Southern Illinois University Carbondale
OpenSIUC

Theses

Theses and Dissertations

12-1-2011

POLICE PROGRAMS, CANINES, AND CONTINGENCY THEORY: AN EXPLANATION OF CANINE NUMBERS AMONG LARGE POLICE DEPARTMENTS

David Wayne Welker
Southern Illinois University Carbondale, wavidwelker@hotmail.com

Follow this and additional works at: http://opensiuc.lib.siu.edu/theses

POLICE PROGAMS, CANINES, AND CONTINGENCY THEORY: AN EXPLANATION OF
CANINE NUMBERS AMONG LARGE POLICE DEPARTMENTS

by

DAVID WELKER

B.A., Southern Illinois University, 2010

A Thesis
Submitted in Partial Fulfillment of the Requirements for the
M.A., in Criminology and Criminal Justice.

Department of Criminology and Criminal Justice
in the Graduate School
Southern Illinois University Carbondale
December, 2011

THESIS APPROVAL

POLICE PROGAMS, CANINES, AND CONTINGENCY THEORY: AN EXPLANATION OF
CANINE NUMBERS AMONG LARGE POLICE DEPARTMENTS

By

David Welker

A Thesis Submitted in Partial

Fulfillment of the Requirements

for the Degree of

Master of Arts

in the field of Criminology and Criminal Justice

Approved by:

Dr. Joseph Schafer, Chair

Dr. Matthew Giblin

Dr. Danielle Soto

Graduate School
Southern Illinois University Carbondale
October 18, 2011

AN ABSTRACT OF THE THESIS OF

DAVID WELKER, for the Master of Arts degree in CRIMINOLOGY AND CRIMINAL JUSTICE, presented on OCTOBER 18, 2011, at Southern Illinois University Carbondale.

TITLE: POLICE PROGRAMS, CANINES, AND CONTINGENCY THEORY: AN EXPLANATION OF CANINE NUMBERS AMONG LARGE POLICE DEPARTMENTS

MAJOR PROFESSOR: Dr. Joseph Schafer

Canines have provided services for humans over many centuries. More recently, they have been used for police work. Canines are used to apprehend suspects, track people, and find drugs. They are also seen as a less-than-lethal weapon and can be used in a number of different programs such as D.A.R.E./crime prevention education, S.W.A.T., and drug task forces. But research on canine use and effectiveness is lacking. This study tries to fill that gap using secondary data from the *Law Enforcement Management and Administrative Statistics* (LEMAS) survey of police agencies. In this study, adoption of canines was predicted by contingency theory based on contingencies such as tasks and structural programs in the various departments. Contingency theory was also used to test the canine's role in enhancing the effectiveness of the police organizations. This study tries to explain the variation of canine use across departments by using contingency theory and the effectiveness of canines by assessing monetary values from drug forfeitures.

DEDICATION

I dedicate this research project to my family and friends. Thanks for all of the support.

ACKNOWLEGMENTS

I would like to formally thank Dr. Joseph Schafer for his help and advice throughout this thesis project. I would also like to formally thank Dr. Matthew Giblin and Dr. Danielle Soto for their input.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER 1

INTRODUCTION

Police have the authority to use force in many situations to detain dangerous offenders and to keep the general public safe. There are also many situations where officers are faced with difficult or seemingly impossible tasks. Officers have a variety of different tools to assist them in apprehending suspects and carrying out difficult tasks such as searching for drugs or tracking missing people or fugitives. Many of these tools are less-than-lethal weapons such as batons and TASERS, but one of the most versatile tools/weapons used by police in many programs is the canine.

Canines work better than machines in finding drugs, tracking, searching and rescuing, and reducing the need to use lethal force in some situations (Stitt, 1991). In addition, the few studies on police canines, along with more general literature on the topic, have stated that they are a very cost effective policy for crime control (Mesloh, 2006; Wolf, Mesloh, & Henych, n.d.). Thus, police agencies use canines when they are responsible for certain tasks or structures (such as full-time units) where the abilities of the canines are valuable. Without canines, departments are assumed to be less effective in dealing with these tasks and structures (according to the literature). This is can be explained by contingency theory. The tasks, or contingencies, that seem to involve canines frequently are drug law enforcement, arson, crime prevention education programs, search and rescue programs, and S.W.A.T. (Chapman, 1990). Number of canines varies by department, and this most likely depends on the nature of the tasks for which the department is responsible and the type of structure the department employs. This is because

canines allow these tasks and structures (or contingencies) to be efficient (Chapman, 1990; Mesloh, 2006; Wolf, Mesloh, & Henych, n.d.).

Not all departments have the same number of canines per officer. Some have similar tasks and structures while some do not. Why this variation in canine numbers across departments occurs will be explained in this study. Contingency theory, an organizational level theory, was used to test if canines were dependent upon (or contingent on) certain tasks and structures in municipal police departments. This study will answer the question of why is there variation in the number of canines across police departments by using a test of this theory. Also, to test effectiveness, drug forfeitures will be used to further explain the theory and canines.

This paper will begin with a discussion (literature review) of the history of domesticated canines. Topics covered in this section include how humans first used canines to help them with day to day tasks. Following that, the history section displays the different uses of canines over time by describing how they were able to perform different tasks from war to policing. Next, the literature review continues by discussing empirical studies and informative papers/books about canines. In this section, the effectiveness of canines in policing is presented and readers are provided with an idea of the types of programs in which canines are used. Then contingency theory is explained how it relates to canine variation in numbers among police departments.

The *Law Enforcement Management and Administrative Statistics* (LEMAS) data set was used and many variables were chosen based on their perceived relevance to canines (contingencies of canines) and information supplied by the literature review. OLS regression was employed for this study, and two regression models are examined.

The study concludes with a discussion section of the results with closing remarks, study limitations, and future directions. Here, the results of the study are discussed in detail along with

the theory, while explanations are offered for those hypotheses that were not supported, including possible reasons why. Following this, the paper is summed up as a whole in the conclusion, restating the main points and hypotheses that were supported. Also stated are the limitations from the LEMAS data set and this study. Ways to better improve future studies are listed and described in this section as well.

Overall, the research attempts to answer the question why there is variation in canine numbers across municipal police departments. Many variables are chosen to help explain the variation in numbers because they were seen to be contingencies of canines. Some variables are broken into tasks and structural variables, while some are general variables seen relative to canine use in police agencies. The explanation of why departments have canines based on certain contingencies is important because it is informative for other departments with those contingencies. Departments tend to adapt and change based on what other departments are doing. Change happens because departments are trying to fit environments by trying or using different tools/technology to increase effectiveness. If departments are responsible for those certain tasks and structures but do not have many canines when compared to similarly organized agencies, then those agencies may want to adapt to incorporate more canines in their department (to fit what other, similar departments are doing).

CHAPTER 2

LITERATURE REVIEW

Historical Background

Canines have been used numerous ways over time, and it is thought that they are the oldest domesticated animals. Humans originally used canines to help hunt and catch food while also using them for protection from attacks by other animals. Later, canines were used in wars as far back as the Peloponnesian War from 431 to 404 B.C. Canines were used mainly as guards and for defensive purposes but were not specifically trained for these duties (Chapman, 1990; Dorriety, 2005). The Egyptians also used canines in battles to deliver messages a few thousand years ago. Later, canines were used mainly for guarding purposes, such as on naval ships in France during the mid-to late-1700s (Handy, Harrington, & Pittman, 1961).

In 1896, Germany was the first country to use canines for policing purposes when it began to use canines against gangs. This was when the first scientific experiments on breeding, training, and usage began. Canine use in policing spread throughout Europe before reaching New York City and New Jersey in 1907 (Dorriety, 2005). By 1911, New York City had sixteen canines for patrolling purposes. These canines were conditioned to be respectful to uniformed officers and to be aggressive towards people dressed in street clothes. Canines were also taught to bring suspects down by wrapping their forelegs around the suspects' legs. Then they stood or sat on top of the suspects and barked until an officer arrived. The main breeds of canine used for this were the Irish wolfhound, because of its large size, and the Belgian sheep dog, because of its aggression. Typically, these canines were let loose at night to catch those who were breaking

curfew. Then, in 1917 or 1918, the first canine corps was disbanded because of problems with the dogs attacking and harming people (Handy, Harrington, & Pittman, 1961).

Following the end of this initial period of police canine use in the United States, the first training school was established in Greenheide, Germany, in 1920. In this school police canines were trained to be obedient, to attack, and to find objects by smell. In 1930, London law enforcement began to use the training tactics from Greenheide to train their canines. These tactics were put to use in 1946 when London was having problems with gangs snatching purses in parks. Six Labradors were used and this caused a reduction in purse thefts. Though police canine use was spreading rapidly in Europe, there were only 14 police dog programs in the United States in 1952 (Handy, Harrington, & Pittman, 1961).

