9.3%	20.4%	22.2%	13.0%	1.9%	66.7%
District 2 (84 Deputies)						
# of Months	8	7	2	1	0	18
% within District	44.4%	38.9%	11.1%	5.6%	0.0%	100.0%
% of Total	14.8%	13.0%	3.7%	1.9%	0.0%	33.3%
Total # of Months	13	18	14	8	1	54
% within all Districts	24.1%	33.3%	25.9%	14.8%	1.9%	100.0%
% of Total	24.1%	33.3%	25.9%	14.8%	1.9%	100.0%

Note: $\chi^2 (4, N=54) = 9.252, p = .055$.

Table 6. Cross-tabulation for Number of Burglary Arrest Rate by PSO Districts

PSO District	Burglary Arrest Rates in Categories					
	5.0-9.9	10.0-14.9	15.0-19.9	20.0-24.9	30.0-35.9	Total
District 1 # of Months	3	5	5	5	0	18
% within District	16.7%	27.8%	27.8%	27.8%	0.0%	100.0%
% of Total	5.6%	9.3%	9.3%	9.3%	0.0%	33.3%
District 2 # of Months	8	7	2	1	0	18
% within District	44.4%	38.9%	11.1%	5.6%	0.0%	100.0%
% of Total	14.8%	13.0%	3.7%	1.9%	0.0%	33.3%
District 3 # of Months	2	6	7	2	1	18
% within District	11.1%	33.3%	38.9%	11.1%	5.6%	100.0%
% of Total	3.7%	11.1%	13.0%	3.7%	1.9%	33.3%
Total # of Months	13	18	14	8	1	54
% within all Districts	24.1%	33.3%	25.9%	14.8%	1.9%	100.0%
% of Total	24.1%	33.3%	25.9%	14.8%	1.9%	100.0%

Note: $\chi^2(8, N=54) = 13.067, p = .110$.

Table 7. Burglary Arrest Rate by Experimental Condition and Testing Status

Condition	Testing Status	Burglary Arrest Rate M	SE	n
Control	Pre	14.42	0.40	24
	Post	12.13	1.44	12
Treatment	Pre	13.83	1.56	12
	Post	18.66	1.50	6

These results provide initial support that the implementation of the SPOT-burglary profile had an effect on burglary arrest rates in the experimental district. However, these results do not control for relevant covariates which could have an influence on the treatment district's burglary arrest rates.

