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The Community Context of Animal and Human Maltreatment: Is there a Relationship between Animal Maltreatment and Human Maltreatment: Does Neighborhood Context Matter?

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The Community Context of Animal and Human Maltreatment: Is there a Relationship between Animal Maltreatment and Human Maltreatment: Does Neighborhood Context Matter?

Abstract

The purpose of the study is to explore the influence of demographic and neighborhood factors on the phenomenon of animal maltreatment in an urban setting as well as the association of animal maltreatment with human maltreatment. Using a unique dataset of animal maltreatment from the Pennsylvania Society for the Prevention of Cruelty to Animals, the distribution and prevalence of animal neglect, abuse, and dog fighting in Philadelphia were mapped with Geographic Information Systems (GIS). Statistical analysis was employed to examine the relationship between animal maltreatment and neighborhood factors, domestic violence, and child maltreatment. The low correlation between animal abuse and neighborhood factors in this study suggests that animal abuse may be better explained as an individual phenomenon than a behavior that is a function of neighborhoods. However, animal neglect does correlate with demographic, cultural, and structural aspects of block groups, suggesting social disorganization may lead to animal neglect. This study also suggests that dog fighting is a crime of opportunity, as dog fighting correlates with indicators of abandoned properties. Finally, this study is unable to demonstrate a community link between animal maltreatment and child maltreatment, which does not preclude the link among individuals. The findings suggest caution in policies and advocacy campaigns that link human and animal violence in all arenas.

Subject Categories
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THE COMMUNITY CONTEXT OF ANIMAL AND HUMAN MALTREATMENT:

IS THERE A RELATIONSHIP BETWEEN ANIMAL MALTREATMENT AND HUMAN

MALTREATMENT: DOES NEIGHBORHOOD CONTEXT MATTER?

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Chapter 1: Background

Specific Aims

Over the past three decades, family violence has emerged as a major social, health, and law enforcement issue. In addition to child and adult homicides, family violence contributes to a broad array of nonfatal injuries and medical and psychiatric disorders each year. In addition, family violence is associated with numerous social problems, including teenage pregnancy, runaway and homeless youth, alcoholism and substance abuse, and crime and delinquency (Amodei & Scott, 2002; Lown, Schmidt, & Wiley, 2006). Statistics show that nearly half of all American couples experience violence at some point in their relationships, and as many as 75% of parents report at least one violent incident in the presence of a child between the ages of 3 and 17 (Mooney, 2000; Straus, Gelles, & Steinmetz, 1980).

There has been a long history of isolationism in the study of all forms of violence. For example, stranger violence was thought to be completely separate from family violence and therefore the two were studied in isolation. Neighborhood factors (e.g. high housing density, high residential mobility, high percentages of single-parent families, the occurrence of neighborhood transitions, economic decline and gentrification, racial heterogeneity, poverty and income inequality) that have been analyzed in an attempt to understand stranger violence are omitted in the discussion when it comes to the analysis of family violence. Even within the field of family violence, linkages between child abuse, domestic violence, and elder abuse have only recently come to light and only in a cursory fashion (Ascione, 1999).

One relatively new area of research on family violence is the link between family violence and animal maltreatment (Volant, Johnson, Gullone, & Coleman, 2008). There are a number of studies that indicate that family violence and animal abuse are linked within families, and that either form of abuse can be a strong predictor of the other (Adams, 1994; Costin, Karger, & Stoesz, 1996; DeViney, Dickert, & Lockwood, 1983; Lockwood & Hodge, 1996; Volant et al., 2008). However, this link is not a simple one. There may be many factors that affect the presence and/or strength of the relationship. One possible factor is the varying definitions of animal maltreatment. Some researchers might consider animal cruelty to encompass behaviors such as pulling wings off of flies, whereas others might only consider cruel acts done to sentient creatures on a repeated basis to be examples of animal cruelty. Another possible factor is differing norms of animal treatment across societies and cultures. For example, in societies where some forms of animal maltreatment are normative, animal maltreatment may not be linked to family violence. Studying the link at an individual level led to new insights but this link has never been looked at in relation to neighborhood context.

Because there is evidence of some link between animal abuse and human violence (DeViney, Dickert, & Lockwood, 1983; Lockwood & Hodge, 1996; Volant et al., 2008), it is important to better understand the phenomenon of animal maltreatment in general and specifically from an ecological perspective. Does animal abuse or neglect occur randomly geographically or are there some neighborhoods where it is more likely to occur? What makes these neighborhoods unique? Are there neighborhoods where human violence is more likely to occur? Do these neighborhoods overlap? Is there something special about neighborhoods that produce animal abuse and human violence or those that

produce none? In order to understand both animal and human maltreatment and implement prevention, detection, and outreach programs, it is important to understand how neighborhood context might influence the presence or absence of animal and human maltreatment.

It is rare that violence is isolated. This study will look at violence holistically. There are compelling reasons to include animal maltreatment and compelling reasons to look at violence from a neighborhood level. Neighborhood factors have not been used as independent variables to explain family violence or animal maltreatment and are not used in explaining the co-occurrence. This study will attempt to fill that gap.

From a clinical perspective, research on animal maltreatment and the link between animal maltreatment and human violence could be informative in identifying more dangerous offender types. Three types of batterers are common across current typology research—a low, moderate, and high-risk offender (Cavanaugh & Gelles, 2005). The abuse of animals may be an indicator of a high risk offender who is more likely to commit severe abuse or homicide. Including animal maltreatment in the picture may help to define the understanding of these types and identify more dangerous offenders.

From a community perspective, this research will help to develop meso-system level interventions (e.g. educating animal abuse workers and veterinarians about human violence, educating human violence workers about animal abuse, including the treatment of the family pet in social service referral forms, and including animal abuse workers and veterinarians as mandated child abuse reporters). Educational programs at both the pre-professional and professional levels could give greater emphasis to training about animal abuse and its overlap with other forms of family and community violence. This effort has

already emerged in veterinary education (Ascione & Barnard, 1998), the legal

profession (Davidson, 1998), and law enforcement (Lockwood, 1989) and could be

expanded to include mental health (psychology and psychiatry) and other human health

professions (e.g., social work, child welfare, and pediatrics) and elementary and

secondary education. This research will also help to develop an improved understanding

of the sequeli of occurrence of forms of family violence and an overall broader

understanding of the complexities of interpersonal violence in general.

Background, Literature Review, and Theory

    Stranger and Family Violence. For decades, criminologists have studied

violence toward intimates and violence towards strangers as separate phenomena. Since

the 1950's, numerous scholars have addressed violent crime while generally excluding

violence against intimate partners. The major criminological works on violence and

aggression have overlooked violence in the home, with the exception of familial

homicide (Gluek & Gluek, 1967; Hirschi, 1969; Weiner & Wolfgang, 1990).

    In the 1960s and 70s, family issues moved to the forefront of public policy. The

identification of child abuse and the emergence of the women's movement made violence

in the home a social concern (Walker, 1979; Walker, 1984). At the same time, law

enforcement agencies were identifying domestic disputes as a major reason they were

being called (Stith, 1990). Researchers observed the high incidence of domestic violence

and homicides (Gil, 1970). In the mid to late 1970s, studies such as the National Family

Violence Survey established violence in the home as a widespread phenomenon in the

U.S. (Gelles, 1974; Gelles, 1976; Gelles, 1979; Straus, 1977; Straus, Gelles, & Steinmetz,

1980). This new knowledge about family violence contradicted popular perceptions of

family life and raised critical questions about the causes and consequences of violence in families.

Although investigation of family violence increased as researchers and policy makers recognized the incidence and consequences of violence in the home, the research remained separate from the study of non-family criminal violence or other types of violence. Few attempts were made to integrate the emerging knowledge of family violence with other types of violence. Neighborhood factors, that were becoming important in examining and explaining stranger violence, were being overlooked in the attempt to understand family violence. Two related processes may have contributed to this schism. First, cultural views held that violence in the home was a private affair. In fact, family violence was treated as a crime only when it resulted in severe injury or death (Bograd, 1988; Crowell & Burgess, 1996).

A second difficulty hindering the integration of research on stranger and intimate violence was the wide variety of definitions and responses that reflected the interests and perspectives of the definer (Wexler, 1982). Various interest groups and federal agencies attempted to stake a claim to the newly identified problem of family violence. The definitions of the nature and causes of this violence were influenced by each agency's mandate. Thus while some conceived of family violence as a criminal problem, others viewed it as a mental health or social service issue (Fagan & Wexler, 1987). Although violence in the home was recognized as a serious problem, no unifying approach to research or policy emerged. Different researchers focused on particular aspects of family violence to the exclusion of others; those who studied child maltreatment did not look at domestic violence, and vice versa (Reiss & Roth, 1993).

Links between different kinds of family violence. Data from the two U.S. National Family Violence Surveys conducted by Straus and colleagues indicated that the incidence of child physical abuse was higher in families with partner violence (Straus, Gelles, & Steinmetz 1980; Straus 1993). In further investigation, Straus and Gelles (1986) determined that of those husbands who were physically violent towards their wives, 23 percent reported also physically abusing a child. Straus and Gelles calculated that each additional act of violence committed against a wife increased the likelihood of child physical abuse by 12 percent (1986). A number of other studies indicate that domestic violence and child abuse are linked within families, and that either form of abuse can be a strong predictor of the other (Bowker, Arbitell, & McFerron, 1988; McKay, 1994; McKibben, DeVos, & Newberger, 1989; Pagelow, 1982; Stark & Flitcraft, 1988).

In spite of evidence of a link between different forms of interpersonal violence, for the past thirty years, the study, services, and policy regarding family and intimate violence have been constrained by two significant problems. First, research on, services for, and policy toward family and intimate violence are all carried out almost exclusively from a victim's perspective, rather than from the perspective of the offender. Research focuses mainly on the consequences of violence and interventions are aimed almost entirely at the victims. By ignoring the offender and his or her neighborhood context, important clues into the cause and mechanism of violence are missed. A second problem is that the research, services, and policy are carried out in "silos". Individual classes of victims (women, children, elders, etc.) are responded to separately (child protective services, adult protective services, etc.). Each "silo" produces separate research,

interventions, and policies that are largely disconnected from the other silos. Each "silo" developed its own separate set of conceptual frameworks, agencies, history, literature, heroes, and villains. Most importantly, this perspective also misses the fact that the offenders may be the same person across victims.

Despite the focus on victims and "siloing" of the field, there are many similarities among the forms of violence in intimate relationships. Most importantly, the offender may be the same person. The violence represents a perpetrator's misuse of power and control over victims. The psychological and socio-cultural factors that lead to violence are often the same, regardless of who the victim is. Finally, the psychological effects experienced by victims of violence are often similar (American Psychological Association, 1996).

Researchers, service providers, and policy makers are often unaware of, or uninterested in current advances in the other "silos". For example, lessons learned in the field of child abuse would generally not be known or even considered relevant by those working in domestic violence, elder abuse, or other fields of intimate or family violence, even if the lessons might prove useful. Furthermore, across the silos, offender variables or factors are often ignored or overlooked, even though these factors most certainly would help to understand and explain intimate or family violence in general.

Current intervention strategies consist of victim-specific remedies that focus on protecting victims while generally ignoring the offender or assuming offenders cannot be changed (Gelles, 1999). Interventions and policy responses are often so focused on protecting a specific type of victim that they fail to protect other victims at risk. For example, child welfare workers may be so focused on protecting an abused child that

they fail to identify and protect the mother who may also be at risk of abuse from the same offender.

The separate silos have resulted in different and often competing terminologies, philosophies, and mandates that make it difficult for professionals to work in partnership with one another, even when it is in the best interest of their victims. For example, the mandate of some domestic violence agencies to protect the woman at all costs has at times included failing to protect a child in the home who is also at risk of being abused. The domestic violence agency may not want to report or intervene in possible child abuse by the common abuser because it may be seen as a punishment to the non-offender mother or make her less likely to seek help for herself in the future.

Only recently has the "multi-victim approach" to understanding family violence begun to challenge these assumptions. This approach focuses on similarities between the different forms of family violence, including child, domestic, elder and animal abuse and shifts the emphasis from the victims to he offender. A multi-victim approach to understanding family violence focuses on similarities between the different forms of family violence. This approach focuses on the psychological and, more importantly, the socio-cultural factors that lead to the violence that are often the same regardless of the type of victim (Lacroix, 1998).

Animal maltreatment. Another type of victim by a violent offender may be a family pet or stray animal (Volant et al., 2008). Because national records on animal abuse are not available, we must rely on clinical case control studies to estimate its prevalence (i.e. any incidents of abuse within a particular time frame) in adult samples. Felthous and Kellert's (1987) review suggests that in psychiatric and criminal samples, animal abuse is

reported in up to 57% of respondents in contrast to near zero rates for respondents in normative comparison groups. In a study comparing sexual murderers with a history of sex abuse with murderers without such a history, prevalence rates for cruelty to animals were 58% for murderers who were sexually abused and 15% for those who were not sexually abused (Ressler, Burgess, Hartman, Douglas, & McCormack, 1986). However, these estimates must be viewed with caution since definitional and measurement variations between studies may affect self-reports.

Ascione (1993) reported that between 14 and 22% of adolescent delinquents at facilities in Utah admitted to torturing or hurting animals in the past year. Using norming data from the CBCL (Child Behavior Checklist), children and adolescents seen at mental health clinics display rates of animal cruelty between 10 and 25%, depending on the sex of the child. Comparable rates for non-clinical children are under 5%. Animal abuse is not measured on the self-report form of the CBCL. Maternal reports of cruelty to animals in a non-clinical sample of 12 to 14 year-olds was 2%, but the children's self reports yielded prevalence rates of 10%. Again, definitional issues, reduced parental surveillance as children get older, and parental reluctance to admit their children's animal abuse may all contribute to such discrepancies (Ascione, 2001).

Violence towards humans and animals. A possible missing variable in the understanding of human violence is the inclusion of this violence toward animals. The link between violence towards animals and people has long been of interest to those seeking to understand human violence. Psychiatric writings as early as the 1800's illustrate the ways that animal abuse might foreshadow human violence (Krafft-Ebing, 1906/1996; Pinel, 1806/1962). Although the concept has a long intellectual history,

scientific and scholarly attention to the possible link between violence toward animals

and humans has been relatively limited (DeViney, Dickert, & Lockwood, 1983;

Lockwood & Ascione, 1998). The earliest empirical research in the area of animal abuse

and violence toward humans did not occur until the 1960's and it focused on a

hypothesized triad of behaviors (enuresis, fire setting, and cruelty toward animals)

among children that appeared to be predictive of adult violent behavior (Macdonald,

1961). However, aside from a few case studies (Justice, Justice, & Kraft, 1974; Wax &

Haddox, 1974) and one empirical assessment (Hellman & Blackman, 1966) many

researchers who followed MacDonald's proposed triad did not find a significant

association among the three variables.