Canine use was growing, however, due to dogs proving themselves dependable in both world wars (e.g., depended on to deliver messages and trained for defensive purposes) and in Vietnam. World War I was the first time canines were trained specifically for war-related responsibilities at a training school. The Germans trained 6,000 canines to be messengers, guards, and sentries. Great Britain and France did not use war-trained canines or have a special school for training until later in the war (Chapman, 1990). During World War II, all major countries used trained canines. Duties included carrying messages, performing sentry duty, carrying first aid supplies, carrying war supplies, finding wounded in the field, and spotting machine gun nests (Chapman, 1990). It was not until 1942 that the United States began to use canines during World War II (Chapman, 1990).

During the World War II era, the German shepherd began to gain popularity for use in policing in the United States due to its ease of training (Wanner, Terry, & Lomas, 2011). Later, in Vietnam, canines were used to find mines, enemy tunnels, and booby traps. Many lives were

saved due to the canines' ability to find these items and protect soldiers. This use of detection and protection later spread to modern day policing (Dorriety, 2005).

In addition to their use in recent wars, canines have been used in modern times by police forces. However, in the 1960s they earned a bad reputation. Officers used canines, fire hoses, and other things to frighten and disperse crowds during the Civil Rights movement. Police canines were misused and set on people who did nothing wrong. These incidents were captured on the news and in newspapers, resulting in a display of shocking images of women and children (in addition to men) being attacked by canines (Dorriety, 2005; Gorden & Haider, 2004). However, the problem was with the handlers and probably some improper training techniques for the canines. Despite this bad reputation police canines received, their use in the United States was still growing. By 1989, there were approximately 7,000 police dog teams in the United States (Dorriety, 2005). Today, positive image of canine programs is important. Canines are often used in community policing-type programs and demonstrations to encourage positive public opinions (Chapman, 1990).

Effectiveness of Canines in Policing

Canines are useful tools in protecting officers and suspects, and in finding drugs. Injuries to officers are decreased due to use of canines because they reduce the potential for a suspect to resist arrest. In addition, the mere presence of the canine during a citizen or offender encounter creates a psychological element that deters many suspects prone to resisting arrest (Stitt, 1991). Many times when officers would have to use lethal force during a citizen/officer encounter, a canine is deployed, thereby preventing the possible death of the suspect (Dorriety, 2005; Stitt, 1991). They also can be used in schools to aid in the prevention of drug use and possession on

school property (Brown, 2006; Dorriety, 2005; Stitt, 1991). Thus, canines save lives, prevent

injuries, deter potentially assaultive offenders, and help maintain drug-free schools.

Though there is little empirical evidence on canine use, many police agencies with

canines attest to their success. Canines are effective in crime solving and prevention when used

by police for groups and individuals (Chapman, 1990).   The advantages of using canines are that

they are unquestionably loyal, more fearless and fearsome than humans, able to get into places

officers cannot; they create psychological effects on crowds and criminals, serve as a valuable

adjunct to patrol, protect officers, and currently have a favorable effect on police-public relations

due to being seen by and displayed to the public in positive images (e.g., schools and

demonstrations in parks). This positive image approach with the public is important for the

survival of canine programs to overcome the bad reputation they received in the 1960s

(Chapman, 1990; Stitt, 1991).

Only a few disadvantages come from using canines. These include costs for feeding and

grooming, training, constant monitoring by handlers, and consequences of bites. In addition,

canines can sometimes interfere with police duties by having to be constantly watched and

controlled. Retraining also limits the times when the canines can be used (Chapman, 1990; Stitt,

1991). The department must also provide a budget that allows for the best training and training

equipment to ensure the maximum effectiveness of the canine. This could be seen as a

disadvantage because of the amount of money that needs to be set aside for training (Handy et

al., 1961). According to Handy et al. (1961), a training school costs $600 per time for the canine

and handler, which would approximate to $4,513 in today's dollars (Inflation calculator, 2011).

Chapman (1990) estimates the annual maintenance cost at $30,098 for an individual canine

(includes food, training, vet care, etc.). Since canines can be expensive, private citizens or public

fundraisers, such as those from schools, are often employed to help aid the departments in the costs for a canine unit (Chapman, 1990). But these disadvantages are outweighed by the aforementioned benefits of canines (and helped by citizens aiding in the budget). The areas that seem to show the most canine use are those areas of resisting arrest/use of force, search and rescue, tracking, narcotics, arson, and drug crimes in schools (Chapman, 1990). But not all agencies are responsible for these tasks; therefore, the disadvantages outweigh the advantages in some cases, which possibly creates variation in canine use between departments.

Training and Use of Canines

When canines are trained for tasks, they are placed in one of two groups: specialist canines and all-purpose canines. Specialist canines can include the Labrador, German shepherd, Rottweiler, Bloodhound, and a few others. Most of the time these specialist canines are used for tracking and searching for missing persons, escaped criminals, and bodies. Besides tracking, canines in this group can also be trained to find narcotics, stolen property, and explosives; they are specialists because each canine is trained to find only one item (Chapman, 1990). Following the specialist canines are the all-purpose canines. These canines have to be very strong and intelligent with an excellent sense of smell. Canines in this group are trained to track, find narcotics, guard suspects, catch fleeing suspects, warn officers of danger, and search many different types of areas. German shepherds appear to be the best type of canine to use for an all-purpose canine (Chapman, 1990).

When canines, typically all-purpose canines, are used as a less-than-lethal tool for apprehending suspects, there are two methods canines can be trained to use. One is the bite and hold method, while the other is the bark and hold method. The bite and hold method involves

the canine biting the suspect on the arm or leg (usually the arm) and holding him/her until the officer arrives and gives the command to release (Chapman, 1990; Mesloh, 2006). But sometimes problems can result from bite injuries and some suspects need medical attention. The bark and hold method involves the canine circling the suspect, barking at him/her until the officer arrives (Mesloh, 2006). However, if the suspect tries to flee or fight the canine, then the dog will bite and hold the suspect until a command is given. The canine is trained to make appropriate decisions. Both of these methods are used to protect officers and reduce the need to use lethal force on suspects during the apprehension process (Mesloh, 2006).

These two types of holds were studied by Mesloh (2006) in Florida. Findings showed that significantly more bites resulted from bark and hold canines than bite and hold canines. This is most likely due to lack of training for the bark and hold canines or the handlers' willingness to use canines in more situations than the bite and hold handlers (Mesloh, 2006). Also, Belgian Malinois were found to have a significantly higher bite ratio, two times greater, when compared to German shepherds. Thus, for the policy on canine use, German shepherds are the preferred type of attack canine. This is because they are very obedient and easier to train than most dogs. Also, the bite and hold method was proven more effective than the bark and hold for apprehension of suspects. When a canine has a suspect by the arm and does not let go, the suspect is deterred from doing further harm and the officer is allowed time to safely handcuff him/her and contain the situation (Wanner, Terry, & Lomas, 2011). Different tasks or structures for a department could alter what type of hold is used. S.W.A.T may be more likely to use a bite and hold where street patrol may use the bark and hold. This difference in types of holds could be another explanation for variation in the number of canines across departments.

Hickey and Hoffman (2003) studied canines as a use-of-force tool (or less-than-lethal force tool) from 1993-1998 in Montgomery County at Maryland Police Department by observing the apprehension rate, bite rate, bite rate that resulted in medical attention, bite rate that resulted in hospitalization, and officer injury rate. There were 28,430 incidents to which canines and handlers responded. Of those incidents, the canine was deployed 15,031 (52.9%) times during the study period and 1,179 canine assisted apprehensions occurred. These included deployment for tracking (568 apprehensions out of 4,367 deployments), building searches (345 apprehensions out of 6,197 deployments), and what Hickey and Hoffman called other (266 apprehensions out of 4,458 deployments). There were 13,582 deployments where the canine did not make an apprehension. It was not specified what happened or why canines did not make apprehensions, but it could be because officers apprehended the suspect before the canine could (Hickey & Hoffman, 2003). Of the 1,179 apprehensions, 19.3 percent were for motor vehicle thefts, 15.9 percent were for commercial burglary, 13.8 percent were for residential burglary, 10.9 percent were for thefts/larceny, 7.5 percent were for narcotic crimes, 6.3 percent were for robberies, and 0.8 percent were for rapes. But the apprehension rate was not the main focus of this study. The main focus was the bite rates from these apprehensions. Results showed that the bite rate was 14.1 per 100 apprehensions, medical treatment for bites resulted in 9.1 per 100 apprehensions, and hospitalization for bites occurred in 4.8 per 100 apprehensions (Hickey & Hoffman, 2003). Besides looking at bite rates and injuries, the researches also observed bite rates and race. Findings here showed that whites were 1.3 times more likely to be bitten than other races. Results displayed that whites were bitten 16.2 times per every 100 apprehensions while other races were bitten 12.3 times per every 100 apprehensions (Hickey & Hoffman, 2003).