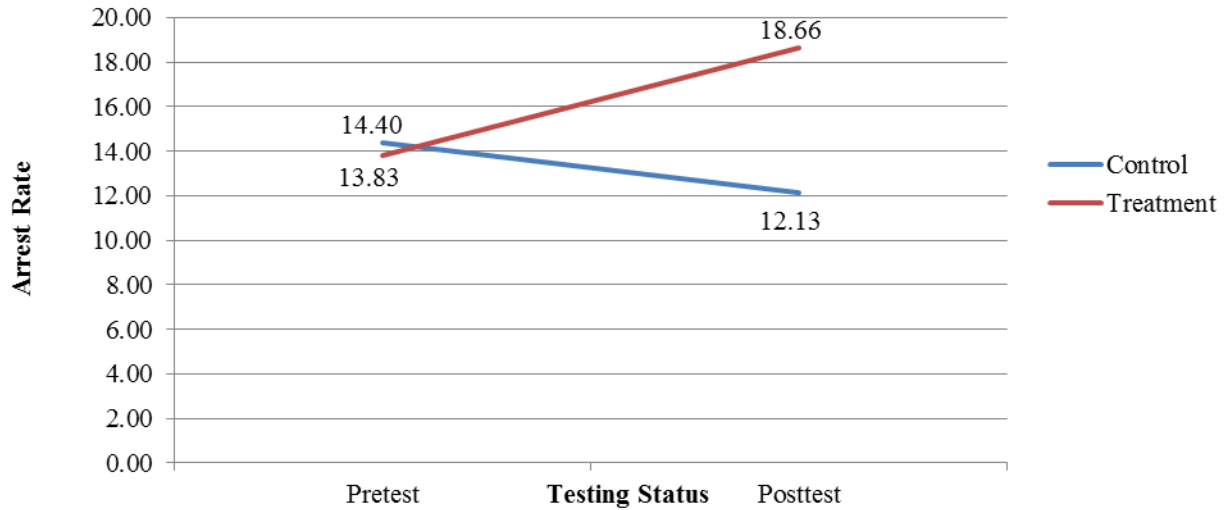


Figure 2. Interaction of the Experimental Condition and Testing on Burglary Arrest Rates

To remedy this issue, the use of an ANCOVA was employed in order to control for those covariates. The results of the ANCOVA are presented in Table 8.

The interaction effect between the treatment condition (Use of the SPOT-burglary profile) and the testing status (pre-, or posttest period) was found to be a significant predictor of burglary arrest rates in the model, even after controlling for relevant variables ($F = 4.97, p = .031$). Furthermore, according to the partial eta squared³ of .096, the use of the SPOT-burglary profiles training had a modest effect on the burglary arrest rates during the experiment. There was also a medium observed power ($=.588$) associated with the interaction term.

The testing status (pre-, or posttest period) was found to be a significant predictor of burglary arrest rates in the model after controlling for relevant variables ($F = 4.45, p = .040$). Burglary rate, population of the districts, officers per districts, and treatment status were not statistically significant predictors of burglary arrest rates after controlling for relevant variables.

Table 8. ANCOVA on the Effect of SPOT on Burglary Arrest Rates

Variable	F	η_p^2	Power	SS
Burglary rate	.087	.002	.060	2.51
Population of District	.783	.016	.140	22.68
Officers per District	.719	.015	.132	20.82
Treatment	.878	.018	.151	25.41
Pre/Posttest Period	.46*	.086	.542	128.72
Treatment \times Testing Interaction	4.97*	.096	.588	143.87

Note: Dependent variable = burglary arrest rates; $R^2 = .228$, Adjusted $R^2 = .129$; $F = 2.308$; $p = .049$; $n = 54$; η_p^2 = partial eta squared, SS= Type III sum of squares. * $p < .05$.

CHAPTER FIVE:

DISCUSSION

The present study attempted to replicate the findings from the first ever experimental evaluation of offender profiling, conducted by Fox and Farrington (2014). Like the original study, the present research used the SPOT-burglary profiles created by Fox and Farrington (2012) in order to evaluate the impact of the profiles on burglary arrest rates in active police investigations. For this study, the Pasco Sheriff's Office's three districts were used. District 1 was chosen as the treatment group and received the SPOT-burglary profile, while District 2 and District 3 would act as the control groups and receive no profile training. Data was collected on burglary arrest rates, number of burglaries, population size, and number of deputies for each of the three districts per month for one year before the treatment, and then per month for six months after the treatment was implemented. After collecting all of the above data for the full one and a half years, an ANCOVA analysis was used in order to control for different covariates that could affect the outcome variable.

Results of the present study showed that the district who received the SPOT-burglary profile training increased their burglary arrest rates from an average of 13.83% to 18.66% in only six months, while the control districts burglary arrest rates dropped from an average of 14.40% to almost 12.13% in the same time frame. The approximate 5% raw increase in burglary arrest rates seen in the treatment condition represents nearly a 75% total increase in arrests for burglary in only 6 months.