Recent research has purported to find supporting evidence for the hypothesis that

aggressive individuals are also abusive toward animals (Felthous, 1980; Felthous &

Yodowitz, 1977; Kellert & Felthous, 1985). However some researchers report no clear

association (Miller & Knutson, 1997). Because of methodological limitations including

design, sampling techniques, and measures of animal cruelty, it is impossible to compare

findings across studies, to generalize to other populations, or even to fully understand the

significance of the findings. The studies that do find an association between animal abuse

and human aggression tend to use a definition of animal abuse that is more severe and

recurrent along with research designs that employed the use of clear control groups

The correlation between spousal abuse and child abuse, where either can be an

indicator of the other, sets a strong precedent for the suspicion that abuse of the family

pet may also be related to other forms of family violence. There is ample evidence to

suggest that individuals who engage in acts of animal cruelty have a greater probability of

committing acts of violence against people as compared to individuals who have no history of committing acts of violence against animals (Arluke, Levin, Luke, & Ascione, 1999; Felthous & Kellert, 1987; Flynn, 1999; Hellman & Blackman, 1966; Lockwood & Hodge, 1986; Ritter, 1996).

Similarly, whether the abuse of a companion animal in a household is directly related to the risk of child abuse in the same household is an area of research that is largely uncharted and in need of more investigation. Three studies address the correlation and raise the suspicion that the two forms of violence are directly linked. A 1980 pilot study conducted in England found evidence suggesting that children are at risk of abuse or neglect in households that abuse the family pet (Hutton, 1983). A similar study comparing records of a Pennsylvania county's Society for Prevention of Cruelty to Animals with those of the same county's youth social services agency found that the behavior patterns towards one's children were similar to those toward one's pets (Walker, 1980). DeViney, Dickert, and Lockwood (1983) reported the results of a study that surveyed the treatment of animals in 53 pet-owning families in which child abuse had occurred. In 60 percent of these families, at least one family member had abused the family pet; of the families in which physical child abuse had occurred, 88 percent also had animals that had been abused.

It is not difficult to imagine that a similar link exists in families that have battered partners. The literature on domestic violence is filled with anecdotal reports of incidents of cruelty to family pets where partner battering occurs (Adams, 1994; Ascione, 1998; Ascione, Weber, & Wood, 1997; Flynn, 2000).Three quantitative studies support the anecdotal findings. In a survey of 38 women seeking shelter from their batterers, Ascione

(1998) found that of the 74 percent of women who reported either currently or recently

owning pets, 71 percent reported that the batterer had threatened to kill or hurt their pet or

pets or had actually done so.

The Community Coalition against Violence in La Crosse, Wisconsin (Quinlisk,

1994), showed that 80 percent of the battered partners who had family pets reported

violence toward the animals. The Colorado Springs Center for prevention of domestic

violence survey reported that 23 percent of the battered women who sought refuge in the

shelter reported animal cruelty (Arkow, 1994).

In an attempt to understand the connection between animal abuse and human

violence, animal advocates have often attempted to bring attention to the issue of animal

abuse by advancing the *graduation hypothesis*, whereby animal abusers are expected to

work their way up from harming animals to harming people. The *graduation hypothesis*

suggests that the presence of cruelty to animals at one developmental period predicts

interpersonal violence at a later developmental period. Much of the early research on

animal abuse was an attempt to test this hypothesis (Felthous, 1980; Felthous &

Yodowitz, 1977; Justice, Justice, & Kraft, 1974; Kellert & Felthous, 1985; Macdonald ,

1961; Wax, & Haddox, 1974).

In 1999, Arluke et al. challenged the assumption that animal abusers commonly

"graduate" from violence against animals to violence against humans. The criminal

records of 153 animal abusers and 153 control participants were tracked and compared.

Arluke and colleagues found that animal abusers were more likely than controls to be

interpersonally violent, but they were also more likely to commit property offenses, drug

offenses, and public disorder offenses. Therefore, there was an association between

animal abuse and a variety of antisocial behaviors, but not violence alone. Moreover, when the time ordering between official records of animal abuse and interpersonal violence was examined, animal abuse was no more likely to precede than to follow other violent offenses (Arluke et al., 1999).

The graduation hypothesis is a simplistic model that may actually misrepresent and distort more complex associations that may exist between animal abuse and violence. Arluke et al. (1999) pointed out that the graduation hypothesis ignores the possibility of alternative kinds of graduation or progression. For example, graduation may not be from animals to humans, but from distant to intimate targets or visa versa. The child who tortures his own puppy may have already been violent toward animals or children who are more distant or strange to him than his own dog. In a recent analysis of woman battering, it was noted that animal abuse is often a component of the emotional abuse suffered by battered women (Ascione, Weber, & Wood, 1997). When physical abuse decreases, emotional abuse may increase. Animal abuse may thus serve as an alternate, and perhaps more socially acceptable control strategy.

Social deviance theory (Dembo et al., 1992; Gottfredson & Hirschi, 1990; Harrison & Gforer, 1992; Hirschi & Gottfredson, 1994; Osgood, Johnston, O'Malley, & Bachman, 1988) which argues that a wide range of criminal behaviors are positively correlated with one another, may be more useful in exploring the possible link between animal abuse and family violence. This is either because one form of deviant behavior leads to the involvement in another form of deviance or because different forms of deviance have the same underlying causes (Arluke et al, 1999).

It is clear that there is some relationship between animal abuse and other family violence in some offenders, but the research often ends there. Research has not moved very far beyond simply testing for correlation and this research is still in debate. Part of this correlation may relate to differences in neighborhood factors. Lack of resources may lead to both human and animal maltreatment (Garbarino, 1977).

Neighborhood factors and violence. A promising approach to the understanding, prevention, and control of violence, a perspective with roots in both criminology and public health, is to focus on the places where violence occurs. These places differ in many ways: for example, in how frequently chance encounters offer the rewards or provocations that elicit violent behavior, how easily one can obtain lethal weapons, or how likely a passerby is to interfere in a violent encounter. The larger social context of violence must then also be included in the analysis, for example ethnic and socioeconomic patterns of violence. This in turn necessitates the inclusion of influences of family and social disorganization, opportunity structure, and community culture. This analysis is the basis for the ecological study of communities and crime (Balwin & Bottoms, 1976; Chilton, 1964; Wikstrom, 1991).

Interaction effects of these variables are also important in understanding how social processes affect violent crime. For example, ethnicity and socioeconomic status (SES) appear to interact: at low SES levels, Blacks are more likely to be homicide victims than whites; but at higher SES levels the differential attenuates or disappears. Three structural factors may explain this variation—low economic status, ethnic heterogeneity, and residential mobility. Subsequent research has supported these findings and refined them. This work points to 1) *concentrations* of poor families in geographic

areas and greater income *differences* between poor and nonpoor (income inequality); 2)

measures associated with *differential social organization* such as population turnover,

community transition, family disruption, and housing/population density—all of which

affect a community's capacity to supervise young males; and 3) indicators of

opportunities associated with violence (e.g., illegal markets in drugs and firearms). (Reiss

& Roth 1993, 14)

In addition, some individual-level risk factors for violent crimes point to possible

community-level causes. Ineffective parenting, drug use, school failure, and a poor

employment history are all more likely to occur in communities in which illegal markets

are nearer at hand than are prenatal and pediatric care, good schools protected from

violence, and legitimate employment opportunities. (Reiss & Roth 1993, 14)

Quantitative indicators of community disorganization include high housing

density, high residential mobility, high percentages of single-parent families, and the

occurrence of neighborhood transitions—both economic decline and gentrification. These

appear to account for more of the geographic variation in violent victimization rates than

do measures of poverty and income inequality. (Reiss & Roth 1993, 15)

Ethnic status and violence. Blacks, Hispanics, and American Indians are at

greater risk than whites for becoming victims of violent crime. However, a look behind

this simple pattern reveals a more complex picture. Evidence on violence rates for the

smallest, most homogeneous areas for which data are available involves census tracts.

Four studies in which the dependent variable was the homicide victimization rate and the

independent variables were measures of the racial or ethnic composition and of the

economic status of the census tract covered three cities in Ohio (Muscat, 1988), New

Orleans (Lowry, Hassig, Gunn, & Mathison, 1988), Atlanta (Centerwall's, 1984

reanalysis of Munford, Kazer, Feldman, & Stivers, 1976), and Boston. In all four studies,

there is an interaction between ethnic status and socioeconomic status. At low

socioeconomic levels, Blacks have much higher risks of becoming homicide victims than

do whites. At higher socioeconomic levels, the difference between Blacks and whites

disappears and even reverses in one of the studies. Although the details of each study

vary somewhat, the results are generally the same.

It is difficult to disentangle the effects of race/ethnic status from community

influences because poor whites and poor blacks live in areas that are very different—

economically and otherwise—making simple comparisons impossible. In 1980, for

example, in the five largest U.S. cities, 85 percent of poor blacks lived in poverty areas,

compared with only 30 percent of poor whites; nearly 40 percent of poor blacks lived in

areas characterized by *extreme* poverty, compared with 7 percent of poor whites. (Reiss

& Roth 1993, 132)

Research finds that community influences often combine with poverty and

race/ethnic status to produce high rates of violent crime. Although some studies report

that the racial composition of communities has a direct effect on violence, virtually all

studies report that the effects of race are also mediated by other factors, such as family

structure and community change (Sampson & Lauritsen, 1993). When these factors are

controlled statistically, the effects of race and ethnic status diminish or disappear

altogether. (Reiss & Roth 1993, 132)

Poverty and violence. Socioeconomic status, as measured using an indicator of

poverty, is a useful starting point for understanding and controlling violence. The classic

work of Shaw and McKay (1942) on the ecology of crime and delinquency led to the

conclusion that three structural factors—low economic status, ethnic heterogeneity, and

residential mobility—resulted in the disruption of community cohesion and organization,

which in turn contributed to variations in crime and delinquency among communities.

This conclusion was buttressed by the fact that high rates of delinquency persisted in

communities characterized by these factors over many years despite high population

turnover in the communities, which changed the ethnic and racial character of their

residents.

Researchers since then who have studied community-level variations have found

associations between poverty and high rates of official delinquency (Gordon, 1967), but

few studies focused specifically on violent crime. Those studies that found associations

continued to find that homicides were disproportionately concentrated in areas of poverty

(Beasley & Antunes, 1974; Bensing & Schroeder, 1960; Bullock, 1955; Mladenka &

Hill, 1976).

This pattern has held up regardless of which ethnic group occupied the low

income areas. Three of the studies examined violent crime in Houston (Beasley &

Antunes, 1974; Bullock, 1955; Mladenka & Hill, 1976). Like Shaw and McKay, each

reported high correlations between violent crime rates and measures of poverty. Areas in

Houston with high rates of violent crime were also characterized by high population

density and a high proportion of black residents. (Reiss & Roth 1993, 132)

Recent research finds correlations between violence rates and many community

characteristics that are distinct from, but related to poverty: concentrations of poverty,

residential mobility and population turnover, family disruption, high density in housing

and population, features of local social organization (e.g., low density of friends and acquaintances, few social resources, weak intergenerational ties in families and communities, weak control of street-corner peer groups, and low organizational participation in community life), and opportunities associated with violence (such as gun density, drug distribution networks, and the location of nonhousehold activities conducive to violence) (Sampson & Lauritsen, 1993).

Other community characteristics. Researchers have identified a number of community characteristics that are related to violence rates. For example, in studies of neighborhood rates of violent crime, measures of the density of multiunit housing, residential mobility, and the prevalence of disrupted family structures generally accounted for more variation in rates of violence than did measures of poverty and income inequality (Sampson, 1983, 1985, 1986). Another study of 57 neighborhoods in three cities, found a similar link between levels of violence and residential mobility in poor, but not in affluent, neighborhoods (Smith & Jarjoura, 1988). High population density was associated not only with high rates of violence but also with high rates of poverty, teenagers in the population, single-parent households, and nonwhite populations—all commonly found correlates of violence. (Reiss & Roth 1993, 134)

The interactions among these factors make it difficult to estimate their independent effects using data from a cross section of neighborhoods at a single point in time. However, in a study of changes in violence rates from 1970 to 1980 in 277 Baltimore neighborhoods, Taylor and Covington (1988) found sharp increases, not only in areas that experienced increasing concentrations of people in poverty, but also in neighborhoods in which gentrification improved housing characteristics and altered

family composition. The suggestion that neighborhood change per se is associated with increased violence levels is consistent with the theory that disturbances in *social organization* of any kind are a factor in increasing neighborhood violence levels. In a study of changes in homicide rates in metropolitan areas and states from 1960 to 1980, Land, McCall, & Cohen (1990) report similar findings for poverty, income inequality, and family disorganization.

The "concentration effects" of ghetto poverty have been a central focus of William Julius Wilson's (1987) work. One effect of the increased concentration, Wilson argues, has been the social isolation of inner cities from mainstream institutions. Community residents left behind in areas of extreme poverty have experienced high levels of family disruption, poor access to prenatal and child care, and low infant birthweight—factors that are described as developmental precursors of aggressive and violent behavior. Recent research confirms their association with violence. The same communities and families also experience high levels of family disruption via divorce, desertion, and female-headed families; the breakdown of community networks of informal social control (Messner & Tardiff, 1986; Sampson, 1985; Smith & Jarjoura, 1988; Wallace & Wallace, 1990); and changes in routine activities that increase the risks of violent victimization.

The diminution of adults' ability to supervise children in their families and neighborhoods exemplifies a breakdown of what Coleman (1990) has called social capital—the quality of intergenerational relationships.

Using data from the British Crime Survey, Sampson and Groves (1989) created area-level measurement for community structural characteristics (e.g. low SES, ethnic

heterogeneity, residential mobility, family disruption, and urbanization), intervening

variables (e.g. sparse local friendship networks, unsupervised teenage peer groups, low

organizational participation), and crime and delinquency. Their findings indicated that the

effects of community structural characteristics on victimization and offending were

mediated by social disorganization, in particular, the level of unsupervised teenage peer

groups. Sampson and Wilson (1995) showed that the same model explained community

variations in the level of personal victimization in Chicago and Stockholm, although the

rates of victimization were much higher in Chicago, even with the sizable social,

political, and economic differences between the United States and Sweden.

Community culture. Poverty, high turnover in population, and other features of

socially disorganized communities affect community culture by impeding

communication, erecting barriers to common values, and making effective collective

action to achieve such values virtually impossible (Skogan, 1990). Under such

circumstances in an isolated community, widely accepted cultural values become

"unviable," and an oppositional culture may begin to shape what are considered to be

appropriate standards of behavior (Anderson, 1978).

"As the basic institutions declined, the social organization of inner-city

neighborhoods (sense of community, positive neighborhood identification, and explicit

norms and sanctions against aberrant behavior) likewise declined. This process magnified

the effects of living in highly concentrated urban poverty areas—effects that are

manifested in ghetto-specific culture and behavior" (Wilson 1987, 138).