Though Hickey and Hoffman's (2003) study show descriptive results, they do not explain why there was such a large gap between the deployments and the actual canine-assisted apprehensions, and they focus mainly on the bite rates. This is a significant limitation of this study, and future studies should consider factors that could explain why so many deployments resulted in a low apprehension rate. There could be many reasons for this, such as other officers in the area were able to catch the suspect before the canine was, the suspect got away, the presence of the canine caused the suspect to comply, or the canine was called off by the handler. The study did not specify if the canines were part of a special team such as S.W.A.T. or drug law enforcement. It was also not specified if a special unit was used for any of these incidents, which could help explain why there could be variation in canine numbers from this department to others. However, this study did show statistics on the number of deployments verses the number of apprehensions. Also, percentages of apprehensions in certain crimes were reported showing in which situations canines were most effective.

Another study was conduced by Campbell, Berk, and Fyfe (1998) who observed the Los Angeles Police Department's use of canines from 1990-1992. Findings on bite rates showed that those suspects who fled had a 150 times greater chance of being bitten. In 1990 (when canines were used), 54 percent of suspects were apprehended by canines; of these, 23 percent fled from the dogs. By 1991, this percentage had decreased to 25 percent of suspects being apprehended by dogs and 17 percent of those suspects fled from the dogs. Then, by 1992, only 15 percent of suspects reported being apprehended by the canines and only 9 percent of those suspects fled (Campbell, Berk, & Fyfe, 1998). The researchers did not explain why there was a change in suspect behavior over this short span of time. However, it is very likely that canine use created a deterrent effect among offenders. This deterrent aspect shows the effectiveness of canines. Over

this short period, suspect flight from canines declined from 23 percent in 1990 to 9 percent in 1992, which is attributed to the use of canines by police agencies (Campbell, Berk, & Fyfe, 1998). However, this only shows that canines are effective at apprehension of suspects and possibly creating a deterrent effect. But would another less-than-lethal weapon such as a TASER or pepper spray have the same result? Departmental use of these other less-than-lethal weapons could be an explanation of the variation in canine numbers across departments.

Besides the previous empirical studies, canines are also an added tool for officers because they create psychological effects that reduce the number of assaults. Eyewitness accounts attest to canine effectiveness. As previously stated by Chapman (1990), police use of canines is not considered deadly force, but their speed creates a physical and psychological factor that is advantageous for police. These canines are able to chase down suspects and prevent officers from having to use unnecessary deadly force (Stitt, 1991). Canines produce a psychological effect because they are not only fast, but they confuse and intimidate suspects as well. Suspects do not know how a canine thinks and do not know if or when it will attack. For the most part, this confusion created by the canine allows enough time for officers to apprehend the suspect and prevent further harm (Stitt, 1991). This is because the suspect is focused on the canine and not the officer. An example of this involves sixty members of the Hells Angels who were causing problems in a small town. Ten officers with only two canines warded off the Hells Angels. It was the canines that caused them to back down because the members in the gang said they did not want to deal with the dogs. They feared the possibility of being attacked by one of the dogs (Chapman, 1990; Stitt, 1991).

Another incident happened at a football game. Two rival teams were playing each other and kept fighting on the field. Eventually both sides of the stands filed onto the field and joined

the fighting. There were only twelve officers present to maintain order at the game. However, one of them was a canine handler and was told to get his dog. The handler put the canine on a long lead and began walking him toward the fighting crowd. With the canine lunging and snarling at the crowd, the mob parted as the canine got close, and the fighting ended with no one being bitten. It took one canine team only five minutes to break up a mob fight without ever letting the canine off the lead with no officers, witnesses, or offenders being harmed (Chapman, 1990). This shows the powerful psychological effect that a canine can have and the ability to deter people from committing further crime. A final example involves a police chief who announced in the papers that the department was beginning a canine program and that these dogs are vicious and trained to attack. This form of policy, according to the police chief, directly led to a decrease in burglaries and thefts around the city. Though this is not empirical evidence, it does spark interest in canines and suggests that they could be worth further study (Chapman, 1990). But all of these incidents dealt with community problems in which canines can be used effectively. Not all communities have the same problems. Perhaps a community has high rates of cyber crime or white collar crime. Agencies responsible for those communities may have fewer canines because canines are not used in those types of tasks. Therefore, depending on the community crimes, an agency may focus on different tasks causing canine use variation. Unfortunately, however, this study does not have data on community crime and is not included. This study examines number of canines based on the contingencies for which departments say they are responsible.

Canines are not always used for attack purposes. They are also used to find drugs and track people. Canines have a very good sense of smell; they have 200 million olfactory sensory cells in their nasal chambers, while humans only have 5 million (Dorriety, 2005). This is why

they are used in policing to find drugs and people. Canines can track or smell anything they are

trained to find. For example, a canine can match the scent of an offender in a line up of suspects

(Schoon, 2005). Schoon (2005) conducted a study observing time and scent decay on objects.

Results show that canines consistently correctly identify scents even if those scents are relatively

old. The age of scent drops initially but then after that first drop, it does not significantly

diminish. In a different study by Schoon (2003), cited by Schoon (2005), with five Dutch dogs

and four German shepherds, eight out of twelve tests resulted in positive identifications made on

a seven year odor. This is strong evidence suggesting how effective canines can be in policing

when searching for drugs or people (Schoon, 2005). In Schoon's (2005) study, he used pieces of

cloth to test the decay of scent and a canine's ability to identify it over time (ten canines were

used). At time zero (the very beginning of the study), all ten canines found the correct piece of

cloth. Then at week eight, six canines found the right piece of cloth while three did not

recognize any scent and one canine made an incorrect choice. By week twenty-four, three

canines made a right choice in picking the cloth, six had no recognition of the scent, and there

were zero incorrect choices (Schoon, 2005). Canines can find the right odors most of the time,

showing their effectiveness as a police tool. Agencies that have special tracking and searching

programs should have canines, or more canines, because evidence suggests the canines' ability to

detect and distinguish between scents (even old scents) is accurate.

Because of their effective scent detections, one of the uses for police canines is sniffing

lockers in schools for drugs. A study by Brown (2006) investigated crime and delinquency in a

high school. Here the majority of students said that drug-sniffing canines reduced drugs in

schools. However, after security measures and canine sniffs of lockers, findings showed that 55

percent of students saw other students use or possess drugs at school (Brown, 2006). These

findings show that policies have only a limited effect on school safety and drug use. This suggests that canine drug searches in schools have a minimal, if any effect on students. However, there are many potential problems with this study, specifically with the use of canines for drug searches. This study did not say how often canines were used to sniff for drugs throughout the year. Furthermore, Brown also did not say if the students knew what days the canines were going to be there. An example of this can be shown by the high school in Carbondale, IL. The high school is randomly searched by canines only three times a year (K. Lindsey, personal communication, April 7, 2011). Ideally, canines need to do random searches of schools to find the drugs. However, most of the time, students know when the police canines will be searching because the search dates get leaked. Also, questions were not asked of students about why they do not bring drugs to school. This could better measure a deterrent effect caused by police canines, which could be derived from their possible effectiveness. But this is only when a scent is involved, and it is a task a human cannot perform. Agencies that do not need to track scents or have other tools to do so would have fewer canines. This could also be an explanation for the variation of canines among departments. There are very few, possibly only one or two, studies that observe canines with drugs in schools (e.g. Brown, 2006). Much more research is needed in this area.

As the literature review suggests, canines are an effective, efficient tool in the fighting and prevention of crime. In spite of the costs related to feeding, vet care, and training, canine effectiveness studies show dogs are worth the money (Handy, Harrington, & Pittman, 1961; Mesloh, 2006; Wolf, Mesloh, & Henych, n.d.). They are also used for drug searches in schools and in vehicles. There is still some opposition to their use in policing for searches of vehicles and schools, but court decisions conclude that dogs are reliable tools as evidenced by the

admissibility of canine-identified evidence (e.g., *Illinois v. Caballes*) (Campbell, Berk, & Fyfe, 1998; Dorriety, 2005; Hickey & Hoffman, 2003; Lunney, 2009; Stitt, 1991; Wolf, Mesloh, & Henych, n.d.).

Canines can be used in many different police programs such as drug law enforcement, arson units, crime prevention education, search and rescue, and S.W.A.T. In these programs, the canines' ability to easily apprehend suspects, to create psychological effects, and to search by scent not only helps protect officers but also performs jobs officers cannot do themselves or jobs that would tie up many officers. Canine use frees other officers to respond to more calls (Chapman, 1990). In addition to this, canines can be used in schools to find and prevent narcotics on school grounds and could be used as an educational tool in school programs such as D.A.R.E. But if canines are effective and are used in many programs, then why is there variation in canine numbers among departments? To answer this question, this study will test to see if the number of canines is contingent on certain tasks and structures. Then, the assumed effectiveness of canines will be tested by the monetary amount from drug forfeitures.

Contingency Theory

Contingency theory helps explain the variation in canine numbers among departments. This theory states that for agencies to be effective, change is needed. Typically this happens when there is a change in environment, and the organization needs to adapt to that change (Pennings, 1987). Furthermore, partially implemented programs need change to become fully implemented programs in order to be more effective. An example is defined in Burruss, Giblin, and Schafer's (2010) article on homeland security. In that article, preparedness for terrorist threats is an important part of homeland security (i.e., preparedness is contingent on homeland

security). Thus, law enforcement agencies need to change in order to be more effective when the risk of a terrorist attack is high (Burruss, Giblin, & Schafer, 2010). Based on this idea, contingency theory is applied to canines and police programs. In the present study, canines are seen as an important part of policing programs such as drug units, arson units, crime prevention education, search and rescue, and S.W.A.T.