Still, one major concern for this experiment was whether or not the three districts utilized in the study were significantly different from each other in regards to relevant variables. In order to test for this, three cross-tabulations with Chi-square values were conducted. The first cross-tabulation focused on the number of burglaries in each district. The test determined that there was not a significant mean difference between the numbers of burglaries for each district. The second cross-tabulation tested for a significant difference between the number of officers per district and the overall burglary arrest rate. It was discovered that there was no significant mean difference between the two, meaning that the number of officers per district did not have a significant relationship with the number of burglary arrests. The final cross-tabulation tested whether or not each district had significantly different burglary arrest rates. There was not a significant mean difference between the two, meaning there was no difference between each district and the number of their burglary arrests. The results suggest that the number of burglaries committed in each of the three districts was not significantly different from some features of the district. These cross-tabulations reinforce the belief that the three districts utilized in the study are well suited for comparison.

To be sure, an ANCOVA analysis was used to statistically control for any minor differences between the PSO districts used in the study, and evaluate the impact of the experimental treatment while controlling for a variety of factors relating to the PSO districts and their crime rates. Results of the ANCOVA yielded many interesting and positive findings. First, the interaction effect between the treatment condition (SPOT-burglary profile use) and the testing status (pre-, or posttest period) was found to be a significant predictor of burglary arrest rates in the model after controlling for relevant variables. Furthermore, the testing status (pre-, or posttest period) was found to be a significant predictor of burglary arrest rates in the model after

controlling for relevant variables. These findings support the hypothesis that the SPOT-burglary profiles significantly raised the treatment group's burglary arrests rates when compared to the control districts. Furthermore, number of burglaries, population, number of officers per district, and treatment status were all found to be nonsignificant predictors of burglary arrest rates. If the null hypothesis were to be true, then one would expect one, some, or all of these variables to be a significant predictor of burglary arrest rates. The fact that they are not, further strengthens the positive findings. Furthermore, the interaction effect between the treatment condition (SPOT-burglary use) and the testing status (pre-, or posttest period) obtained the strongest power in the model (.588), showing that the SPOT-burglary profiles had the most significant impact on burglary arrest rates, beyond the number of officers, number of burglaries committed, and the size of the population.

Implications

With the results of this study, and the previous study by Fox and Farrington (2014), there are many implications to the implementations of the SPOT-burglary profile training in law enforcement agencies. The burglary arrest rate increase of almost 5%, from 13.83% to 18.66% for the treatment group may seem small, but when considering there were approximately 2.1 million burglaries in the United States in 2010 (FBI, 2010), a 5% increase in burglary arrest rates can have a large impact on burglary crime.

For instance, each burglary has been estimated to cost law enforcement approximately \$5,000 to investigate, though each offense costs about \$22,000 once the damage to the victim's home, property, insurance payouts, and court costs are included (Fox, Farrington, Chitwood & Courtemanche, forthcoming). Furthermore, each burglar has been shown to commit an average

of 4 offenses per year, when they are not behind bars (Piquero & Blumstein, 2007). Therefore, by raising the national arrest rate just 5%, an additional 105,000 burglaries would be solved, thereby preventing nearly half a million burglaries from occurring the following year while the offenders are incarcerated. When the costs associated with the prevented burglaries are taken into account, an estimated 2.1 billion in savings would result for law enforcement, and about 9.24 billion would be saved for society in general. It quickly becomes clear how much impact a 5% increase in burglary arrest rates could actually have for this country. Specifically for this study, District 1 in a posttest period of six months solved 21 additional burglaries. Using the same calculations, Pasco Sheriff's Office is projected to save \$420,000 in law enforcement resources alone.

Fox and Farrington (2014) and the present study are the only two experiments that have scientifically evaluated the effects of offender profiling in the field. Furthermore, both of the experiments have shown significant increases in burglary arrest rates after the implementation of the SPOT-burglary profile. With replication of the results, law enforcement agencies around the world have added empirical evidence to support the implementation of the SPOT-burglary profile in their agencies, and help solve the costly and prolific crime of burglary. This is especially true, given the ease in which the profile can be implemented into their agencies, and the fact that there is almost no cost associated with it. In other words, the small nuisance of implementing the profile will be heavily outweighed by the benefits of increased burglary arrest rates, even at an increase of just 5%.