A vivid picture is provided by Elijah Anderson's ethnographic study of adjoining

community areas in Philadelphia: Northton, a black community formerly of mixed

socioeconomic status, now increasingly occupied by the ghetto poor, and The Village,

a gentrifying mixed-race community. Anderson (1991) analyzed the complex

oppositional culture—widely shared in some poor black communities—that has resulted

from the unique historical circumstances, structural economic changes, and institutional

failures experienced by the ghetto poor he has observed. The street culture requires skills

utterly unlike those required in the service economy. While workers employed in the old

manufacturing economy could act tough and use coarse language, these behaviors limit

opportunities for employment in the service economy.

The physical environment. Research has identified only a few physical

characteristics of residential and public places as unambiguously associated with the risk

of violence (Taylor & Gottfredson, 1986). Public areas near apartment units, located in

geographic areas with high rates of divorce and population turnover, are particularly

dangerous (Sampson & Wooldredge, 1987). Such areas concentrate large numbers of

adolescents, who are unsupervised while their single parents are at work. Because of the

high population turnover, potential monitors are unlikely to know these children, and

potential victims tend to be unknown to their attackers. Apartment housing areas,

especially those on city blocks that are large in area and population, with high population

density, and near public housing projects and high schools are also associated with high

risks of violence (Beasley & Antunes, 1974; Mladenka & Hill, 1976; Roncek, 1981;

Roncek & Faggiani, 1986; Sampson, 1983; Schuerman & Kobrin, 1986; Smith &

Jarjoura, 1988).

Alcohol outlet location. Although previous research establishes a link between

alcohol consumption and increased levels of violence, studies relating the density of

alcohol outlets (e.g., restaurants, bars, liquor stores) and the likelihood of violent crime have been less common. Using data from 79 neighborhoods in the city of Minneapolis, Minnesota, controlling for covariates (e.g., neighborhood racial heterogeneity, age heterogeneity) and also accounting for spatial association, a significant positive relationship between alcohol outlet density and violent crime appeared (Britt, Carlin, Toomey, & Wagenaar, 2005). Alcohol outlet density has been shown to be an important environmental factor associated with higher violent crime rates in certain areas of Newark, New Jersey (Speer, Gorman, Labouvi, & Ontkush, 1998).

Ethnographic research on alcohol use suggests both that its role in violence depends on drinkers' expectations and on cultural norms—even binge drinking is commonly observed in some non-European cultures without violent aftermaths. (Reiss & Roth 1993, 14)

Femicide and neighborhood factors. Research on neighborhood factors and domestic violence is extremely limited. An evaluation of medical examiner data on 1861 femicide victims between 1990 and 1999 and archival information on 59 neighborhoods in New York City were used to conduct a multilevel case. Control analysis showed, after controlling for neighborhood-level income, no neighborhood factors were significantly associated with intimate partner femicide (IPF) risk, as compared with risk of non–IPF and risk of femicide from unknown perpetrators, above and beyond the contributions of individual-level factors. The contribution of neighborhood-level factors indicative of social disorganization, including educational and occupational attainment, immigrant concentration, physical disorder, and social cohesion, to the likelihood of IPF, while

taking into account known neighborhood- and individual-level IPF risk factors, found

little neighborhood-level heterogeneity with respect to IPF risk. (Frye et al., 2008)

      Neighborhood factors in animal maltreatment and link to human violence.

Since the 1920s researchers have been examining the relationship between stranger

violence and neighborhood context, and drawing conclusions about the causes and

correlates of violence (Miles-Doan, 1998). This contextual work has not been replicated

with domestic violence or animal maltreatment. Despite the development of integrated

theories in criminology, few social scientists in general, or criminologists in particular,

integrated the emerging empirical literature on the multiple forms of aggression within

families with other perspectives on violent crime. Family violence continued to be

defined and studied as a separate type of crime, not as another aspect of violence and

aggression. Accordingly, criminologists in earlier decades tended to view family violence

as a unique, idiosyncratic crime, the result of processes unique to certain families or

gender oppression and therefore inappropriate for study within the larger context of

deviance, violence, and crime (Buzawa, Austin, & Buzawa, 1995). This left the study of

family violence out of the study of the relationship of neighborhood factors of violence.

      Many studies of stranger violence identify the community as a crucial setting that

can insulate or protect its members, or conversely, can create or enhance risk (Aldarondo

& Sugarman, 1996; Kposowa, Breault, & Harrison, 1995; Sampson, 1986; Sampson &

Grove, 1989; Sampson & Lauritsen, 1993; Skogan, 1990). Many neighborhood-based

studies investigate the association of community poverty and economic inequality with

elevated risk of violent crime. Resource deprivation is thought to lead to weak social

organization reflected both in families' inability to socialize their youth against violence and in a reduction of effective interventions in situations of potential or actual violence.

Most of the literature oriented toward community level mechanisms only examines types of violence that affect the whole neighborhood such as predatory victimization involving strangers or juvenile delinquency (Sampson & Groves, 1989). This literature emphasizes the family unit both as part of a system of violence and as a potential agent of social control that can be coerced or influenced by legal interventions to stop violence (Fagan & Browne, 1993). Crimes committed within the family are largely ignored.

The lack of attention to neighborhood context in studies of domestic violence may partially arise from the quantitative nature of ecological studies and the qualitative preference of feminist scholars. Feminist studies of violence against women tend to distrust quantitative methodologies, and argue that the problem is too complex to capture with numbers (Bograd, 1988). Other researchers believe that quantitative analysis can shed light on questions related to domestic violence (Jayaratne, 1983; Yllo & Straus, 1990). It is also possible that few ecological studies exist because it is assumed that violence between intimates is determined more by individual and situational precipitants than by external factors (Fagan & Browne, 1994).

Garbarino (1977) did study the human ecology of child maltreatment. He attempted to explicate a model of child maltreatment as a problem of "asynchrony – i.e., as a mis-match of parents to child and of family to neighborhood and community (p. 721). He also discusses the historical role of violence in our civilization and that

macrosystem support for the legitimacy of physical force against children and the child's status as property is a necessary condition for child abuse to occur. Garbarino suggests that stress combined with a lack of resources may lead to human maltreatment (Garbarino 1977; Garbarino & Crouter 1978). This combination could lead to animal maltreatment as well.

Theories of Violence. Several theories have been used to explain the relationship between community characteristics and stranger violence. Most are derived from structural models, which assert that community disruption or disorganization brought on by certain structural properties is the primary cause of violence (Kornhauser, 1978). One theory is the social disorganization model, which posits that structural characteristics, particularly high levels of poverty, racial heterogeneity, and residential mobility, can lead to a disruption in community organization. This in turn results in the impairment of community processes (i.e. formal and informal social control) that might otherwise constrain deviant behavior. Shaw and McKay (1942) used this theory to explain juvenile delinquency, and concluded that new people moving into an area may make it difficult for residents to agree on local standards of behavior. As a result, control functions of the family and neighborhood are eroded, freeing residents to engage in antisocial behaviors.

Feminist theory has long been dominant in explaining domestic violence. Feminist scholars argue that the prevalence, and even the very existence, of family violence is rooted in our patriarchal society's view of women (Dobash & Dobash, 1979; Walker, 1984; Yllo, 1993). The abuse of women by male partners is an outgrowth of a culture that maintains the domination of men over women through economic inequality and portrayals of women as inferior to men (Fagan & Browne, 1994). There does appear

to be a direct connection between men who batter and patriarchical sex role attitudes. Straus, Gelles, & Steinmetz (1980) reported a higher level of domestic violence among couples who engage in husband dominated decision-making (also wife dominated decision making).

Domestic violence is not only associated with patriarchal attitudes within the family but in the larger structure. Yllo and Straus (1990) found a curvilinear relationship between the status of women and domestic violence. In the U.S. states where the structural inequalities against women were highest, rates of male perpetrated domestic violence were highest. However, states where women had the highest status also had high rates of domestic violence, which Yllo and Straus attributed to a backlash against the improved status of women.

Social learning theory is also a common framework used to explain domestic violence. This theory states that individuals learn how to behave violently due to experiences of and exposure to violence. When applied to domestic violence, the theory is often termed intergenerational transmission of violence, suggesting violence is learned in the context of family socialization (Gelles, 1997). In particular, individuals who experience or witness domestic violence in their family of origin learn that violence is an appropriate tactic for getting what they want. In addition, individuals exposed to violence in their families learn that those you hit are also those you love. Thus, the family becomes a training ground for violence (Pagelow, 1984).

Exchange theory is used to explain both stranger and domestic violence. It states that individuals engage in behavior to maximize rewards and minimize punishments. All behavior is driven by a calculated assessment of the risk versus the return on any

particular action (Gelles, 1983). Violence is a means by which individuals and groups can maintain or advance their interests, therefore, male violence can be interpreted as a means for men to maintain their position of dominance in the social structure (Gelles, 1997). In regards to the dynamics of violence against women and the social response to it, it seems that violence is an effective mechanism of control. Historically, violence in the home has been viewed as a private matter that should not involve government agencies such as the police. The use of violence is often associated with a desired outcome for the perpetrator, which serves as reinforcement (Jasinski, 2001). However, when applied to intimate violence, exchange theory does not adequately explain why victims would stay in an abusive relationship. In some families, particularly those of lower classes, women benefit from the men's income and relatively higher social position (Rosenbaum & O'Leary, 1981; Strube & Barbour, 1983). In situations where the abused women is educated and employed it is more difficult to see how the rewards of the relationship outweigh the negative aspects.

Resource theory is situated within the framework of exchange theory. This theoretical perspective is used to explain violence occurring within the family. The primary concept is power, defined as the ability of one individual to influence another. According to Goode (1971), the family is a power system and violence may be used as the ultimate resource when other resources are lacking. An individual who wants to be the dominant person in the family yet has little education, a low prestige job, and poor interpersonal skills, may choose violence to gain a power position. In addition, family members may use violence to resolve grievances when they have few alternative resources available.

Ecological Systems Theory, also called "Development in Context" or "Human Ecology" theory, specifies four types of nested environmental systems, with bi-directional influences within and between the systems.. The four systems are the Microsystem, Mesosystem, Exosystem, and Macrosystem. The Microsystem is the Immediate environments (family, school, peer group, neighborhood, and childcare environments). The Mesosystem is a system comprised of connections between immediate environments (i.e., a child's home and school). The Exosystem is the External environmental settings which only indirectly affect development (such as parent's workplace). The Macrosystem is the the larger cultural context (Eastern vs. Western culture, national economy, political culture, subculture). (Berk, 2000)

Garbarino (1977), through the human ecology model, explains child abuse as a result of stress and lack of resources. The community context of child abuse and neglect includes socioeconomic factors (e.g. economic resources, housing conditions, work patterns, etc.), demographic features (e.g. family and age structure of population), ideological factors (values and attitudes about neighborhood and community characteristics), and historical factors (development trend in the characteristics of the community and individual relationships to local residence). Garbarino also looked at neighborhood support systems like availability of services for families (e.g. child and family health care), feedback for families in trouble (e.g. monitoring of deviant behavior), and neighborhood patterns (e.g. natural neighborhoods, neighborhood associations etc.).

Theories of animal abuse –motivations that may underlie animal abuse. Early psychiatric writings by Pinel (1806/1962) in the 1800's and Krafft-Ebing (1906/1996) in 1906 illustrate the ways that animal abuse might foreshadow human violence. Mead

(1986) provided one of the earliest suggestions that societies should watch for, and record, evidence of children's and adolescents' killing and torture of animals to prevent the escalation of violence toward humans. She pointed out that each culture places a ban on cruelty and killing. She felt that the torturing and killing of animals in a way that violated society norms (local norms) might prove an important diagnostic sign for the motiveless type of killer.

In an effort to better understand the motivations of adults who abuse animals, Kellert and Felthous (1985) interviewed 23 male subjects with a substantiated history of animal abuse and discovered a number of motivations that may characterize adult cruelty to animals. Based primarily on the statements of these 23 subjects, the nine reasons for animal cruelty included the following:

- To control an animal;

- To retaliate against an animal;

- To satisfy a prejudice against a species or breed;

- To express aggression through an animal;

- To enhance one's own aggressiveness;

- To shock people for amusement;

- To retaliate against other people;

- To displace hostility from a person to an animal; and

- To experience nonspecific sadism (Kellert & Felthous, 1985).

Child and adolescent motivations for animal abuse have not been studied as extensively. However, case reports and a youth-interview study conducted by Ascione, Thompson, and Black (1997) suggest a number of developmentally related motivations:

- Curiosity or exploration;

- Peer pressure;

- Mood enhancement;

- Sexual gratification;

- Forced abuse;

- Attachment to an animal;

- Animal phobias;

- Identification with the child's abuser;

- Posttraumatic play;

- Imitation;

- Self-injury;

- Rehearsal for interpersonal violence; and

- Vehicle for emotional abuse (Ascione, Thompson, & Black, 1997).

Previous research indicated that family pets--especially those residing in angry and aggressive households such as those families with ongoing domestic violence--are often made the scapegoat for family and personal problems (Adams 1994; DeViney, et al., 1983; Kellert & Felthous 1985; Lockwood & Hodge 1986; Vermeulen & Odendaal 1993). Agnew (1998) argued that stressed and strained people may use animals as scapegoats because animals provide a safe target for the discharge of aggressive feelings and that those who engage in animal abuse tend to be more sensitive to stress and strain.

Cultural differences. Through ecological theory, the dynamics of animal abuse may be better understood by considering companion animals as symbiotic members of human families, stray animals as participants in neighborhood and community

ecosystems, and societal views about our treatment of animals as part of our cultural environment. These societal and cultural views are extremely important to define in an attempt to understand the connection between violence to animals and people. It is possible that only when animal abuse is the breaking of a serious societal norm that it is related to the individual's willingness to break other society norms.

The violence link, however, has rarely been discussed in the context of a multicultural society. Culturally defined attitudes toward animals challenge animal care and control services on a daily basis. Research on the link between animal abuse and human violence has also struggled with or ignored this problem. For example, in many Hispanic communities animals are seen as objects, not as members of the family. In some of these communities, normative behavior such as dog or cock fighting, would be deemed as abuse by many researchers. Animals are often kept outside and in conditions that would be deemed as neglect in other cultures (Richard, 2004). Emotional attachments to animals may also be very different among and across cultures. Is it possible that in communities with normative low emotional attachment to animals that the link between animal abuse and human violence does not occur? No research has been done on this issue.

We do know anecdotally that animals, especially pets, can get caught up in the cycle of family violence. But we do not know how this varies among different ethnic communities. It has been postulated that in many cases, the animal is just the last victim in a chain of abuse that filters down from the strongest family member to the weakest. But we don't know if this link remains stable in a community where animals are not recognized as members of the family or in communities where the normative treatment of

animals is very different. Motivations for animal abuse in these communities may be very different and the link may or may not exist at all.