Contingency theory is an organization-level theory which deals with organizational change. This change encompasses both internal and external organizational factors. Organizational contingency factors (or organization characteristics) include technology, task uncertainty, size, and strategy (Donaldson, 1996; Hollenbeck et al., 2002). These factors, or characteristics, are said to mirror the environment in which the organization resides when the organization is deemed effective or fully implemented. The main aspect of contingency theory is fit (Drazin & Van de Ven, 1985). Therefore, to be effective, the structure of the organization needs to fit the contingency factors showing an adaptation to the environment (Donaldson, 1996; Drazin & Van de Ven, 1985; Pennings, 1987). However, poor adaptations to the environment can lead to low performance, or a not fully implemented program (Hollenbeck et al., 2002). This can be applied to policing because when police agencies do not adapt to their environment (e.g., changes in crime, increases or decreases in specific crime rates or general crime rates), then the department's effectiveness suffers.

These adaptations described by contingency theory can be applied to criminal justice, and specifically, to police use of canines. Canines are assumed to enhance these tasks and structures (i.e., drug law enforcement, S.W.A.T., arson, etc…) based on prior literature attesting to their effectiveness in policing (Chapman, 1990; Wanner, Terry, & Lomas, 2011). With regard to canines, contingency theory would suggest that many policing functions would benefit from their

inclusion, making these policing efforts more effective and efficient. Agencies might have different in canine numbers because they focus more on different tasks (or contingencies) when compared to other agencies (though departments may have many tasks, such as a gang unit when there are no gangs around; they might focus on one task over the other). When these tasks include a focus on tasks such as arson units or drug units, it could be possible those departments are more likely to use canines to better fit what other agencies do. Agencies tend to adjust to keep up with what other agencies are doing based on stories of effectiveness from other departments. The police world is constantly changing with criminals adapting to their environments to evade the police. Therefore, agencies adapt to the changes criminals make which then spreads across agencies in the U.S. Canines are a tool that can be used in numerous situations and can be trained to adapt to a variety of situations and are growing in use (Chapman, 1990). Not using canines could result in police programs being only partially implemented if an agency is responsible for tasks that are more effective with canine use (Burruss, Giblin, & Schafer, 2010; Jiao & Rhea, 2007). It is possible agencies adopt canines when responsible for certain contingencies because other agencies attest to their effectiveness.

Specific examples that were used in this study include tasks, structures, budget, use-of-force complaints, and less-than-lethal weapons. The first hypothesis for the study addresses task variables. This hypothesis discusses programs such as drug law enforcement, arson, crime prevention education, search and rescue, and S.W.A.T. Canines are necessary to increase the effectiveness of police departments when the departments are responsible for certain tasks, such as the ones previously stated, which allows departments to have a better fit to their environments. The smelling capabilities of canines would allow them to play an important part in detecting narcotics when properly trained (Chapman, 1990). Canines are used in arson cases to sniff for

accelerants to help determine if the fire was an accident or an arson case. Once the canine finds

the accelerant, a sample can be taken for analysis (P. Echols, CCJ 303 lecture, spring 2008).

Canines are also useful in crime prevention education because they keep the young audiences'

attention and excite them, while educating them about crime. In addition to this, the canines'

great sense of smell is used to follow the trail of human scent for search and rescue missions

(Chapman, 1990). Finally, the canines are able to alert S.W.A.T. members to booby traps, enter

teargas-filled rooms to apprehend suspects, and help solve hostage situations by apprehending

the suspect when officers are unable to get close (Wanner, Terry, & Lomas, 2011). Therefore,

canines are contingent upon law enforcement tasks based on the assumption that they are

effective at performing these tasks.

Structural variables, like the task variables, are used to explain variation in canine

numbers across agencies. Variables include full-time drug education personnel, full-time

missing children unit, full-time school safety unit, and full-time community crime prevention

unit. These structures were deemed to use canines based on the literature stating that canines are

contingent upon these four structures.

Budget affects canines because if there is a low budget, then agencies will adopt canines

due to their many uses in law enforcement. In addition, when the budget is tight, agencies have

more canines because they are cost effective (especially when the agency is responsible for tasks

that typically use canines). Canines can replace costly tools or can cut down on needed

manpower. Low budget could also be seen as a reason for not having canines based on the

literature and many departments view canine programs in this way; however, for this study,

canine effectiveness will be hypothesized that it reduces the need of many tools and manpower

(Chapman, 1990; Handy et al., 1961; Stitt, 1991). Canines can be viewed as contingent on the budget amount per officer.

When discussing use-of-force complaints, departments that receive more complaints are typically agencies with unorganized tasks and structures and are thus less likely to have canines. This is because these agencies will not have many full-time special units. Also, canines can create fear, causing public dissatisfaction leading to complaints and fewer, or zero, canines in the department (Chapman, 1990). Canines are seen as contingent on the amount of complaints received by the department.

Less-than-lethal weapons were the last variable viewed to have an effect on the number of canines across departments. When an agency has many less-than-lethal tools, then there may not be as much of a need for canines. Those agencies with fewer less-than-lethal tools use canines because of the many tasks canines can perform. Those agencies with fewer less-than-lethal weapons will most likely need more canines because of canine effectiveness. Canines are contingent on the number of less-than-lethal weapon types issued.

These are the types of variables that were in the data set and were deemed capable of explaining canine number variations. By testing contingency theory in this study, it is believed that the theory can be applied to all types of tools that could make programs more effective. However, for this study, canines are used as the example to test the theory.

Contributions

Since canines are seen as an effective tool, why do agencies have different ratios of canines per officer? The variation in canine numbers could be explained by the different tasks and structures for which the departments are responsible or direct their focus. Since there are

very few empirical studies on canines in police work, and the little research completed typically addresses training methods, this study intends to fill the gap in the canine literature by discussing their adoption by police agencies and their potential effectiveness as a law enforcement tool to explain the variation in their use. By using contingency theory, this study will help strengthen the body of research that has been conducted in this area to see if canines are contingent on specific programs. To test for effectiveness of canines, drug forfeitures will be used. This is based on the assumption that canines are used in drug crime prevention/seizure and are linked to the forfeiture amounts seized. Another point of this study is to see if a tool, such as canines, is capable of enhancing programs (e.g., other tools could include computers used in patrol cars).

CHAPTER 3

DATA AND METHODS

The *Law Enforcement Management Administrative Statistics* (LEMAS) survey data from 2003 and 2007 were used for this study. This cross-sectional secondary data was obtained from the National Archive of Criminal Justice Data (NACJD) website. Data were collected from police agencies across the United States from December 2003 to December 2004 and December 2007 to December 2008 using surveys. The sampling procedure called for mailing surveys to 3,179 local and state law enforcement agencies in 2003 and 3,224 in 2007. However, twenty-five agencies were deemed to be out-of-scope for the study (i.e., due to closures of the agencies or outsourcing operations), dropping the mailing list to 3,154 agencies in 2003 (the final sample size in 2007 was 3,095 due to 129 out-of-scope agencies). Researchers surveyed all state and local large agencies (100 or more officers) and conducted a stratified sample of smaller agencies. The response rate for the mailed surveys was 90.6 percent (2003) totaling 2,859 agencies and 91.8 percent (2007) totaling 2,840. For this study, years 2003 and 2007 were combined and only large municipal police agencies were used due to the large number of missing cases from smaller departments and the slightly different survey issued to those smaller departments (there was not as much detailed information in the small agency surveys). Large agencies are defined as any agency with 100 officers or more and excluded state and Sherriff agencies (to simplify the data when combining 2003 and 2007). This brought the number of cases down to 477.

Measures

The dependent variable for the study is canines per 1,000 officers taken from the 2007 LEMAS data set. This was a combination of paid sworn full-time officers and number of canines maintained. Number of canines maintained will be divided by the number of officers in the agency. Once this is done, it will be multiplied by 1,000 (for ease of comparison and interpretation) resulting in the dependent variable K9rate = (# of Dogs/# of Officers) x 1,000. This will be used to create a rate of canines per 1,000 officers that could be compared across agencies.

Five task variables were used in this study as independent variables from the 2003 LEMAS data set. All of these variables were asked in question one of the survey. The question asked "Which of the following functions did your agency have PRIMARY responsibility for or perform on a regular basis during the 12-month period (of 2003)?" From the list of responsibilities, drug law enforcement, arson investigation, crime prevention education, search and rescue, and special weapons/tactics (SWAT) were chosen. Each variable was measured by a yes/no response (no=0, yes=1).

Hypothesis 1a: Law enforcement agencies with a drug law enforcement program are likely to have more canines than agencies without drug law enforcement programs.

Hypothesis 1b: Law enforcement agencies with an arson task-force are likely to have more canines than those agencies that do not have an arson task-force.