Limitations and Future Research

Like with any study conducted, there will always be limitations to the findings. The largest limitation to the current research is the absence of a randomized experiment. In order to establish true causality, the use of a randomized experiment must be used. However, as stated above, randomized experiments are difficult to use in social sciences, and more specifically, field research in policing. Fortunately, there are statistical analyses that may be used in order to control for variables that may influence the outcome variable. This study used an ANCOVA which allows for the control of certain covariates that may influence the outcome variable you are attempting to measure. Since the ANCOVA was used and all important control variables were properly entered, it is unlikely that the significant increase in burglary arrest rates in the treatment group was due to some unknown variable.

Another limitation would be the limited number of data points available in the study. Unfortunately, the experiment was limited to only three districts within one police agency. This was due to the agency specifically requesting the SPOT-burglary profile training. Although this is different from the original Fox and Farrington (2014) study where they used multiple agencies as their control and treatment groups, it does however benefit from the fact that the three districts all must adhere to the same policies and procedures of their agency. This is beneficial as it standardizes how the deputies, detectives, and crime analyst within that agency conduct investigations and the classification procedures for crimes that are committed.

Due to the time constraints for the study, only a six month follow-up was able to be collected. This allowed for the minimum amount of data points to effectively evaluate SPOT-burglary profiles on burglary arrest rates. In the future, a follow-up period of at least one year is needed in order to collect enough data points for the evaluation. More time may allow for the

burglary arrest rates and the strength of their relationships to rise even more. Burglary arrest rates may increase as investigators and deputies become more familiar and comfortable with the use of the burglary profiles.

Another limitation may be the increased focus and attention on solving burglary after the implementation of the burglary profiles. If the treatment district went from a lackadaisical focus on solving burglary to focusing their complete attention on it, it may be the cause for the increase in burglary arrest rates. However, an increase in the follow-up period may lessen the effect of the increased attention as investigators become less enthusiastic about the new tool to use.

The need for many more replications of the original Fox and Farrington (2014) study is paramount. As more and more studies are conducted in order to evaluate the SPOT-burglary profiles, the more we can be confident that their implementation is the reason for the increased burglary arrest rates. Also, it is important to expand the study to multiple agencies in order to collect as much data as possible. Although it may be difficult, an experiment utilizing numerous agencies and the random assignment of the treatment to a particular agency is sorely needed.

Conclusion

The goal of the study was to evaluate the effectiveness of the SPOT-burglary profiles in active police burglary investigations on burglary arrest rates. To do this, a scientific experiment using non-equivalent groups design was utilized. This study aimed to be the second ever experiment to evaluate the overall effectiveness of offender profiling in actual law enforcement agencies investigations. Using a non-equivalent group design, relevant information from three districts within one single law enforcement agency was collected for one year before the experiment began, and six months after the implementation of the burglary profile in the

treatment district. The results show the treatment district's burglary arrest rates saw a significant increase when compared to the other two districts who received no training.

Although the results of this study are positive, it would be unwise to forget the necessary steps and hurdles that had to be undertaken in order to complete this study. The difficulties that come with conducting actual experiments within a law enforcement agency and the issues that come with the collaboration between practitioners and academics are not to be taken lightly. However, the emergence of the ILP model which mandates that evidence-based policing practices must be evaluated for their effectiveness has finally allowed practitioners to understand the importance of collaborative experiments. Seizing this new way of thinking, Fox and Farrington (2012) took the field of offender profiling which lacked the proper scientific evaluation and created a new profiling tool that could be tested in the field. Soon after, the SPOT-burglary profiles became the first offender profile to be scientifically evaluated in active police investigations (Fox & Farrington, 2014).

This study aimed to be a replication of the 2014 study, in the hopes of finding similar results. The finding that the SPOT-burglary profiles significantly increased burglary arrest rates is a positive result. Hopefully, as more positive results come from more replications, SPOT-burglary profiles can become a common practice in law enforcement agencies.

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