Because much of the research on the link between animal abuse and human violence has been carried out by advocacy agencies, questions such as these are seen as less important in the struggle to highlight the importance of animal abuse. But in an attempt to test the theories explaining the linkage of these different forms of violence and to understand the motivations of all violence, this information is essential.

The overall picture of animal abuse is still unclear. A more complete understanding of the dynamics at work when humans abuse animals will bring us closer to the goal of reducing or eliminating all violence. Acts of violence against family members do not occur in a vacuum. Looking at the abuse of animals and its possible link toward human violence allows us to focus on the repetitive nature of the violent acts and enhances our detection of the perpetrator's chronic violent behavior. Looking at the link between animal abuse and human violence in societies where the normative treatment of animals varies will provide even greater insight into this issue.

Previous GIS research in this area. A 2000 study by Adler, a veterinary student at the University of Pennsylvania, carried out a statistical analysis of the nature of urban animal abuse through the use of an ecological perspective and geographic methods of analysis. Data from Pennsylvania SPCA documentation of reported animal cruelty and neglect in the city of Philadelphia between 1996 and 1999 were examined using Ecological Modeling through the application of a Geographical Information System. Maps were produced representing the geographical distribution of cruelty and neglect, as reported to PA SPCA. The physical location of reported abuse was then compared to a

variety of socioeconomic, demographic and contextual variables so as to determine the social ecology of urban animal abuse. The link between violence towards animals and other forms of antisocial behavior was also explored.

In Adler's study, data were collected from the Pennsylvania SPCA concerning reported cases of abuse and neglect in the city of Philadelphia; the reports spanned the period of January 1996 to December 1999. The original data set was collected in the following manner: 1) The complainant phones, visits, or writes the PSPCA to report a neighbor, acquaintance, or family member for abusing or neglecting an animal. 2) The operator logs the call in text form, and follows up either by mailing a form letter to the respondent, or sending an agent to investigate, depending on the severity of the reported crime. 3) All details and action taken on the case are stored in text form, and are sorted by assigned sequential case number. Therefore, it was necessary to manually code the text form data for type of abuse so that statistical analysis could be employed; twenty-eight categories of abuse or neglect were coded, from type of animal, to no food or water, to dog fighting, and physical aggression against an animal.

While the initial maps were not conclusive, they did demonstrate the interesting and promising nature of this method of analysis. Statistical significance was not shown due to the small size of the dataset. With a larger dataset and improved coding organization, much more information could be gleaned and analyzed.

Research Question

Historically, family violence has been studied in isolation from other forms of violence. Criminologists in earlier decades tended to view family violence as a unique, idiosyncratic crime, the result of processes unique to certain families and therefore

inappropriate for study within the larger context of deviance, violence, and crime (Buzawa, Austin, & Buzawa, 1995). Research shows that there is a link between different forms of family violence and the abuse of animals (Adams, 1994; Costin, Karger, & Stoesz, 1996; DeViney, Dickert, & Lockwood, 1983; Lockwood & Hodge, 1996; Volant et al., 2008). However, since the study of family violence has been separated from the study of stranger violence, the variables needed to explore this link, as well as animal maltreatment in general, have been largely ignored. Neighborhood context has been largely left out of an explanation for family violence and therefore, from the study of the link between animal abuse and family violence. However, the link between different forms of violence leads us to question the contexts in which these links do or do not occur.

This study will look at violence holistically. There are compelling reasons to include animal abuse and compelling reasons to look at violence from a neighborhood level. Neighborhood factors have not been used as independent variables to explain family violence or animal abuse and are not used in explaining the co-occurrence. This study will attempt to fill that gap.

From a clinical perspective, this research will add to the evolving perspective that violence exists by offender type (low, moderate, and high-risk offenders) and including animal abuse in the picture helps to define the understanding of types (Cavanaugh & Gelles, 2005). From a community perspective, this research will help to develop meso-system level interventions (e.g. including animal abuse workers as mandated child abuse reporters, educating human violence workers about animal abuse, educating animal abuse workers about human violence, and including the treatment of the family pet in referral

forms.) This new and unique information will also improve prevention and detection of maltreatment because interventions can be targeted at at-risk neighborhoods making better use of scarce resources. This research will also lead to an improved understanding of the sequeli of occurrence of forms of family violence and an overall broader understanding of the complexities of all forms of interpersonal violence.

What is the community context of animal maltreatment and it's possible link to human maltreatment.

1) Does animal maltreatment occur evenly throughout the city of Philadelphia? If not, what neighborhood factors (e.g. social stress, structural decline, economic decline and gentrification, racial heterogeneity, crime rates, poverty and income inequality) are linked to a higher or lower rate of animal maltreatment?

2) Does the rate of human maltreatment (non-intimate violence, domestic violence, and child abuse) correlate to the rate of animal maltreatment in Philadelphia neighborhoods?

3) Do neighborhood characteristics, previously found to be correlated with non-intimate interpersonal violence, help us to understand where animal and human maltreatment are linked?

Chapter 2: Methods

Using a unique dataset spanning 11 years of over 31,000 case reports of animal

maltreatment from the Pennsylvania Society for the Prevention of Cruelty to Animals

(PSPCA), the distribution and prevalence of animal neglect, abuse, and dog fighting were

mapped with Geographic Information Systems (GIS). Ecological Modelling techniques

and linear regression were then employed to examine the relationship between animal

maltreatment and a wide range of neighborhood and demographic variables, domestic

violence and child maltreatment. This section will: 1) describe the PSPCA database and

the process used to code it, 2) explain geobase files in general and the geocoding

methodology that will be used in this study, 3) briefly describe the databases that were

used to gather data on neighborhood variables and rates of human violence in

Philadelphia, and 4) briefly explain how the geobases were analyzed.

PSPCA Database

The PSPCA database is a spreadsheet that comprises 31,534 reported cases of

animal maltreatment in Philadelphia, as logged by the Pennsylvania Society for the

Prevention of Cruelty to Animals. The cases span 11 years, from August 4 1995 to July

11 2006. The database includes a street address of each incident and a text form

description of the type of maltreatment. Each incident was assigned a case number. The

PSPCA responded to these cases by mailing a form letter to the accused or directly

inspecting the site and animal, depending on the severity and nature of the complaint[1].

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[1] Each case was assigned a case number by the agent working the files on computer. A complainant phones the SPCA and reports abuse/neglect. The Philadelphia Police Department also refer such complaints to the SPCA. The agent logs the complaint, including the address of the respondent as well as the nature of the incident, in text form. The agent determines what action shall be undertaken. Barking, No Shelter, Yard Dirty letters are sent initially, although more serious cases are investigated promptly. If necessary, an agent visits the site of the violation and determines the conditions. Citations can be written, as well as warnings given. Animal control, sanitation police or the police department may be called in for assistance. A warrant must be issued to remove an animal, although

Therefore, the data set includes documentation of the filed report, the action taken, and

limited updates on each case of reported animal misuse in the city of Philadelphia

between August 1995 and July 2006.

Coding PSPCA data. The PSPCA data encompasses all reported violations of

animal-related city ordinances or state anti-cruelty laws. The complaints, originally in

text form, were coded according to type of maltreatment and type of animal. Three super

categories have been established, allowing each case to be coded as *animal neglect,*

abuse, and/or *misuse*. These super categories are not mutually exclusive as one

household may possess multiple animals subjected to cruelty. Additionally, one animal

may be subjected to various forms of maltreatment within the same household. Also,

there were additional sub-codes created that do not fall under any of the super-categories

for cases reported to the PSPCA (for example, noise/barking, animal at large, stray cats

fed, dead animal). (See Appendix A: Coding Sheet for more detail.)

Cases of neglect comprise the most numerous of the three super categories and

also the most contentious and difficult to label. "Negligence" is defined by The

American Century Dictionary as, "culpable carelessness" (1995); this definition, although

highly subjective, was employed when coding the text form data. The following types of

animal treatment were included under the super category 'neglect'.

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animals running loose on public property will be picked up immediately. Cards are left at the site if the respondent is not home, with advice to an order to phone the shelter within 24 hours.

Table 1. *Subcategories Included under the Super Category: Neglect*

No Water or Shelter Provided

Animal Kept in Filthy Conditions

No Food, or Emaciated Animal

Neglect of Animal's Body (Infested with Fleas, Matted, etc.)

General Neglect[2]

Chained[3]

Animal in Dangerous Situation[4]

Animal in Need of Medical Attention

The second super category, 'abuse,' is designed to represent those cases of active aggression or violence against animals; physical aggression directed towards animals is the most elusive category of cruelty, as demonstrated by the small number of prosecutions related to this form of cruelty.

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[2] 'General Neglect' is a complicated subcategory; it includes those cases where the complainant claims the owner is neglecting their animal, when no other details are provided.

[3] It is illegal in Pennsylvania to tie an animal on a leash shorter than 2 feet.

[4] This subcategory includes instances in which an animal is housed in a situation that may result in bodily injury; animals in burnt out houses or on roofs are included in this category. Yards strewn with automotive parts or other dangerous debris are coded.

Table 2. *Subcategories Included Under the Super Category: Abuse*

Physically Abused
Shot
Poisoned
Hung
Other Cruelty

'Misuse' represents those cases in which animals are being employed as a weapon or for fighting. 'Housed in abandoned property' was also included as countless complainants alleged neighborhood children and young adults keep aggressive dogs in abandoned properties; these animals are reportedly involved in fighting. Animal control frequently supported the complaint by removing several animals from the property. Although this information was coded to obtain frequency information on categories of misuse, the subcategory dog fighting was used as a dependant variable in the analysis.

Table 3. *Subcategories Included Under the Super Category: Misuse*

Dog Fighting
Aggressive Animal
Cock Fighting
Housed in an Abandoned Property

In the PSPCA data set of reported animal maltreatment, the type of animal involved (dog, cat, bird, horse, other) was coded from the textbox description of the reported animal maltreatment. The animal type was not always listed in the description of

the report. Therefore, the dataset was not always clear as to what animals were present. Additionally, in reports where multiple animal types were listed, it was not always clear what animal type was the victim of the maltreatment. Therefore, each report was initially coded with a unique code for animal type, when available. Those codes were then combined into 3 codes (dog present (yes or no), cat present (yes or no), or other animal present (yes or no)).

In the complete data set, 15,990 reports were coded as involving a dog, 1003 reports were coded as involving a cat, and 400 reports involved animals of than a dog or cat. These codes are not mutually exclusive as one report could involve more than one animal type. Because dogs were reported to be present 16 times more often than cats or other animals and because dogs are more likely to linked to an address than cats or other animals, the final dataset included only cases where a dog was present.

This PSPCA coded file of animal maltreatment was geo-coded according to street location within the city of Philadelphia. The next section will explain geobase files in general and the geocoding methodology that will be used to code the PSPCA data.

Geobase Files and Geocoding Methodology

Geobase file. The geobase of a geographic information system (GIS) consists of those files that are necessary for mapping. Unlike ordinary databases, geographic information systems store information in layers instead of tables (although GIS also stores and accesses data in tabular format to relate layer information to attributes). Therefore, the geobase of a geographic information system is made up of layers of information. The main difference between a layer and a table is that a layer stores data geographically instead of in rows: each data object is associated with one or more

geographical coordinates. There are three types of data objects which can be stored in layers: points (single coordinate), lines, and polygons. Examples of each type of object include neighborhood boundaries (polygon), electric lines (line) and liquor stores (point). In addition, each object has attributes (such as the neighborhood name or the gross income of the liquor store) which are usually stored in related tables, although they can also be a part of the layer. Overlaying one or more types of layers on top of the other results in a map. (Olligschlaeger, 1997)

Geocoding methodology. Geocoding refers to the process of associating a data point with a geographic location based on some form of address. This address need not necessarily be a street or mailing address, but can be any key identifier of a particular location, such as the name of a place or the lot and block number of a property parcel. Before an address is to be matched against a street coverage (street coverage will show each street name) a first step is to separate the components of the address (such as street number, name, type, etc.) in order to ensure compatibility with the address format in the address coverage. This maximizes the number of data points that can be successfully matched. This step includes standardizing abbreviations for street types and street directions. Once all addresses have been separated, the raw data file is ready for geocoding. During geocoding the computer attempts to find a matching address in the address coverage for each raw data point, polygon or line. If a match is found, the 'xy' coordinates of the matched address are added to the original data record[5].

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[5]By far the most commonly used address coverage is a line-based address coverage. For example, address coverages created with Tiger line files (available from the Census Bureau) are line based. Geocoding with line-based coverages differs in that geocoded locations are only approximate. Instead of having an address for each polygon or point, line-based address coverages have an address range for each arc (line) representing a street. In most GIS systems each arc has a left and right beginning address and a left and right ending address. It is assumed that numbers on each side of the street have the same parity, i.e., even or

Regardless of the type of address coverage, problems arise during geocoding when no exact matches can be found. The two main causes for this are ARC/INFO (GIS software) cannot find a matching street name or a matching street number. The user can then choose one of a list of possible candidates obtained by ARC/INFO, if available. Another problem is that files can contain numerous spelling errors and inconsistencies (street names may be spelled incorrectly, street directions missing, or street types missing). This can be fixed by manually going through each property file record and correcting any spelling mistakes. Finally, many streets in Philadelphia are numbered streets. While Arc/Info can handle numbered streets, it does not recognize "2nd Ave." and "Second Ave." as being the same street. These must be manually checked.

Crime Rates, Neighborhood Indicators, and Child Maltreatment Variables

> **CrimeBase, NeighborhoodBase, and Census Databases.** CrimeBase and NeighborhoodBase are publicly-accessible, web-based, geographic data applications developed by the University of Pennsylvania's Cartographic Modeling Lab (http://cml.upenn.edu). The CrimeBase and NeighborhoodBase websites are designed to assist community-based planning and development organizations, government agencies, researchers and concerned individuals in their efforts to analyze, transform and revitalize Philadelphia neighborhoods. CrimeBase incorporates data elements, grouped into two categories (Police Department Data and limited U.S. Census Data). Domestic violence rates are derived from the CrimeBase data. NeighborhoodBase incorporates data

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odd. The entire arc shares the same street name, direction, suffix and type. During geocoding using line-based address coverages in ARC/INFO, the system first finds all arcs with the same street name, direction, etc. as the address that is to be matched. Once all candidate arcs are found, it tries to find an arc whose address range encompasses that of the data point to be matched. The exact xy coordinates of the geocoded location are then determined via interpolation on that arc. For example, if the starting and ending address of

elements, grouped into eight categories (Land use, Property Ownership, Housing

Characteristics, Vacancy and Abandonment Indicators, Real Estate Sales, Property Tax

and Revenue, Utility Information, and limited U.S. Census Data). Further census

information was obtained from the government census website (http://www.census.gov).

All independent variables used in this study, their source and description are listed in the

data dictionary in Appendix B.