Hypothesis 1c: Law enforcement agencies with crime prevention education are likely to have more canines than those agencies without crime prevention education.

Hypothesis 1d: Law enforcement agencies with search and rescue programs are likely to have more canines than those agencies without search and rescue programs.

Hypothesis 1e: Law enforcement agencies with S.W.A.T. are likely to have more canines than those agencies without S.W.A.T. teams.

Four structural variables are employed as independent variables. In this question on the survey (2003 LEMAS), participants were asked how the agency addresses problems. These were coded into 1 (full-time personnel to address problem), 2 (dedicated personnel to address problem), 3 (agency addresses problem but does not have dedicated personnel), and 4 (agency does not address problem). Variables used in this section include drug education in schools, missing children, school safety, and community crime prevention. To measure these, 1 was coded as 1 and 2, 3, 4 were coded as 0. This was used to separate the agencies that address the problem full time and those agencies that do not have full time personnel to address the problem. Those with full time personnel are more likely to have and use canines.

The hypothesis involving the structural variables observes agencies with full-time personnel to address problems versus those agencies without full-time personnel to address problems. Here it will be observed if agencies have full-time drug education personnel, full-time missing children unit, full-time school safety unit, and full-time community crime prevention unit. Agencies with a full-time special unit for these areas will use canines because it will make them more effective and allows them to fit what other agencies are doing for this structure (according to the literature review and contingency theory). These agencies with a special unit are focusing on these specific areas to prevent crime, so in order to have a fully implemented unit, canines are needed based on their assumption of effectiveness.

Hypothesis 2a: Agencies with a special drug education in schools unit are likely to have more canines than those agencies without a special program.

Hypothesis 2b: Agencies with a special missing children unit are likely to have more canines than those agencies without a special unit.

Hypothesis 2c: Agencies with a special school safety unit are likely to have more canines than agencies without a special unit.

Hypothesis 2d: Agencies with a special community crime prevention unit are likely to have more canines than agencies without a special community crime prevention unit.

Total budget (total agency budget for 12 months) was divided by number of sworn officers for 2007 to create a rate so these could be compared to other agencies and standardize the variable by number of officers ((budget / # of officers) x 1,000). A rate for 2003 was going to be calculated and then a combination of 2007 and 2003 were going to be used for a budget change variable. This was to see if a change in budget had any relationship with the K9rate, but there were errors with the data and this variable was left out.

Hypothesis 3: Law enforcement agencies with a tight budget are likely to have more canines than agencies with a large budget.

The total filed use-of-force citizen complaints were counted from the 2003 LEMAS data set. To get a rate, this was divided by the number of officers in the department (total use-of-force complaints/# of officers). This was used to see if there was a relationship between the rate of complaints and canine use. Agencies with more use-of-force complaints will most likely have fewer canines.

Hypothesis 4: An agency with more citizen use-of-force complaints is less likely to have canines than those agencies with fewer citizen use-of-force complaints.

The last independent variable was regarding types of less-than-lethal weapons issued by the agency. Here, the total number of less-than-lethal weapon types authorized was counted for

each department from the 2003 LEMAS and then compared by number of weapons to see if there is any effect on the number of canines. To do this, 1 was coded yes and 0 was coded no. There were fifteen different types of weapons listed in the LEMAS data set. To measure these weapons, they were added up to see how many weapons each department allows officers to carry (counting the number of times yes was answered). This variable is measuring the departments by the total number of weapon types allowed.

Hypothesis 5: Agencies with fewer less-than-lethal tools are likely to have more canines than those agencies with more less-than-lethal tools.

There was one control variable used in this study. This variable is region of the country based on the FBI regions used in the UCR. The fifty states will be coded into four categories (1=Northeast, 2=South, 3=Midwest, 4=West)[1] based on what area they fell under. Northwest will be recoded into 1 and all other regions to 0. Then South will be recoded into 1 with all other regions coded as 0. Finally, Midwest will be coded as 1 and all other regions will be coded 0. These will then be compared to the West region (which was chosen as the reference region) because the West is said to be more innovative, thus more likely to use canines (Weiss, 1997).

Another analysis will be run to test for canine effectiveness using drug forfeitures. Canines are said to be effective which is why they are used for certain contingencies (tasks, structures, etc…) to create fully implemented programs, but effectiveness needs to be tested. This analysis included K9rate as the independent variable and the estimated value of drug forfeitures received from drug arrests as the dependent variable (both taken from 2007 LEMAS). Other independent variables viewed as relevant to amount of drug forfeitures were S.W.A.T. and

---

[1] Northeast: VT, PA, RI, NH, NJ, NY, ME, MA, CT.
  South: TN, TX, OK, MS, LA, MD, AR, DC, DE, FL, GA, NC, SC, VA, WV, KY, AL.
  Midwest: SD, WI, OH, ND, NE, MI, MN, MO, IA, IL, IN, KS.
  West: UT, WA, WY, OR, MT, NM, NV, AK, CA, CO, HI, ID, AZ.

community crime prevention. These variables (described above) will be added into this regression because they were seen as relevant to drug forfeitures. S.W.A.T. and community crime prevention are seen as possible predictors of drug forfeiture increases similar to larger numbers of canines. The focus of this regression is using drug forfeitures to test for canine effectiveness based on the assumption that canines were used in drug forfeitures. In order to use the monetary forfeitures from drug arrests, they need to be converted into a rate. Therefore, the amount of money received will be divided by the total number of officers in the department (monetary drug arrests/number of officers in dept).

Hypothesis 6: Law enforcement agencies with larger amounts of drug forfeiture values will have more canines than those agencies with lower amounts of drug forfeitures.

Analytical Strategy

For this study, OLS regression is used to assess the hypotheses because the dependent variable is normally distributed. There are very few methodological issues that arise when using this technique. Only large agencies were used due to many missing cases in the smaller agencies data. The response rate for the large agencies was 94.7%.

CHAPTER 4

RESULTS

Descriptive Statistics

Task Variables

The results of the descriptive analysis showed an average of 18.18 canines per 1,000 officers per agency. This ranged from agencies with no canines to an agency that had 74 canines. Almost all agencies were responsible for drug law enforcement tasks (98 percent), crime prevention education tasks (92 percent), and S.W.A.T. tasks (90 percent). Most of these agencies have an arson investigation task force (75 percent) while a fourth of agencies had a search and rescue task force (25 percent).

Structural Variables

With regards to the structural variables, 70 percent of agencies had a full-time community crime prevention unit. Agencies with a full-time drug education unit accounted for 57.1 percent of departments in the study sample. Only 34.1 percent of the agencies had a full-time missing children unit, while 55.5 percent of the agencies had designated school safety unit.

Other Variables

Budget rate for agencies during 2007 had an average of $131 million per 1000 officers (reporting bias in the budget variable most likely skewed budget statistics)[2]. Total use-of-force complaints resulted in 0.06 complaints per officer during 2003. The amount of drug forfeitures (assuming canines were used in all drug related forfeitures) collected showed an average of 1,082,900 dollars per 1000 officers across the agencies collected in 2007, and there was an average of 5.4 less-than-lethal weapons issued across agencies.

Region was broken into four sections. The Northeast region included 22 percent of the states with the Southern region containing approximately 35 percent of the states in the country. States in the Midwestern region composed 19 percent of the country while the West included about 24 percent of the states.

Table 1 displays the correlations and descriptive statistics. Because of large monetary values in the descriptive statistics, drug forfeitures amounts were divided by 1,000,000 to reduce the form so it would fit on the table. For example, the mean for drug forfeitures was $1,082,900 but was converted to $1.082 in the table. Budget was divided by 1,000 so the numbers would fit on the table.

---

[2] There were some agencies that reported very low total budget amounts (i.e., $300,000) while some reported large amounts. This could be due to misinterpretations of the question in the data set causing agencies to possibly report left over budget money. Regardless, this variable was left in the analysis to see what effects it had even though there appear to be some reporting errors.

Table 1

Canines, Contingencies, and Drug Forfeitures: Correlations and Descriptive

Statistics

TABLE 1. CORRELATIONS AND DESCRIPTIVE STATISTICS

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Drug LE	1.000																	
2. Arson	0.061	1.000																
3. Crime Prev. Ed.	0.019	-0.003	1.000															
4. Search and Rescue	0.081	0.017	0.056	1.000														
5. S.W.A.T.	0.006	-0.064	0.038	0.062	1.000													
6. Dog Rate per 1000	0.040	0.018	0.015	-0.042	**0.202**	1.000												
7. Budget rate	0.002	0.008	-0.030	-0.084	0.001	**0.113**	1.000											
8. Region	-0.043	-0.017	-0.021	**-0.178**	**0.190**	**0.195**	**0.612**	1.000										
9. Northeast	0.036	**0.204**	-0.003	**0.103**	**-0.336**	**-0.319**	**-0.309**	**-0.712**	1.000									
10. South	0.038	**-0.286**	0.028	0.088	**0.200**	**0.200**	**-0.250**	**-0.304**	**-0.392**	1.000								
11. Midwest	-0.089	**0.100**	-0.002	-0.048	0.053	-0.014	**-0.092**	**0.250**	**-0.258**	**-0.358**	1.000							
12. Comm. Crime Prev.	0.058	-0.037	**0.151**	**0.092**	0.087	0.047	0.036	0.068	**-0.175**	**0.149**	0.001	1.000						
13. Drug Ed. Personnel	0.019	0.041	**0.107**	0.056	-0.028	0.015	-0.036	-0.860	0.075	0.003	-0.005	**0.197**	1.000					
14.Missing Children Personnel	0.060	-0.028	-0.046	0.087	**0.113**	**-0.142**	-0.015	-0.004	0.002	-0.009	0.026	**0.162**	**0.219**	1.000				
15. School Safety Personnel	0.052	0.071	**0.113**	**0.119**	-0.088	-0.009	0.012	0.012	0.032	-0.064	0.022	**0.209**	**0.358**	**0.168**	1.000			
16. UOF Complaints	-0.044	-0.038	0.050	0.028	0.082	-0.033	-0.077	0.036	-0.066	0.024	0.051	0.071	0.019	0.080	0.083	1.000		
17. Drug Forf	0.014	0.016	-0.006	-0.026	0.031	0.072	0.063	0.017	**-0.098**	**0.116**	-0.019	0.044	0.043	0.088	-0.007	-0.032	1.000	
18. LTLW	0.041	-0.062	0.034	-0.079	**0.161**	**0.151**	**0.422**	**0.461**	**-0.245**	**-0.183**	-0.043	0.017	-0.022	0.017	-0.023	0.006	0.052	1.000
MIN	0.000	0.000	0.000	0.000	0.000	0.000	2754	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.000
MAX	1.000	1.000	1.000	1.000	1.000	74.770	387875	4.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.910	75.445	13.000
MEAN	0.980	0.750	0.920	0.250	0.900	18.178	131533	2.440	0.220	0.350	0.190	0.700	0.570	0.340	0.560	0.060	1.082	5.360
St. DEVIATION	0.136	0.436	0.265	0.435	0.299	12.360	54922	1.080	0.415	0.478	0.393	0.459	0.495	0.475	0.500	0.088	3.770	2.320

Notes: Correlations in bold are statistically significant at the 0.05 level.

OLS Regression One

Table 2 shows the results from the first regression. The first regression using drug forfeitures as the dependent variable proved not to be significant (sig. = .385). According to this regression (though it was not significant) the amount of drug forfeitures increased when number of canines per 1,000 officers increased. Also, none of the variables showed significance (S.W.A.T. tasks, and community crime prevention structures).

Table 2

Drug Forfeitures and Canine Effectiveness

TABLE 2. MODEL 1

	B	SE	beta
K9rate	20520.96	15077.47	0.066
S.W.A.T.	135827.53	652078.22	0.010
Comm. Crime Prev.	354544.19	400821.08	0.042

Model Adjusted R squared = 0.000

*p<0.05 **p<0.01 ***p<0.001

OLS Regression Two

Results from the first regression model predicting canine use showed that it was significant (sig. = .000). The adjusted R squared reported that 16.3 percent of the K9rate variation is explained by this model. Arson, S.W.A.T., special missing children unit, use-of-force complaints, the Northeast region, and less-than-lethal weapons were significant in this regression (sig. at the .050 level). Agencies with arson (sig. = .021) showed that they had 3 more

canines per 1,000 officers than agencies without an arson taskforce. S.W.A.T. (sig. = .003), however, was double the arson rate, resulting in 6 canines per 1,000 officers more than other agencies without S.W.A.T. On the other hand, special missing children unit (sig. = .001) was significant but in the opposite direction from the hypothesis. Agencies that have a special unit for missing children cases showed that there were 3.9 fewer canines per 1,000 officers. Less-than-lethal weapons (sig = .049) also proved to be in the opposite direction from the hypothesis. There was a 0.54 increase in canines per 1,000 officers for every unit increase in less-than-lethal weapons. Use-of-force complaints (sig. = .024), however, was in the predicted direction. Here, there were .005 fewer canines per 1,000 officers for every one unit increase in complaints. The Northeast region was also significant (sig. = .001) and showed that there were 7.3 fewer canines per 1,000 officers than the Western region.

Table 3 displays the results from the first OLS regression. Drug law enforcement, crime prevention education, and search and rescue tasks were not significant based on the results. Departmental structures such as community crime prevention personnel, drug education personnel, and school safety personnel were also not found to be significant. The other variable in the regression that proved not to be significant was budget. For the region variable, the Southern and Midwest regions were not significant.

Table 3

K9rate and Contingencies

TABLE 3. MODEL 2***

	B		SE	beta
Drug LE	3.184		4.123	0.034
Arson	3.061	*	1.285	0.109
Crime Prev. Ed.	-1.044		2.050	-0.022
Search and Rescue	-0.261		1.264	-0.009
S.W.A.T.	6.159	*	2.064	0.141
Budget rate (2007)	-1.74E-06		0.000	-0.005
Northeast	-7.292	***	2.225	-0.241
South	3.366		1.926	0.130
Midwest	-1.047		1.959	-0.034
Comm. Crime Prev.	-0.639		1.245	-0.024
Drug Ed. Personnel	1.644		1.189	0.066
Missing Children Personnel	-3.861	***	1.198	-0.148
School Safety Personnel	0.592		1.187	0.024
UOF Complaints	-0.005	*	0.002	-0.101
LTLW	0.540	*	0.273	0.099

Model Adjusted Rsquared = 0.163

*p<0.05 **p<0.01 ***p<0.001

CHAPTER 5

DISCUSSION

The present study was used to examine the different factors that could create variation in canine use among municipal police departments. Task variables such as drug law enforcement, arson investigation, crime prevention education, search and rescue team, and S.W.A.T. were selected based on prior literature as known canine tasks. Structural dynamics such as full-time drug education personnel, full-time missing children personnel, full-time school safety personnel, and full-time community crime prevention personnel were also chosen based on the literature. The other chosen variables thought to affect canine variation were budget rate, use-of-force complaints, drug forfeitures, less-than-lethal weapons, and region (used as a control variable). Two analyses were run using drug forfeitures as the dependent variable in the first and K9rate as the dependent variable in the second.

Regression One

In the first regression, the analysis was not significant (sig. = .385). This regression was to test canine effectiveness by using drug forfeitures as the dependent variable. Canines per 1,000 officers, S.W.A.T. tasks, and community crime prevention structures were the independent variables and proved to be non-significant as well. There are several reasons for why this analysis was not significant and why the variables within the analysis did not show significance.

One reason the regression resulted in non-significance is lack of detail about drug forfeitures in the LEMAS data. As reported, this variable was a monetary amount collected by the agency. Perhaps if the data set provided information on how the money was obtained

(canines, S.W.A.T. raid, officer pat-down) and where it was obtained, then this model may have provided significant results. Also, if there was more detail on canine use, or arrest rate data that included canine apprehensions, then this model may have produced better outcomes. Future research should try to include canine apprehension data and incorporate it with the LEMAS data.

Another reason why the model could have been insignificant is because possibly canines are not related to drug forfeitures. It is possible that the problem is not with the data set (lack of details) but that canines have no relationship to drug forfeitures. If this is the case, then no matter what variables are added or taken away, it will not be significant.

When the canine variable was observed in this model, it showed that as the number of canines increased, the monetary value of drug forfeitures increased. This variable was not significant and could also be attributed to the lack of detail in the LEMAS data. It could be possible that drug forfeitures are recorded as an officer (or handler) find and not as a canine find. The officer trained the canine so it could be recorded on paper that the canine officer was the one who established the drug forfeitures. This would throw off the results.

Though the main focus of the first regression was drug forfeitures relation to canines, S.W.A.T. and community crime prevention were also used in this study and were found non-significant. These variables were used because they were seen as ones which might have a relationship with drug forfeitures. It was thought that these variables would help explain the canine variable, but the model was not significant, nor was the canine variable.

S.W.A.T. has been known to involve canines and drug seizures which is why it was used in this model. Taskforces such as S.W.A.T. conduct raids on drug houses and gangs. Canines are not always used to find drugs in these situations because they are used to find hidden people or booby traps (Chapman, 1990; Wanner, Terry, & Lomas, 2011). So drug forfeitures are

retrieved by S.W.A.T., but canines are not necessarily always used for drug finding (though they are sometimes). This could have also mixed the results causing non-significance. If there were more information on specific S.W.A.T. functions (i.e., how canines were used in drug raids), then that could prove better results. However, again, it is possible that S.W.A.T. was not related to drug forfeitures.

Community crime prevention was linked to drug forfeitures because drugs are in many communities. However, there are obviously other crimes as well. Therefore, like other variables, detailed information about specific drug crimes in the community and if/how a canine is used to prevent those crimes would be advantageous for future research. The lack of detail could be the reason why this variable was not significant. But again, it could be plausible that community crime prevention is not linked with drug forfeitures in addition to it being a very broad variable.