Table 4: *Independent Variables from NeighborhoodBase, CrimeBase, and US Census*

Demographic	Neighborhood/Structural	Crime
% White	% Gas Shutoff	Truancy by population under 18
% African American	% Water Shutoff	Burglary Rate
% Hispanic	% Water Suspension	Robbery by population
% Asian	% Gas Shutoff	Thefts by population
% of the population under 18	% Housing Code Violations	Prostitution
Median Household Income	Owner Occupied Rate	Arson by population
% below 100% poverty	% Residential properties	Graffiti
% below 200% poverty	% Commercial properties	Aggravated assault by population
High School diploma Rate	% Industrial properties	Narcotic Possession
College graduate rate	% multi-family properties	Narcotic Sale
White % Change	Median Residential Price	Domestic Violence
African American % Change	Median Rent	
Hispanic % Change	Median Year Built	
Asian % Change		
Population % Change		
Under 18 % Change		

Child Maltreatment Data: Philadelphia Services Utilization Monitoring

System (SUMS).[6] The Services Utilization Monitoring System (SUMS) is an online

mapping, reporting, and data analysis tool that gives users easy access to Philadelphia

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the arc are 100 and 200, respectively, and the address number of the data point to be matched is 150, then
the geocoded location will be exactly half way along the arc.

[6] It was hoped that the KIDS (University of Pennsylvania) may have provided block level data on child
abuse and neglect. According the KIDS Research Director, they would have to attempt a data draw and
make sure there are no block groups with few cases. If so, the data may be identifiable and they would not
be able to provide it without additional IRB permission and additional permissions from DHS and other
KIDS partners. KIDS has recently had a policy change allowed no more sharing of information without
permissions from all partners. This excluded this data from inclusion in this study. Future research could
include these additional data. (H. L. Rouse, personal communication, 2008/2009).

children and families data via a secure website. The application works with aggregate

level data, which means that confidentiality of individual records can be protected, while

at the same time information regarding child and family need and service delivery can be

shared across agencies. Although SUMS is not currently collecting data for public

distribution, Substantiated Neglect Cases, Indicated Abuse Cases, and the number of

families per 1990 blockgroup were obtainecd. Because 1990 blockgroups were redrawn

for the 2000 census, the analysis of child maltreatment and animal maltreatment was

performed separately and without the controlling variables from the 2000 census. The

2000 census, Crimebase, and NeighborhoodBase statistics are not compatible with 1990

blockgroups.

Table 5: Child Maltreatment Data

Philadelphia Services Utilization Monitoring System (SUMS)
Substantiated Neglect Cases (1996 – 1999)
Indicated Abuse Cases (1996 – 1999)
Total Families (1996 – 1999)

Factors. Along with the independent variables described above, three "factors"

(social stress, structural decline, and neighborhood crime) were used in this study. The

factors were created by Gross and McDermott (2008) from Philadelphia archival data

originating with many diverse municipal departments, including public health, welfare,

police, fire, education, housing, and licensing. They performed an exploratory and

confirmatory structural analyses of geographically referenced administrative data

aggregated to the census-block group. Gross and McDermott distinguished multiple-

marker dimensions focusing on the degree of social stress experienced by people within

neighborhoods, the relative state of structural decline for the neighborhood environs,

and the measure of felony crime that affected each neighborhood. According to the

authors:

> The resultant dimensions avoided the limitations of measures that convert
> frequency data to percentages or rates, and the dimensions were weighted such
> that the differential contributions of the various markers were reflected in
> summative scores. Each of the three neighborhood dimensions was demonstrated
> to convey a substantial amount of reliable variability that was uniquely
> independent of the other dimensions. (p. 175 – 176)

The factors at a 2000 blockgroup level were obtained directly from the researchers who

created them. The three factors were an alternate means of examining neighborhood

variables and their relationship with animal maltreatment.

Analysis

The text version of the PSPCA data was converted to a coded file and geo-coded

according to street location within the city of Philadelphia using the above explained

methodology (using a 'street file,' the addresses provided by complainants will be

matched to a map location on the ArcView, GIS). Maps were produced demonstrating

the geographical distribution of animal neglect, animal abuse, and dog fighting within the

city. Point maps were produced showing each incidence of animal maltreatment. From

these point maps, density maps for each type of maltreatment were created. Maps of the

rates of animal neglect, animal abuse, and dog fighting (by number of households) in

each blockgroup were also produced. Finally maps were produced showing the

relationship between key neighborhood variables and animal maltreatment. (See

Appendix C).

Animal maltreatment was grouped into block groups (a grouping encompassing

several city blocks) and statistical analysis was performed looking for associations with

demographic, structural, and crime rate characteristics of each blockgroup. Bi-variate

correlations were run for animal abuse, animal neglect, and dog fighting and each

independent variable. To avoid multicollinearity with factors, two models were run for

animal abuse, animal neglect and dog fighting. The first model included the three factors

(crime, structural decline, and social stress) along with race and age distribution

characteristics of the blockgroup. The second model did not include the factors but did

include demographic, structural, and crime characteristics of each blockgroup. Because

the child maltreatment variables were in a different format (1990 block groups), they had

to be analyzed separately. Bi-variate correlations between animal abuse, neglect, and dog

fighting, median household income, and child abuse and neglect were performed. One

model was produced through linear regression for each type of animal maltreatment and

child maltreatment.

Chapter 3: Results

The PSPCA data set of reported animal maltreatment in Philadelphia, PA from

1996 – 2006 included over 31,000 reported cases, but not all cases fit into the

subcategories included under the macro-categories of abuse, neglect, or misuse. Some

cases did not have enough information to code. Other cases did not receive codes because

the report included only issues not included under the macro-categories of abuse, neglect,

or misuse (such as a barking dog, a dog at large, or a dead animal).

Across Philadelphia county from 1996 – 2006, of the 17,137 coded reports, the

most frequent type of reported animal maltreatment was animal neglect (15,537 – 91%)

followed by animal abuse (1,122 – 7%), and dog fighting (478 - 3%).

Each report may have included several subcategories of neglect or abuse. The

percentages of all reported subcategories of animal maltreatment are shown in Table 1.

Table 1: *Percent of Animal Maltreatment*			
Subcategory of Neglect	Percent of total Neglect (N = 22,446)	Subcategory of Abuse	Percent of total Abuse (N = 1,139)
No Water/Shelter	48	Physically Abused	84
No Food/ Thin	17	Other Cruelty	13
Filth	10	Shot	1
Tied Out	9	Poisoned	1
General Neglect	7	Hung	<1
Needs Medical Attention	6		
Neglect of Body	2		
Animal in Dangerous Situation	<1		

To determine a rate of animal maltreatment by blockgroup, each report was coded as positive or negative for the three types of maltreatment (abuse, neglect or dog fighting) and counted only once for each macro-category even if multiple subcategories had occurred in an incident. The three types of animal maltreatment examined in this study ((1)animal abuse; (2) animal neglect; (3) and, dog fighting) were individually summed for each Philadelphia blockgroup and then divided by the number of households in that blockgroup to create the three rates of different animal maltreatment for each blockgroup.

In the first level of analysis 5 block groups were outliers with unusually high rates of animal maltreatment (in some cases over 1). An examination of the GIS maps indicates that the outlier blocks were composed of a very high percentage of Philadelphia parks. Because of the reports of animal maltreatment in these parks, and the low number of households in the area of the parks, block groups composed of more than 90% of parks were removed from the analysis. Since the block groups are drawn around park boundaries, this eliminated only 5 block groups. In the resulting analysis, no blockgroup was composed of more than 80% park.

Animal abuse, animal neglect, and dog fighting appeared to all have a non random distribution across block groups, (See maps 1, 2, and 3), but for each type of maltreatment the rates per blockgroup were quite varied.

Animal maltreatment is a low base rate behavior. The lowest rate (reports by household) of animal abuse, animal neglect, and dog fighting was 0. The highest rate of

animal neglect, animal abuse and dog fighting were .38, .07, and .03, respectively.

Dog fighting and animal abuse are less common than animal neglect. (See table 2)

Table 2: *Rates of Reported Animal Maltreatment*				
		ABUSE	NEGLECT	DOGFIGHT
N	Valid	1777	1777	1777
	Missing	39	39	39
Mean		.0018	.0279	.0010
Median		.0000	.0211	.0000
Mode		.00	.00	.00
Std. Deviation		.00377	.02786	.00287
Minimum		.00	.00	.00
Maximum		.07	.38	.03

Correlates of Rates of Reported Animal Maltreatment

Bivariate correlations were run separately for each of the three dependent

variables (rate of reported animal abuse, rate of reported animal neglect, and rate of

reported dog fighting) and attributes of Philadelphia block groups (3 factors,

demographic characteristics, crime rates, and neighborhood variables). The 3 factors used

in this study (social stress, structural decline, and neighborhood crime) were created by

Gross and McDermott (2008) in an exploratory and confirmatory structural analyses of

geographically referenced administrative data aggregated to the census-block group in

which they identified three latent dimensions.

Regression models were also tested with each dependant variable. To avoid

multicollinearity, each dependant variable was run in a linear regression with factors and

demographic variables and then each dependent variable was tested in a linear regression

with crime statistics, neighborhood variables and demographic characteristics.

Reported Animal Abuse

Bivariate correlation of animal abuse. Animal abuse does not correlate robustly with structural neighborhood characteristics, but does correlate slightly with demographic and cultural characteristics.

Table 3a presents the independent variables with a significant relationship with rate of reported animal abuse in Philadelphia block groups. The two other forms of animal maltreatment (animal neglect and dog fighting) do significantly correlate with animal abuse.

As expected and predicted by PSPCA workers, cultural and demographic variables (such as percent Hispanic, percent of the population under 18, and percent under the poverty line) correlate most strongly with animal abuse. Percent below the poverty line correlates more strongly with animal abuse as opposed to the measure of median household income.

Types of crime such as burglary and graffiti also positively correlate with animal abuse, as does the overall crime factor. Unexpectedly, the rate of domestic violence does not significantly correlate with animal abuse.

Table 3a: *Bivariate Correlations of Animal Abuse reports*

Independent Variable	Pearson Correlation
Animal Neglect reports by household	.323 **
% Hispanic	.182 **
% of the population under 18	.181 **
% Income below 100% poverty	.175 **
% Income below 200% poverty	.159 **
% African American	-.158 **
Burglary Rate (by population)	.156 **
College graduate rate	-.116 **
Median Residential Price	-.116 **
Graffiti Rate (by population)	.103 **
Dog fighting reports by household	.101 **
% industrial properties	.100 **
% White	.098 **
Crime FACTOR	.097 **
African American % Change	.093 **
Median Household income	-.085 **
Hispanic % Change	.082 **
Robbery Rate by population	.080 **
% commercial properties	.079 **
Social Stress FACTOR	.078 **
Thefts by population	.078 **
% multi-family properties	-.072 **
% Gas Shutoff	-.063 **
Prostitution by population	.063 **
Aggravated assault by population	.060 *
Under 18 % Change	.052 *
Truancy by population under 18	.052 *

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Regression Model of animal abuse. The regressions model with the crime, structural

decline, and social stress factors included only demographic variables as controls to avoid

multicollinearity problems. When controlling for the crime factor in a linear regression on

reported animal abuse, the social stress factor becomes insignificant. When controlling for

percent Hispanic and percent under 18, the crime factor remained significant, but the strength of

the association is reduced. When controlling for percent Hispanic and percent under 18, the

structural decline factor unexpectedly switches direction, but percent Hispanic and percent under

18 remain significant. This model has a very low Adjusted R square, which means the model

explains very little of the variance of animal abuse in Philadelphia block groups. See Table 3b.

Table 3b: *Reported Animal Abuse with Factors*

Reported Animal Abuse				
	R	R Square	Adjusted R Square	Std. Error of the Estimate
	.236	.056	.054	.00366

	Unstandardized Coefficients		Standardized Coefficients	
	B	Std. Error	Beta	t
(Constant)	.001	.001		1.961
% Hispanic	.00002.776	.000	.124**	4.907
% under18	.00007261	.000	.178**	5.899
Structural Decline Factor	-.00005020	.000	-.129**	-3.929
Crime Factor	.00002472	.000	.065*	2.158

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

In a model without the 3 factors, but including crime, demographic, and structural variables, specific crime rates and poverty showed a significant relationship to animal abuse. With the introduction of poverty as a control variable, Hispanic was no longer significantly associated with reported animal abuse. In this model the percent gas shutoff and domestic violence rate correlates in the opposite direction as expected. This model also has a low Adjusted R square, which means the variable explains very little of variance of animal abuse in Philadelphia block groups. See table 3c.

Table 3c – *Animal abuse with crime, demographic, and structural variables*

Animal abuse			
R	R Square	Adjusted R Square	Std. Error of the Estimate
.379	.143	.140	.00350

	Unstandardized Coefficients		Standardized Coefficients	
	B	Std. Error	Beta	t
(Constant)	.000	.000		-.673
Burglary Rate	.00004041	.000	.177**	6.696
% under18	.00008295	.000	.201**	6.887
Domestic Abuse Rate	-.016	.002	-.270**	-8.680
Income below 100 poverty	.00004225	.000	.200**	7.216
Percent Gas Shutoff	-.00006340	.000	-.176**	-6.472
Aggravated Assault Rate	.00003652	.000	.161**	5.815
Median Residential Price	-.000000003101	.000	-.056*	-2.084

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Reported Animal Neglect

  Bivariate correlation of animal neglect. Animal neglect, correlates with income, demographic/cultural variables, and crime variables. Table 4a shows the independent variables with a significant relationship with rate of reported animal neglect in Philadelphia block groups.

  As expected and predicted by PSPCA staff, cultural and demographic variables (such as percent Hispanic and percent of the population under 18) correlate most strongly (directly) with animal neglect. Block groups with high rates of poverty also positively correlate with animal neglect, as expected. All three factors (crime, structural decline, and social stress) positively correlate with the rate of animal neglect. Types of crime such as arson, burglary and narcotic sale rates also positively correlate with the rate of animal neglect. Forms of structural decline such as percent of the properties where the water and gas has been shutoff and percent of the blockgroup with housing code violations also positively correlates with the rate of animal neglect. The rate of domestic violence (coded by the Philadelphia police department) in a blockgroup does significantly positively correlate with animal neglect, as expected.