Regression Two

The second analysis proved to be significant with variables arson taskforce, S.W.A.T., special missing children unit, use-of-force complaints, the Northeast region, and less-than-lethal weapons showing significance. Agencies with arson and S.W.A.T. displayed more canines per 1,000 officers than agencies that did not engage in these two tasks. Use-of-force complaints and the Northeast region variables were also significant and in the predicted direction. Both variables showed a negative relationship displaying that one unit increase in complaints resulted in .005 fewer canines and the Northeast agencies having 7.3 fewer canines per 1,000 officers than the agencies in the Western region. The region variable could show significance because of the number of agencies within the region. Perhaps there were more, or larger, agencies in the

Northeast than anywhere else in the country, causing an effect on the significance. Less-than-lethal weapons and the missing children unit, however, were not in the predicted direction, though they were significant. For less-than-lethal weapons, it was predicted that there would be more canines with fewer less-than-lethal weapons, but the regression showed there being a 0.54 increase in canines per 1,000 officers per one unit increase in less-than-lethal weapons. Also, results from the regression indicated that there were 3.9 fewer canines per 1,000 officers for agencies with the missing children structure when it was predicted that there would be more canines.

The less-than-lethal weapons variable was counted one through fifteen, observing how many types of weapons each agency had. It was predicted that agencies with fewer weapons would have more canines. However, it could also be that agencies that allow additional less-than-lethal weapons have more money and could thus be capable of affording more canines (the opposite of what was predicted). Also, based on the literature, canines are considered a less-than-lethal weapon by many sources but were not listed as a less-than-lethal weapon on the LEMAS data set. This could be useful information that could have an effect on the results. More detail on canine use is needed and should be used in future studies. In addition to this, frequency of less-than-lethal weapon use by weapon type could be important.

It was also predicted that agencies with a structured full-time missing children unit would have more canines based on the canine's tracking abilities. But since the regression showed differently, the difference could be because canines are not a main tool in finding missing children. It is possible that computers and other technology are used to track cell phones or credit cards to find the missing children. Children may be abducted and put into a car. A canine would be impractical to track a vehicle long distances. Perhaps canines are only useful within

the first few days of a runaway child and if the child is on foot. This way the canine would more likely be able to track the child. Specific information on the type of missing children (runaway or abducted) would be useful. Canines are probably more likely to be used in runaway children than abducted children and most of the cases in the data set could be child abduction. More detailed information on the types of missing children cases is needed for future research in this area.

It is possible that these aforementioned variables are significant because they are related to canine numbers. However, it is possible that with the inclusion of other variables such as crime rates or specific community crimes, results could change. It is also possible that the number of canines does not matter as much as how the canines were used. This would explain why some tasks, or contingencies, are significant and others thought to be related to canines are not.

The task variables that proved not to be significant were drug law enforcement, crime prevention education, and search and rescue tasks based on the results. It was surprising that these were not significant when prior literature states that canines are used in these tasks. However, there could be several reasons why these tasks did not show significance. Drug law enforcement, like the other four task variables that were in question one on the 2003 survey, was asked by the researchers if the departments were responsible for this task. While most departments were responsible (98%) for this task, there was no detail about activities or micro responsibilities within this task. Being responsible is not the same as being proactive about drug law enforcement. Yes, canines are used in finding drugs, but officers also search for drugs when conducting pat-downs or strip searches. It is very possible that lack of detail on drug law enforcement led to the non-significant results.

Crime prevention education also lacked detail in the LEMAS data set; however, there are other explanations to why this was not significant. It is possible that canines are not used as often in this task as originally thought (even though 92 percent of agencies have this task). Canines have been used in programs such as D.A.R.E. before, but it may have been a ploy to gain audience attention (Chapman, 1990). Also, canine demonstrations are directed at public relations and improving the canine image in a positive way and not necessarily educating the public in crime prevention. Crime may be discussed at these demonstrations, but it is not the main goal or outcome of the program (Chapman, 1990). Canines could be used in this educational task, but perhaps not as often as other tasks. More detail about types of programs within agencies would be beneficial to address the canine issue. Future studies should find other data sources to combine with LEMAS when looking for a significant finding in this task.

The last task variable that was not found to be significant was search and rescue. This was a surprising finding as well because canines are used heavily in this task. But this study looked at only large municipal police agencies (25 percent of agencies were responsible for this task); it was found that most municipal agencies do not have this task. The agencies that are responsible for this task may not engage in the task often, or do not use canines for this task. It is possible that search and rescue is more of a rural police department task when it comes to canine numbers. The inclusion of smaller agencies in a more wilderness setting could change these results because canines have been found to be used in wilderness search and rescue missions. Search and rescue tasks in that type of setting could be more likely to use canines (Chapman, 1990). Future studies should try to use small agencies in addition to the large agencies to produce better, more accurate results. Again, specifics about individual task aspects would be

important. The LEMAS data is too general and should try to generate more detail in future surveys (or be combined with data that has the necessary details).

Structural variables such as community crime prevention personnel, drug education personnel, and school safety personnel were not found significant in this regression. The non-significance of these variables was not as surprising as the task variables. For these structural variables, there could be many different reasons why there was no significance.

Community crime prevention personnel could possibly use canines, but it is also possible that they are not needed. This structure could include programs such as neighborhood watch or other civilian type of policing. Special personnel are appointed to start and help run these programs. Canines are not used in neighborhood watches. They are used in preventing crime, but not necessarily by full-time personnel working community crime prevention program structures. Details on the specific responsibilities of these crime prevention personnel could allow for a better understanding of this departmental structure and if or how canines are used. There are too many unknown factors that could affect the significance of the canine in this type of structure, such as duties of the assigned personnel and their responsibilities to programs like neighborhood watch.

Drug education unit is similar to the task variable drug law enforcement. The full-time unit working this structured program could be focused on educating children about health issues and the harms of drugs. A canine would not be needed other than for shock value and to gain the audience's attention. It was originally thought a canine could be used in this type of structure, but it is also likely, based on the results, that canines are not a necessity in drug education structure. More survey detail could help answer this question of whether or not canines are used

more by full-time personnel than agencies without full-time personnel working drug education. Details about the program structure would also be beneficial.

School safety personnel were seen to use canines based on the idea that canines are used for drug searches in lockers and cars (Brown, 2005). However, it is possible that full-time school safety personnel are there to be a deterring law enforcement threat. If students see that law enforcement personnel are stationed at the school, then maybe they are more likely to behave and not bring harmful items (guns, drugs, knives) to school. Also, it is possible that school safety personnel do not use canines, but employ canine officers to do special searches of lockers or cars. This would bias the results. Information about who is considered school safety personnel and whether they are full-time or not could prove significant results (whether a canine officer is considered school safety personnel or just a visiting officer). Future studies should find more detail on this structure to better the results.

The other variable that proved insignificant was budget rate. The budget rate possibly was not significant because canine numbers may not change much when the budget changes. For example, if an agency already has a certain number of canines and the budget increases or decreases, it is likely that agencies will not add or retire canines. When the budget changes (a low budget decreases), it is possible that outside fund raisers for the canine program fill the gap that allows the program to continue at its present status, thus not affecting the canine program. If the budget increases, it might be that agencies are more likely to spend that money on other areas such as more officers instead of more canines (i.e., the canine program may not be a top priority. However, this most likely varies from department to department). It is also possible that the hypotheses should be predicted in the opposite direction. Perhaps agencies with higher budgets are more likely to have a larger number of canines because they can afford a large program and

tight budgeted agencies can not afford many canines. This hypothesis should be explored in future studies. Details on budget composition within the departments could be useful when looking for a significant outcome. But budget in general may be too broad to be a significant predictor of variation in the number of canines. Also, for a better outcome, budget change over time should be included in the study (it was not in this study due to some errors found in the data set).

For the control variable region, the South and Midwest regions were not significant. This could be due to lack of detail in the LEMAS data. It could also be that the West was not the region to be compared. Maybe the Northeast region should have been compared to the West, South, and Midwest. Changing this could result in these control variables being significant. Also, perhaps the South and Midwest did not have as many agencies as the West or Northeast. For future studies, the number agencies in each region should be measured. It could be possible that number of agencies in each region had an effect on the outcome of the results.

Overall, details about canines, and many other variables listed above, are needed to further the results in future studies when observing this topic and theory. The second regression was significant with about 16 percent of the variation in canine numbers among departments being explained and showed canines to be contingent on some of the variables (tasks, structures, and other organizational components). However the first regression proved not to be significant. Other data sources, and perhaps data about canine apprehensions and drug crimes, should be included along with the LEMAS data.

When relating the overall results to contingency theory, much can be said. Model two was significant showing support for K9rate. Based on this, some tasks (arson and S.W.A.T.), structures (missing children unit), and other variables (use-of-force complaints and less-than-

lethal weapons) all seemed to be related to theory stating that canines are contingent on these items. It is likely that canines are contingent on these tasks, structures, and other organizational aspects of agencies based solely on number of canines in the department, but it is plausible that information on how canines were used in these contingencies could further improve results. This could work for the other variables that were not found to be contingencies in this study (i.e., drug law enforcement, search and rescue, budget…). It was thought the insignificant variables were contingencies of canines but based on the models, they were not found to be so in this study. There are issues for why the models show canines not to be contingent on certain variables (no relationship, lack of detail, etc…) but more research is needed and the possible inclusion of crime data in research could prove beneficial.