Table 4a: *Bivariate Correlations of Reported Animal Neglect*

Independent Variable	Pearson Correlation
% Hispanic	.355 **
% under18 population	.353 **
Animal abuse reports by household	.323 **
College graduate rate	-.310 **
Median Residential Price	-.276 **
Income below 200% poverty	.257 **
Crime FACTOR	.248 **
Arson by population	.240 **
Median Household income	-.235 **
Median Year built	-.230 **
Income below 100% poverty	.229 **
Dog fighting reports by household	.211 **
Structural Decline FACTOR	.208 **
% industrial properties	.206 **
Burglary by population	.192 **
Social Stress FACTOR	.191 **
% multi-family properties	-.184 **
% Water Shutoff	.183 **
Under 18 % Change	.169 **
African American % Change	.163 **
Hispanic % Change	.162 **
Graffiti by population	.162 **
Domestic Violence by adult population	.161 *
Domestic Violence by population	.137 *
Median Rent	-.132 **
% commercial properties	.121 **
% Gas Shutoff	.115 **
Narcotic sale by population	.114 **
Owner Occupied Rate	.108 **
Robbery by population	.095 **
% African American	-.089 **
Aggravated assault by population	.086 **
Prostitution by population	.077 **
Narcotic possession by population	.061 **
% Housing Code Violations	.056 *
% Water Suspension	.053 *

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Regression model of animal neglect. When controlling for all three factors, the association between animal neglect and social stress becomes insignificant, but crime and structural decline stay significantly positively associated with animal neglect. When controlling for all factors and percent Hispanic and age distribution, crime and structural decline were significantly associated with reported animal neglect, but, unexpectedly social stress changes direction from positive to negative. Percent Hispanic, percent below 18, and crime stay significantly correlated to animal neglect. This model has a very low Adjusted R square, which means the variable explains very little of variance of animal neglect in Philadelphia block groups. See table 4b.

Table 4b: *Reported Animal Neglect with Factors*

Reported Animal Neglect			
R	R Square	Adjusted R Square	Std. Error of the Estimate
.488	.238	.237	.02434

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	-.003	.003		-.948	.343
% Hispanic	.000	.000	.252	11.114	.000 **
% under 18	.001	.000	.322	11.359	.000 **
Crime Factor	.000	.000	.157	5.500	.000 **
Social Stress Factor	.000	.000	-.139	-4.239	.000 **

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

In a model without the factors, but including crime, demographic, and structural variables, percent Hispanic, median year built, percent under 18, burglary rate, college grad rate, arson, median price, and aggravated assault all are associated with animal neglect and go in the expected, positive, direction, but the rate of domestic violence (as coded by the Philadelphia police) unexpectedly changes direction, as was the case for animal abuse. The adjusted R square of this model is a modest .318 which explains a larger fraction of the variance of animal neglect than the previous model. See table 4c.

Table 4c- *Animal Neglect model including crime, demographic, and structural variables*

Reported Animal Neglect			
R	R Square	Adjusted R Square	Std. Error of the Estimate
.567	.322	.318	.02478

	Unstandardized Coefficients		Standardized Coefficients	
	B	Std. Error	Beta	T
(Constant)	.176	.013		13.599
% Hispanic	.000	.000	.171**	7.519
Median year built	-.00008559	.000	-.265**	-12.673
% under18	.001	.000	.266**	8.967
Burglary rate	.000	.000	.141**	5.338
College graduate rate	.000	.000	-.119**	-4.420
Domestic violence rate	-.095	.013	-.196**	-7.137
Arson rate	1.217	.247	.118**	4.938
Median Residential Price	-.00000003234	.000	-.073**	-2.949
Aggravated assault rate	.000	.000	.062*	2.413

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Reported Dog Fighting

      Bivariate correlation of dog fighting. Dog fighting correlates with structural characteristics, income, demographic/cultural variables, and crime variables. Table 5a presents the independent variables with a significant relationship with rate of reported dog fighting in Philadelphia block groups.

      As expected the Structural decline factor as well as structural decline variables such as percent of properties whose water has been shutoff significantly correlate with the rate of reported dog fighting. As expected and predicted by PSPCA workers, cultural and demographic variables (such as percent Hispanic and percent of the population under 18) significantly correlate with dog fighting. Types of crime such as narcotic sale and arson rates also correlate with the rate of dog fighting, as well as the overall crime factor. Social stress is also associated with dog fighting.

Table 5a: *Bivariate Correlations of Dog Fighting*

Independent Variable	Pearson Correlation
% Water Shutoff	.269 **
% under 18 population	.263 **
Structural Decline FACTOR	.249 **
Income below 200% poverty	.245 **
Income below 100% poverty	.238 **
Animal neglect reports by household	.211 **
% Hispanic	.209 **
Domestic Violence by Adult Population	.183 **
Domestic Violence by Population	.183 **
College graduate rate	-.203 **
Crime FACTOR	.202 **
% white	-.195 **
Median Household income	-.186 **
Social Stress FACTOR	.185 **
Median Residential Price	-.174 **
% Housing Code Violations	.172 **
% Gas Shutoff	.163 **
Narcotic sale by population	.149 **
Arson by population	.132 **
% African American	.131 **
% multi-family properties	-.125 **
Animal Abuse reports by household	.101 **
% Water Suspension	.098 **
% industrial properties	.074 **
Median Rent	-.066 **
% Asian	-.063 **
Population % Change	-.060 *
Under 18 % Change	-.056 *

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Regression of dog fighting. This model has a very low Adjusted R square, which means the variable explains very little of the variance in dog fighting in Philadelphia block groups. Controlling for all factors, structural decline and crime factors are significantly related to dog fighting. When controlling for percent under 18 and percent

Hispanic, percent under 18, structural decline and percent Hispanic remain significantly

associated with dog fighting. See table 5b.

Table 5b: *Reported Dog fighting with factors*

Reported Dog Fighting				
	R	R Square	Adjusted R Square	Std. Error of the Estimate
	.312	.097	.096	.00273

		Unstandardized Coefficients		Standardized Coefficients	
		B	Std. Error	Beta	T
	(Constant)	-.002	.000	**	-6.926
	Percent under18	.00003948	.000	.127**	4.327
	Structural Decline Factor	.00004400	.000	.148**	5.335
	Percent Hispanic	.00002220	.000	.130**	5.301

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

With no factors, %Water Shutoff, %Hispanic, %under18, Arson rate, and Income

below 200% poverty correlate with dog fighting. This model also has a very low Adjusted R

square, which means the variable explains very little of variance of dog fighting in Philadelphia

block groups. See table 5c.[7]

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[7] As an additional test, bi-variate correlations and regression models were also tested on the dependent
variables and neighborhood factors from the Census database, NeighborhoodBase and CrimeBase at cenus
tract level of analysis (n=351). Bi-variate correlations and correlation coefficients in the regression models
were consistent in direction with the block-group analysis, but the results are not presented here because
additional analysis is needed to statistically transform some of the variables. It is suspected that the skewing

Table 5c: *Reported Dog fighting model including crime, demographic, and structural variables*

Reported Dog fighting			
	R	R Square	Adjusted R Square	Std. Error of the Estimate
	.335ᵉ	.112	.110	.00271

	Unstandardized Coefficients		Standardized Coefficients	
	B	Std. Error	Beta	t
(Constant)	.000	.000	**	-3.572
Percent Water Shutoff	.000	.000	.151**	5.228
Percent Hispanic	.00001649	.000	.096**	3.795
Percent under18	.00003008	.000	.096**	3.217
Arson rate	.077	.023	.078**	3.363
Income below 200 Percent poverty	.000008221	.000	.065*	2.161

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Child Maltreatment

Because the data set of indicated child abuse and substantiated child neglect in Philadelphia block groups (1997 – 1999) available to this researcher was coded for 1990 blockgroup units, the analysis of child maltreatment and animal maltreatment could not be combined with the crime, demographic, and structural variables used in the larger analysis.

of variables and the lower n in this analysis may have led to artificially high correlation coefficients. Further analysis is needed in future research on the census tract data. (Appendix D)

Bivariate correlation of animal and child maltreatment. Without controlling for other variables, the rate of animal abuse in a Philadelphia blockgroup does not significantly correlate with the rate of child abuse or neglect in Philadelphia block groups. The rate of animal neglect in Philadelphia block groups does significantly correlate with the rate of child abuse and neglect, but at such a small strength that it has little predictive value (.062, .057). The rate of dog fighting in a Philadelphia blockgroup does correlate with the rate of child abuse and neglect, but with a very small association (.095, .118). There is face validity to this analysis as the bivariate correlations with median household income go in the expected direction. See table 6a.

Correlation of animal and child maltreatment controlling for median household income. When controlling for median household income of the blockgroup, the relationship between child maltreatment and animal neglect becomes insignificant. When controlling for median household income of the blockgroup, the relationship of dog fighting with child abuse also becomes insignificant. Controlling for income also reduces the strength of the relationship between dog fighting and child neglect. Household income and child neglect explain less than 1% of the occurrence of dog fighting in a Philadelphia blockgroup. See table 6b.

Table 6a: *Bivariate Correlations of Child Maltreatment and Animal Maltreatment*

	Indicated Child Abuse	Substantiated Child Neglect	Median Household Income
Reported Animal Abuse	-.017	-.005	.000
Reported Animal Neglect	.062**	.057*	-.087**
Reported Dog Fighting	.095**	.118**	-.124**
Median Household Income	-.306**	-.336**	1
	N= 1743	N = 1743	N = 1796

** Pearson Correlation is significant at the 0.01 level (2-tailed).

* Pearson Correlation is significant at the 0.05 level (2-tailed).

Table 6b: *Dog Fighting Model*

R Square .026	Adjusted R Square .025	Std. Error of the Estimate.00359

Dog Fighting					
	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	.002	.000		7.801	.000**
Median Household Income	-.00000003501	.000	-.116	-4.567	.000**
Child Neglect Rate	.010	.003	.079	3.111	.002**

** Correlation is significant at the 0.01 level (2-tailed).

Chapter 4: Analysis and Discussion

This analysis will discuss 1) the research questions/hypotheses, 2) plausible rival explanations, 3) implications of findings for policy and practice, and 4) implications for future research.

Research Questions

The purpose of this study was to explore the community context of animal maltreatment and the possible link between animal and human maltreatment. Because animal maltreatment has not been studied from the neighborhood level of analysis using GIS methodology, this study was exploratory in nature.

The first research question was, "Does animal maltreatment occur evenly throughout the city of Philadelphia?" The maps of rates of animal maltreatment in Philadelphia show a non-random distribution. (See maps in Appendix C). Moreover, reports of each form of animal maltreatment (abuse, neglect, and dog fighting) appeared to be distributed differently. One important finding is that there are distinct types of animal maltreatment, so they should be analyzed and explained separately. Because of the differing definitions of animal maltreatment used in research, studies often mix the phenomena together as a dependant variable or ignore some forms of neglect altogether (Agnew, 1998; Arluke, Levin, Luke, & Ascione, 1999; Ascione, 2001; Kellert & Felthous, 1985). This study points to the need for more precise, evidence-based definitions of animal abuse and neglect.

Based on these findings, one type of animal maltreatment and the relationship to neighborhood factors were examined at a time. I looked at the bi-variate correlation, and

two models for each type of maltreatment. The second research question was, "what neighborhood factors are linked to a higher or lower rate of animal maltreatment?"

Animal abuse. Because of the strength of the correlation between animal abuse and structural, demographic, and cultural characteristics of the blockgroup is so low, this suggests that animal abuse may be better explained as an individual phenomenon than a behavior that is a function of neighborhoods. Therefore, while one can reject the null hypothesis that there is no relationship between animal abuse and neighborhood factors, the effect is so small that little to no predictive value exists. It would appear better to examine animal abuse as an individually driven behavior (not taking into account methodological limitations such as the surveillance explanation that will be discussed in the next section).

The correlations of reported animal abuse and demographic and cultural aspects of block groups may be stronger with improved data collection (discussed in the next section). For this reason, these correlations will be discussed in this analysis. Animal abuse, as I measure it, does not correlate robustly with structural characteristics, but does correlate slightly with demographic and cultural aspects of block groups.

The first animal abuse model suggests that a high crime neighborhood may lead to social stress, but it is the crime, not the stress, that seems to predict animal abuse (although with a very low strength). Hispanics and young people are more likely to live in neighborhoods with a high crime factor and it may be their presence, not the crime factor itself, that makes animal abuse more likely in a given blockgroup. Hispanics and young people are more likely to live in neighborhoods with structural decline. But when controlling for this, a surveillance effect may become apparent as neighborhoods

undergoing structural decline have fewer "eyes on the street" to observe and report animal abuse.

The second animal abuse model suggests that Hispanic blocks are more likely to be poor and it is the poverty of the block, not the racial makeup that makes animal abuse more likely. These models suggest that animal abuse is more likely to occur on poor blocks with a lot of children. Previous research on other criminal activity has found neighborhoods with large numbers of juveniles have higher rates of crime (Shaw & McKay, 1942). Perhaps blocks with a high percentage of juveniles make it more likely for differential association to occur and abuse to come out of peer association, peer pressure, and/or peer machismo of young adults. Poverty may be associated with animal abuse due to weaker ties to social norms.

Animal neglect. As predicted, animal neglect does correlate with demographic, cultural, and structural aspects of block groups. Therefore, we can reject the null hypothesis that there is no relationship between animal neglect and neighborhood factors. Neighborhood social disorganization may explain why animal neglect is correlated with income, demographic, cultural, and crime variables. Social disorganization is defined as an inability of community members to achieve shared values or to solve jointly experienced problems (Bursik, 1988). Without a shared value system regarding animal neglect, it is more likely to occur. A person living in a disorganized neighborhood may also have less time and or energy to adequately care for a pet and therefore neglects their animal. Again, social stress does not correlate directly with animal neglect in the multivariate model. Percent Hispanic positively correlates to animal neglect. Why being Hispanic is important in this analysis is discussed in a future section.

Dog fighting. As expected, dog fighting correlates with other forms of deviance, highly disorganized neighborhoods, and percent Hispanic. Dog fighting seems to be a crime of culture and opportunity. We can reject the null hypothesis that there is no relationship between dog fighting and neighborhood factors. There has to be a location to host a dog fighting event. Since dog fighting shows a correlation with indicators of abandoned houses in a given blockgroup, dog fighting seems to be a crime of opportunity and if the opportunity can be reduced, then the incidence of dog fighting may be reduced as well.

Human Violence. The second research question was "Does the rate of human maltreatment (non-intimate violence, domestic violence, and child abuse) correlate with the rate of animal maltreatment in Philadelphia neighborhoods? Unfortunately, due to financial limitations and the change of KIDS policies, the best variables to measure this phenomenon were not obtained for this study.

Domestic Violence. The rate of domestic violence available for this study was reports from the police department. Although that was the only measure of domestic violence available for this study, it is not a good measure of domestic violence. It was expected that there would be a positive correlation with any type of animal maltreatment (which there was), but these correlations changed direction when controlling for other factors. Because it is a muddy measure, domestic violence does not warrant further analysis. Better measurement is needed to use GIS because of small effect size.

Child Maltreatment. To test for validity, a known correlate (median household income) was included in the analysis of animal maltreatment and child maltreatment. Child maltreatment is negatively correlated with Median Household income, as would be

predicted. However, when controlling for median household income, I could not reject

the null hypothesis that there is no neighborhood association between animal

maltreatment and child maltreatment. By default, this would explain the reported

connected between animal maltreatment and child maltreatment as "a kind of person"

effect versus one explained by neighborhood factors.