CHAPTER 6

SUMMARY AND CONCLUSION

Canines have been used by humans in many ways over the past 20,000 years for work. They have been used for hunting purposes, war purposes, and guard purposes. Today canines are used as a tool in law enforcement (Chapman, 1990). Canines can be a useful law enforcement tool when used for certain tasks and structures, or contingent on these tasks and structures. They have been seen to be effective in many areas that involve scent and physical apprehensions, and can create psychological effects (Chapman, 1990; Wanner, Terry, & Lomas, 2011). However, if canines are so useful, then why do departments vary in the number of canines maintained? This study focused on, and tried to explain, why there was variation in canine numbers among departments by observing the LEMAS data and testing contingency theory. In the second model, only a few hypotheses were supported and in the predicted direction (1b-arson, 1e-S.W.A.T., 4-use-of-force complaints, 5-less-than-lethal weapons) showing canines to be contingent upon these variables. The first model with drug forfeitures as the dependent variable to test effectiveness of canines and contingency theory was not significant.

Results from this study show that there are more canines in agencies that have arson tasks, S.W.A.T. tasks, and affect the number of use-of-force complaints inferring that those items are contingencies of canines. However, there were many other tasks in which canines are used but were not supported by this study that were thought to be contingencies (i.e., drug law enforcement). Detailed information was lacking in the LEMAS data and should either be combined with other data or expanded in the future for better results.

Limitations

Before improved results can be seen, better studies on canines (especially about canine effectiveness) should be conducted. One of the main problems with this study is that the LEMAS data on drug forfeitures do not include any information about canines and if they were used in the drug law enforcement processes of those forfeitures. Because of this, it is assumed that effectiveness of canines was measured by total monetary amount of property, money, and drugs seized from drug-related offenses. The study also assumed that canines were effective based on prior literature. This literature was mostly anecdotal and opinionated as opposed to concrete evidence (mostly because there is a lack of empirical evidence on canines). Effectiveness of canines is based on what evidence has been presented up to this point in time. However, future studies should pursue more insightful ways to measure canine effectiveness. Drug forfeitures may not be related to canines at all, so perhaps a different dependent variable should be used to measure canine effectiveness. Furthermore, since secondary data was used, variables that could be included were limited in this study. For example, the questions asked were very general. The LEMAS survey does not ask departments how canines are used. They are simply asked how many dogs were maintained. Future surveys should include how the dogs are used in addition to the number maintained. In addition to this, number of cleared criminal cases involving canines could be helpful. This will be an important factor which could be used as a better measure of effectiveness. The survey should include more specific questions in the future so more and better data are provided. Also, only large agencies were used in this study. Small agencies could provide important information which could have caused all hypotheses to be supported. However, since secondary data was used, the smaller agencies had too much missing data and had to be discarded. Future studies should use small and large agencies to gain

a full scope concerning how canines are contingent on programs used in law enforcement agencies. But in order to use small and large agencies, LEMAS needs to make sure the small agencies report for every question so the number of missing cases can be reduced.

Contingency theory has some limitations as well. The theory looks at organizations as either effective or ineffective. According to this theory, if an organization is ineffective because it is not fitting to its environment, then it should be discontinued or changed. However, sometimes departments may keep a task because they receive money from the government for being responsible for that task or keep it because most departments have that task (i.e., gang unit). Contingency theory could not be used to explain that type of situation. It is possible that some of the perceived contingencies of canines do not use canines and the agencies say they are responsible for them because of other reasons.

Limitations on some variables include less-than-lethal weapons variable and the budget variable. Less-than-lethal weapons were hypothesized that fewer weapons meant more canines. However, this could be flipped around and stated that more weapons means more canines. Though this variable was not significant, more information on this is needed for future studies when observing this variable. The budget variable had some errors in the data set. As said earlier, a budget rate for 2003 was going to be created and then used in a budget change variable. This would allow changes in budget over time to be seen and could be useful when observing the K9rate. However, it was excluded due to the errors found but would be important to look at in future studies once the errors are fixed. In addition to this problem, total budget was divided by the number of full-time sworn officers with arrest powers. There are other part-time officers, other employees, and programs that are covered in this budget. Thus, the budget variable is slightly skewed due to using only full-time sworn officers (showing more money per officer than

there really is available). Future studies should perhaps further break down the budget variable into different categories of employment for agencies to receive more accurate results.

Once these issues are addressed, better results could prove more specific policy implications and allow for a better understanding of canine use among police departments. This study was meant the help close the gap in canine research between training methods and effectiveness. Based on the findings, future research should use this study as a stepping stone when looking further into why there is variation in the number of canines across police departments. Also, studies on canine effectiveness would be beneficial to conduct. Research in this area is limited and a study on how, when, where, and why canines are used could explain crime rates, why canines are used, and better explain variation in canine numbers across departments.

REFERENCES

Brown, B. (2005). Controlling crime and delinquency in the schools: An exploratory study of student perceptions of school security measures. *Journal of School Violence*, *4*(4), 105-125.

Burruss, G. W., Giblin, M. J., & Schafer, J. A. (2010). Threatened globally, acting locally: Modeling law enforcement homeland security practices. *JQ: Justice Quarterly*, *27*(1), 77-101.

Campbell, A., Berk, R., & Fyfe, J. (1998). Deployment of violence: The Los Angeles police department's use of dogs. *Evaluation Review*, *22*(4), 535-561.

Chapman, S. (1990). *Police dogs in North America*. Springfield, IL: Charles C Thomas.

Donaldson, L. (1996). The normal science of structural contingency theory. *Handbook of Organization Studies*, *44*(20), 57-76.

Dorriety, J. (2005). Police service dogs in the use-of-force continuum. *Criminal Justice Policy Review*, *16*(1), 88 - 98.

Drazin, R. & Van de Ven, A. (1985). Alternative forms of fit in contingency theory. *Administrative Science Quarterly*, *30*(4), 514-539.

Gordon, H., & Haider, D. (2004). The use of 'drug dogs' in psychiatry. *Psychiatric Bulletin*, *28*(6), 196-198.

Handy, W., Harrington, M., & Pittman, D. (1961). The K-9 corps: The use of dogs in police work. *Journal of Criminal Law, Criminology & Police Science*, *52*(3), 328-337.

Hickey, E. & Hoffman, P. (2003). To bite or not to bite: Canine apprehensions in a large, suburban police department. *Journal of Criminal Justice*, *31*(2), 147 - 154.

Hollenbeck, J. R., Moon, H., Ellis, A. J., West, B. J., Ilgen, D. R., Sheppard, L., & Wagner, J. (2002). Structural contingency theory and individual differences: Examination of external and internal person-team fit. *Journal of Applied Psychology*, *87*(3), 599-606.

Inflation calculator: Money's real worth over time. (2011). Retrieved June 5, 2011, from http://www.coinnews.net/tools/cpi-inflation-calculator/

Jiao, A. Y., & Rhea, H. M. (2007). Integration of police in the United States: Changes and development after 9/11. *Policing and Society, 17*(4), 388–408.

Lunney, L. A. (2009). Has the Fourth Amendment gone to the dogs?: Unreasonable expansion of canine sniff doctrine to include sniffs of the home. *Oregon Law Review*, *88*(3), 829-904.

Mesloh, C. (2006). Barks or bites? The impact of training on police canine force outcomes. *Policy Practice and Review*, *7*(4), 323-335.

Pennings, J. M. (1987). Structural contingency theory: A multivariate test. *Organization Studies*, *8*(3), 223-240.

Schoon, G. A. (2003). Internal report on the international workshop for id-dog handlers in Stukenbrock.

Schoon, G. A. (2005). The effect of the ageing of crime scene objects on the results of scent identification line-ups using trained dogs. *Forensic Science International*, *147*(1), 43-47.

Stitt, B. G. (1991). Practical, ethical and political aspects of engaging 'man's best friend' in the war on crime. *Criminal Justice Policy Review*, *5*(1), 53-65.

Wanner, E., Terry, D., & Lomas, S. (2011). K-9 Cops [Television series]. St. Paul: Animal Planet.

Weiss, A. A. (1997). Communication of innovation in American policing. *Policing*, *20*(2), 292-310.

Wolf, R., Mesloh, C., & Henych M. (n.d.) *Fighting campus crime: Perceptions of police canines*

    at a metropolitan university. Retrieved February 15, 2011, from Florida Gulf Coast

    University, Weapons and Equipment Research Institute:

    http://lesslethalweapons.org/articles.html

VITA

Graduate School
Southern Illinois University

David W. Welker

wavidwelker@hotmail.com

Southern Illinois University Carbondale
Bachelor of Arts, Administration of Justice, May 2010

Title: Police Programs, Canines, and Contingency: An Explanation of Canine Numbers Among Departments

Major Professor: Dr. Matthew Giblin