The third research question was "Do neighborhood characteristics previously found to

be correlated with non-intimate interpersonal violence help us to understand where

animal and human maltreatment are linked?" This question could not be answered since

animal and human maltreatment were not shown to be linked on a community level in

this analysis.

Plausible Rival Explanations - Threats to Validity

Reported animal maltreatment. This study had some important limitations. The

data obtained through the PSPCA represent *reported* cases of animal maltreatment.

These data may severely under or overestimate the actual animal maltreatment problem

in Philadelphia. Thus the data may represent the propensity to report instances of animal

maltreatment as related to neighborhood demographic/social factors. However, this

limitation is typical of projects examining the occurrence of criminal behavior (as well as

child maltreatment and domestic violence), when the dependent variable is measured

using official report data.

An uncontrolled surveillance effect is a plausible rival explanation for these

results. People may be more likely to report maltreatment in neighborhoods where the

maltreatment is visible, for example where houses are closer together or where back

yards or lots are not hidden by fences. Also, the annoyance of a barking dog may lead to

false reports of animal maltreatment in the hopes that involvement of authorities will remove the nuisance. There is anecdotal evidence to suggest that people use calls to authorities in cases of neighbor disputes (Stokoe, 2003). Also, animal abuse may be reported less often than animal neglect because abuse may be more likely to happen behind closed doors. Animal abuse is less likely to show obvious effects, while some acts of animal neglect by definition are visible to neighbors (for example leaving a dog outside with no shelter or tied short.)

No Precise Denominator. A limitation to this study is the lack of data on the number of animals per block group in Philadelphia, which may lead to under or overestimation of the comparative rates of animal maltreatment. Attempts were proposed to use existing survey data (American Veterinary Medical Association, 2007; Pew Research Center, 2006) that give general rates of pet ownership by income level and race to adjust rates of animal maltreatment by probable rates of pet ownership, but this was not deemed possible for this study[8].

Without a denominator (the number of dogs or pet animals in a blockgroup), the results may be due to the amount of pet ownership per blockgroup, and not the actual rate of animal maltreatment. However that possibility is less likely because studies of animal ownership show lower rates of pet ownership among poor and Hispanic families (Pew Research center 2006).

In a Pew Research center survey (2006) more whites (64%) than Hispanics (39%) or blacks (30%) have a pet. More whites (45%) than Hispanics (26%) or blacks (20%) have a dog. There is also an income skew to pet ownership: nearly seven-in-ten (69%) of

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[8] Personal communication with Steven C. Marcus, PhD, Research Associate Professor SP2

adults with an annual family income of $100,000 or more had a pet, compared with fewer than half (45%) of adults with an income below $30,000. Since these two neighborhood factors are positively correlated with each other (poorer, more Hispanic neighborhoods show higher rates of animal maltreatment) this concern is lessened, but not eliminated.

PSPCA location. The PSPCA is located in the middle of an area of high reported animal maltreatment in an Hispanic neighborhood. Although interviews with PSPCA workers indicate no reason that PSPCA location should effect reporting of animal maltreatment or detection, there may still be an unexplained effect.

Poor measures and limited data. Domestic violence as coded by the police as a measure of IPV or even all domestic violence is also a limitation. Calls to the police are limited as a measure of IPV because they severely underestimate the actual incidence. The child abuse data were only available in 1990 blockgroup form, so no controls other than household income could be used in the analysis. With more controls and better measurement of these variables, it is possible relationships could be found.

Assumptions of independence violated. All GIS research violates the assumption of independence because block groups close to each other are likely to affect each other. This threat to validity is noted as a plausible rival hypothesis to this study.

Implication of findings for policy and practice

According to this analysis, holistic animal maltreatment interventions are unlikely to be effective because each phenomenon (abuse, neglect, misuse) is different. Strategies should be targeted based on type of maltreatment. However there is a positive correlation between different types of maltreatment, so SPCA workers should be aware that the

existence of one form of maltreatment may make it more likely that another form of maltreatment exists in a blockgroup.

Animal Abuse. There is little correlation between the rate of animal abuse in a blockgroup and that block group's neighborhood characteristics, suggesting that animal abuse may be more a "kind of person" phenomenon as opposed to a behavior created by neighborhoods. However animal abuse is correlated with percent under 18 of a blockgroup along with percent Hispanic. Interventions may be more successful if focused on younger groups of people such as in school or community centers or in Hispanic neighborhoods (to be addressed in more detail in the Hispanic section below).

Animal Neglect. The confirmed preponderance of animal neglect cases in the data make animal neglect more deserving of interventions than is currently allowed. Currently, much of the animal protection communities' resources are dedicated to animal abuse. As in the case of child welfare, neglect, the most common form of maltreatment, is neglected. This research would support the idea that poor, Hispanic neighborhoods should be targeted for humane education campaigns and animal neglect should be heightened in the awareness of the animal protection community.

Dog fighting. To reduce dog fighting, there should be an effort to reduce places where dog fighting can occur, specifically abandoned houses. Dog fighting seems to be partly a crime of opportunity and if the opportunity can be reduced, then the incidence of dog fighting may be reduced as well.

Hispanic Issue. I can't overlook correlation of animal neglect with the percent Hispanic of the blockgroup, but the discussion is delicate in nature, especially since correlation is not causation. Catholicism has a history and culture of the disregard of

animal welfare at best and an acceptance of cruelty to animals at worst. For example, Catholic teaching states that animals don't go to heaven, don't have souls, and are created to serve human beings (Serpell, 1996). It is also taught that humans do not have a moral duty to animals (1996). Hispanics are steeped in this environment and this may be one of the reasons for the correlation of animal maltreatment with Hispanic neighborhoods.

Humane education in predominantly Hispanic schools (simple lessons on animal care, for example) may be beneficial in reducing some forms of animal maltreatment. In Puerto Rico it is normative to keep a pet dog outside, however winters in Puerto Rico are not dangerous to dogs. In Central and South American communities, dogs do not necessarily belong to one owner but rather are allowed to roam freely and are fed and cared for by multiple community members (Possa & Baderb, 2007). In schools it may be beneficial to start with questions like how many of you keep dogs in the back yard? A discussion about what this means in terms of dog care and being outside in the cold can then result.

University of Pennsylvania veterinary students focus humane education where they assume rates of animal maltreatment will be highest. They assume that visiting poor underserved, under resourced communities (which tend to be AA communities), would be the best use of their resources. The assumption of poor AA neighborhood correlating highest with animal neglect is not supported by this data; instead it may be more beneficial to target Hispanic neighborhoods for humane education programs designed to prevent neglect.

Appropriate use of resources. There is value in maps to observe and monitor the density distribution of animal maltreatment. This could be a valuable new approach for

urban communities looking to deploy scarce resources. GIS is an opportunity to focus on at risk blockgroups and target interventions to take advantage of cultural and other factors. No community wants to be identified as cruel to animals. Humane associations could talk to residents, schools, priests, and store owners in communities with high rates of animal maltreatment and tackle the problem at a community level. PSPCA staff could go to animal maltreatment hotspots and investigate what it is about those neighborhoods that make them different than other neighborhoods. For example, upon investigation of an animal maltreatment hotspot, they may find that there is a feral cat problem, and an intervention could be targeted to remove or spay/neuter the cat population in that area. These kinds of data could also be used to monitor the effectiveness of intervention strategies over time, but we need better measurement.

Cross reporting. Certainly reports of any maltreatment, regardless of the victim, should be made by all professionals to the agency responsible for the protection of the victim. If a child abuse worker sees animal maltreatment they should be mandated to report (this may increase detection of animal maltreatment and also lead to better data collection). If a PSPCA worker sees child maltreatment they should be mandated to report. The debate is about whether it would be advantageous to report maltreatment to agencies that protect other victims, for example seeing animal maltreatment as a risk factor for child maltreatment, or removing a child from a home where animal abuse is founded. This study is unable to offer information on this topic since the lack of a community link between animal maltreatment and child maltreatment does not preclude the link among individuals, however it does offer some caution in policies and advocacy campaigns that link human and animal violence in all arenas.

Patterson-Kane & Piper (2010) critique studies claiming to show clear associations between animal abuse and human abuse. They state that:

> An (over)emphasis on the danger that animal abusers pose to humans serves to assist in achieving a consensus that animal abuse is a serious issue, but potentially at the cost of failing to focus on the most common types of abuse, and the most effective strategies for reducing its occurrence. Nothing in this review and discussion should be taken as minimizing the importance of animals as frequent victims of violence, or the co-occurrence of abuse types in 'at risk' households. However, given the weakness of the underlying data, emphasizing the indiscriminate dangerousness of all animal abusers may have unforeseen and unwanted consequences. (p. 589)

In fact, according to Patterson-Kane & Piper (2010) the link is being misused, putting advocacy above truth. In Michigan a man was required to register as a sex offender after he was convicted of sodomizing a sheep, not because the sheep was accorded status as a victim of sex crime, but on the apparent assumption that: *"once out of prison, he could prey on children or vulnerable adults"* (Patterson-Kane & Piper, 2010, p. 609). The Chicago Crime Commission (a citizens' group formed to combat crime) have recently turned their attention to the links: *"An important part of our anti-violence strategy includes strict enforcement of the dogfighting statutes ... [Dogfighting] is directly connected to the violent world of gangs, drugs and weapons"* (Arkow, 2005). The data in the current study do not support the conclusion that the overall association between animal abuse and child abuse works at a community level. The data in the current study also suggest that the connection between dog fighting and other kinds of crime, while significant, is not as strong as advocates may lead the public to believe.

Policy change for data collection and census. Questions about pets should be added to the census. The American Pet Products Association and the American Veterinary Medical Association do surveys of stratified random samples, but it's just a

hint of the actual rate of pet ownership. Without good information about pet ownership, studies of animal maltreatment are limited. Census information about pet ownership could help in many areas, not just the study of animal maltreatment. A dangerous dog controversy currently exists about certain breeds, Pit Bulls for example. Without more knowledge of pet ownership, it can not be determined if Pit Bulls bite more often or the higher number of Pit Bull bites is due to the number of Pit Bulls in a given neighborhood.

Improving data collection of animal maltreatment and providing software to shelters would greatly improve the understanding and interventions into animal maltreatment. (Standardizing categories for common data collection software will be discussed in the next section in more detail.) A pet insurance company currently markets to shelters by donating data collection software. In exchange, shelters provide information on pet insurance to pet adopters. Therefore, there is clearly some need in the field for this software. Training on the data software would also be important since the software is of no use if shelter staff do not use it correctly.

Implications for Future Research

Standardize categories for common data collection software. In an ideal world, data would be collected in a more organized fashion. Reports of animal maltreatment would be collected with a standardized coding system in electronic database systems in all SPCA's and shelters all over the US. The software could be preformatted so that shelters all over the world would be collecting the same data in the same format. Differences could then be compared between urban/rural populations, areas of the country, even different countries.

The coding system should include the subcategories of maltreatment used in this study along with information on both humans and animals. Different forms of maltreatment have different frequencies and distributions across Philadelphia and different subtypes of maltreatment call for different interventions and policy decisions. Therefore, it is important to collect data with codes for the specific type of maltreatment. Information on the results of the call is important as well. Was the report investigated? If so, was it found to be credible and if so what action was taken? This information is crucial to eliminate cases of neighbor disputes (especially reports of non maltreatment reports like barking dogs).

More household information is needed to distinguish who the perpetrator is in the household. With more perpetrator information, researchers could drill down to an individual level. This study found that some forms of animal maltreatment may be better individually explained, so it could show up in any neighborhood. If researchers knew the age/race/gender of the abuser, they could answer more refined questions and possibly test the relationship between animal maltreatment and human maltreatment at an individual level. This could lead to answers to currently debated policy questions like, "Do young people that abuse animals need to be reported to human services?"

More information is also needed on animals to distinguish types of maltreatment. If we knew more information about the animals being abused, we could answer important questions. For example, there is currently a dangerous dog controversy which could be informed by this data. We could also better understand what types of animals are most at risk for maltreatment.

Table 1*: Data Collection Chart*

Animal Information	Human Information
- Subcodes for types of abuse and neglect used in this study (See Appendix A)	- Is the perpetrator the owner of the animal?
- The type of animal and breed of dog	- Does the perpetrator live in the address of the maltreatment?
- Is the animal a stray or pet?	- The gender of the perpetrator
- Does the animal live in the address of the maltreatment?	- The race of the perpetrator
- dogfighting (place of fight or where dog is kept)	- The age of the perpetrator
- Code for hoarding (should be distinguished)	- The number of adults and children in the home
- pit bull research (can't say what breed)	- Was the report investigated (founded or unfounded)

Denominator. Future research could be improved even without national census changes. For example, a citywide telephone survey of pet ownership would be useful in a citywide study of animal maltreatment.

Hotspot Research. GIS analysis had identified block groups that are relatively high in animal maltreatment. Ethnographic research could investigate those animal maltreatment hotspots and explore what it is about those neighborhoods that makes them different than other neighborhoods. Researchers could talk to residents, schools, teachers, priests, store owners. This could provide invaluable information about this animal maltreatment and possibly its relationship to neighborhood factors and human violence.

Conclusion

The low correlation between animal abuse and neighborhood factors in this study suggests that animal abuse may be better explained as an individual phenomenon than a

behavior that is a function of neighborhoods. However, animal neglect does correlate with demographic, cultural, and structural aspects of block groups suggesting social disorganization may lead to animal neglect. This study also suggests that dog fighting is a crime of opportunity, as dog fighting correlates with indicators of abandoned properties.

This study is unable to demonstrate a community link between animal maltreatment and child maltreatment, which does not preclude the link among individuals. The findings suggest caution in policies and advocacy campaigns that link human and animal violence in all arenas. However, there is a need for better data collection in the area of animal maltreatment. With better data collection and future research, a more refined understanding of the phenomenon of animal maltreatment and its connection to human violence may be revealed.

Appendix A: CODING SHEET

SPCA DATA SECTION
Case Number
Date complaint received (by phone, letter, or in person)
Zip Code
Street Address
Nature of incident (in text form)

CODING SECTION

Subcategories of NEGLECT	Description
No water/ shelter	No water or no shelter
Filth	Filthy Conditions. Animal's environment is slovenly. Dog waste. Odor.
No Food/ Thin	Emaciated/ Not Fed. Includes both thin animals and no food where housed.
Neglect of Body	Neglect of Body, Matted, filthy, infested with fleas, etc.
General Neglect	Other/ General Neglect; Leaving animal in yard while away for days at a time. Large number of animals in slovenly conditions. Animal left out in extreme heat all day. Can be due to owner in hospital, deceased or some other situation beyond control. 'General Neglect' is a complicated subcategory; it also includes those cases where the complainant claims the owner is neglecting their animal, when no other details are provided.
Tied Short	(Short Chain Animal is chained in yard, alley, etc. Short chaining dogs is illegal, long chaining is not. Note that it is illegal in Pennsylvania to tie an animal on a leash shorter than 2 feet.
Animal in Dangerous Situation	This subcategory includes instances in which an animal is housed in a situation that may result in bodily injury; animals in burnt out houses or on roofs are included in this category. Yards strewn with automotive parts or other dangerous debris are coded.
Need Medical Attention	Need Medical Attention. From gaping wounds to possible mange, to hit by car. Owner does not seek medical advice.

Subcategories of ABUSE	Description
Physically Abused	Physically Abused, Beaten, as reported by the complainant.
Shot	Animal shot; included (shooting stray cats and squirrels).
Poisoned	Poisoned
Hung	Hung
Other Cruelty	Other Cruelty

Subcategories of MISUSE	
Dog Fighting	Dog Fighting; Complainant reports owner is using animal for fighting.
Aggressive Animal	Attacks or threatens neighborhood (pets, children, adults). From growling over fence to chasing and biting children.
Cock Fighting	Cock fighting
Dog kept in an abandoned house	Housed in an abandoned house. Often related to fighting. Children often store fighting dogs in abandoned yards.

Action Taken Codes	
Other Authorities Involved	Animal control or some other authority is notified. Police, sanitation police, SPCA (animal signed over to the shelter). Most often Animal Control or animal is signed/seized by shelter.

Convicted of Abuse	Convicted of Abuse
Citation	Citation

Miscellaneous Codes	
Animal Type	1 Dog; 2 Cat; 3 Bird; 4 Exotic; 5 Horse; 99 Unknown
Noise	Noisy animals (barking, crying, wining, bird chirping).
Mess of yard	Complainant calls due to nuisance of dog.
At large	Off lead, roaming
Abandoned	Animal permanently abandoned at reported address.
Dead	A dead animal is reportedly on the property. Can be due to a variety of circumstances.
Multiple animals	(greater than 2) on site
Hoarding	Hoarding of animals (greater than 10)
Pit Bulls	Pit Bulls reportedly involved in the complaint.
Stray cats fed	Stray cats fed. This is against the law in Pennsylvania.

Appendix B: Data Dictionary

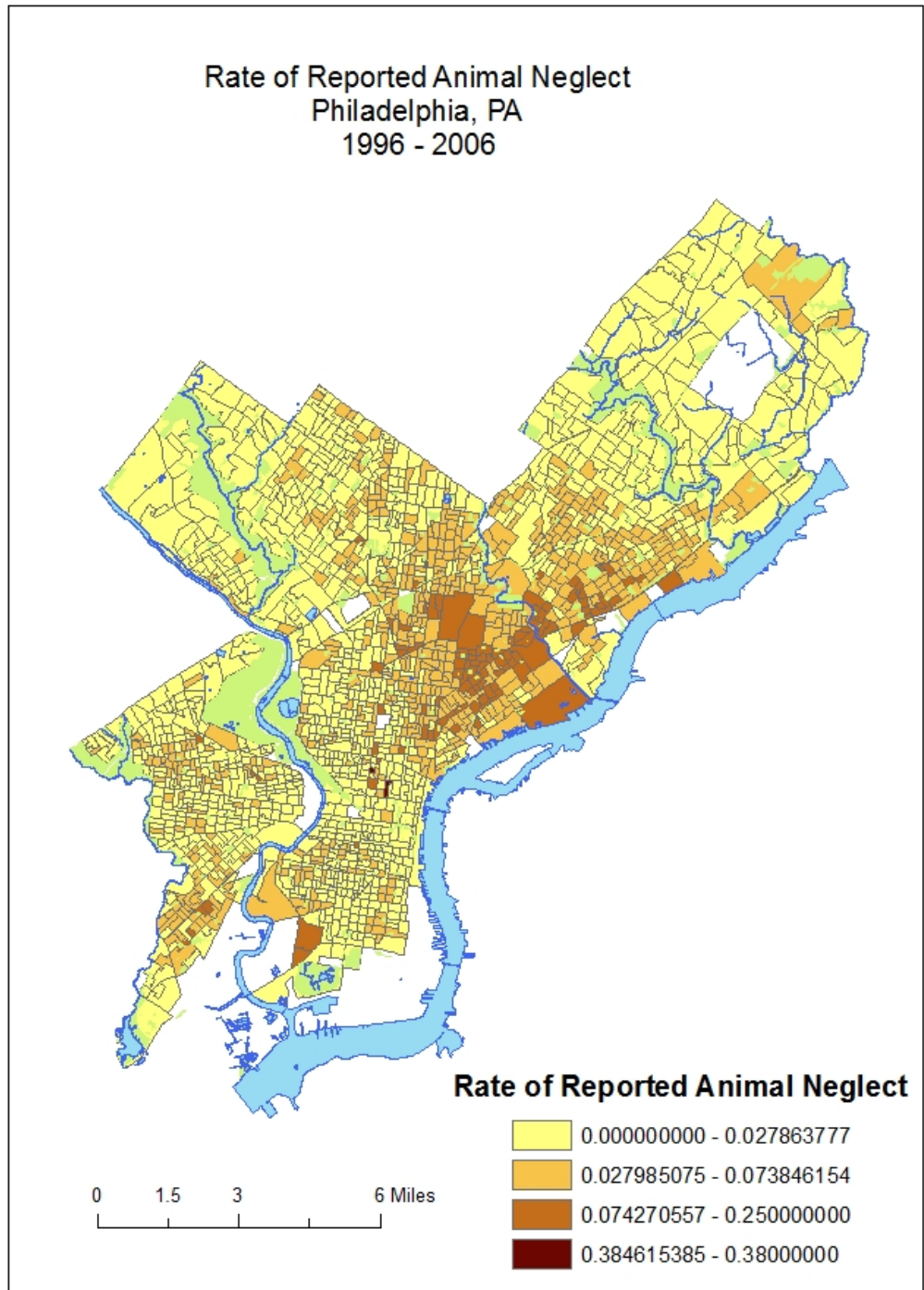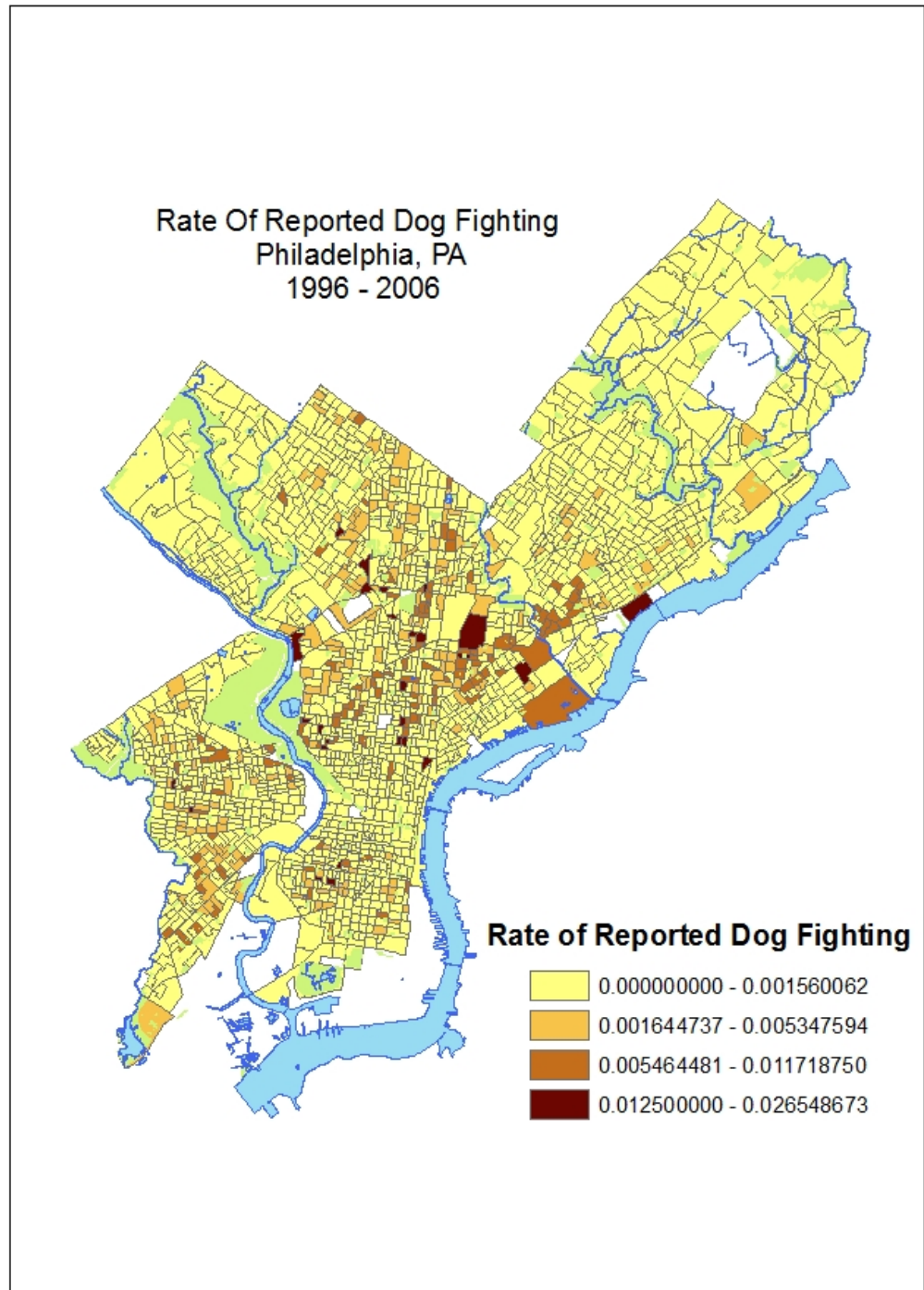| Variable Name	Source	Description
Animal Abuse by household	PSPCA / 2000 census	Number of animal abuse (Supercategory) reports by total households
Animal Neglect by household	PSPCA / 2000 census	Number of animal neglect (Supercategory) reports by total households
Dog fighting by household	PSPCA / 2000 census	Number of dog fighting reports by total households
Crime Factor	Gross, K. S., & McDermott, P. A. (2008)	Administrative data aggregated to the census-block group
Social Stress Factor	Gross, K. S., & McDermott, P. A. (2008)	Administrative data aggregated to the census-block group
Structural Decline Factor	Gross, K. S., & McDermott, P. A. (2008)	Administrative data aggregated to the census-block group
% White	2000 census	Percentage of total population that is White in 2000
% African American	2000 census	Percentage of total population that is African American in 2000
% Hispanic	2000 census	Percentage of total population that is Hispanic in 2000
% Asian	2000 census	Percentage of total population that is Asian in 2000
% of the population under 18	2000 census	Percentage of total population that is under 18 years of age in 2000.
% Gas Shutoff	Neighborhoodbase/ Philadelphia Gas Works	Percentage of Philadelphia Gas Works-serviced properties that have been shut-off for at least an entire winter. (4/1/1999)
% Water Shutoff	NeighborhoodBase/ Philadelphia Water Department	Percentage of Philadelphia Water Department-serviced properties that have had water service shut-off. "Shut-off" indicates service is disconnected due to water and sewer bills that have not been paid and outstanding delinquent charges.
% Water Suspension	NeighborhoodBase/ Philadelphia Water Department	Percentage of Philadelphia Water Department-serviced properties that have had water service suspended. "Service suspended" indicates that billing has been suspended at the property because water is not being used due to an uninhabitable building.
% Gas Shutoff	NeighborhoodBase/ Philadelphia Gas Works	Percentage of Philadelphia Gas Works-serviced properties that have been shut-off for at least an entire winter. (4/1/1999)
% Housing Code Violations	NeighborhoodBase/ Licenses	Percentage of total number of

	and Inspections	properties that have open housing code violations from Philadelphia Licenses and Inspections.
Owner Occupied Rate	2000 census	Percentage of housing units which are owner-occupied in 2000.
% Residential properties	NeighborhoodBase / Board of Revision of Taxes	Percentage of total tax assessed properties that are residential.
% Commercial properties	NeighborhoodBase / Board of Revision of Taxes	Percentage of total tax assessed properties that are commercial.
% Industrial properties	NeighborhoodBase / Board of Revision of Taxes	Percentage of total tax assessed properties that are industrial.
% multi-family properties	NeighborhoodBase / Board of Revision of Taxes	Total number of properties that are apartments or hotels.
Median Residential Price	NeighborhoodBase / Board of Revision of Taxes	Median residential sales. (Residential properties are defined as Detached, Semi-Detached and Rowhouse building types)
Median Rent	2000 census	Median gross rent in 1999.
Median Year Built	2000 census	Median year structure built.
White % Change	NeighborhoodBase/ 1990 census/ 2000 census	Net change in number of White people from 1990 US Census to 2000 US Census.
African American % Change	NeighborhoodBase/ 1990 census/ 2000 census	Net change in number of African American people from 1990 US Census to 2000 US Census.
Hispanic % Change	NeighborhoodBase/ 1990 census/ 2000 census	Net change in number of Hispanic people from 1990 US Census to 2000 US Census.
Asian % Change	NeighborhoodBase/ 1990 census/ 2000 census	Net change in number of Asian people from 1990 US Census to 2000 US Census.
Population % Change	NeighborhoodBase/ 1990 census/ 2000 census	Percent change in total population from 1990 to 2000.
Under 18 % Change	NeighborhoodBase/ 1990 census/ 2000 census	Net change in number of children under 18 years of age from 1990 US Census to 2000 US Census
Truancy by population under 18	CrimeBase/ Philadelphia Police	Truancy (3129) (Source: police)
Burglary by population	CrimeBase/ Philadelphia Police	Burglaries (500 series) Rate per 1,000 population
Robbery by population	CrimeBase/ Philadelphia Police	Robberies (300 series) Rate per 1,000 population
Thefts by population	CrimeBase/ Philadelphia Police	All Thefts (600 series) Rate per 1,000 population
Prostitution	CrimeBase/ Philadelphia Police	Prostitution (1600 series)
Arson by population	CrimeBase/ City of Philadelphia Fire Department	Percentage of total fires on property which were determined to be started with willful and malicious intent (determined after investigation by the Fire Marshall.)
Graffiti	CrimeBase/ Philadelphia	Graffiti (Source: police)

	Police	
Aggravated assault by population	CrimeBase/ Philadelphia Police	Aggravated Assaults (400 series) Rate per 1,000 population
Narcotic Possession	CrimeBase/ Philadelphia Police	Narcotics Possession (1821-1827)
Narcotic Sale	CrimeBase/ Philadelphia Police	Narcotics Sales/ Manufacturing/ Delivery (1801-1817)
Domestic Violence	CrimeBase/ Philadelphia Police	Domestic Abuse (3303-3305)
Child Neglect 1996 -1999 (1990 block groups)	SUMS	Substantiated Neglect Cases (1996 – 1999)
Child Abuse 1996 - 1999 (1990 block groups)	SUMS	Indicated Abuse Cases (1996 – 1999)
Median Household Income (2000)	2000 census	Median household monetary income in 1999.
Median Household Income (1990)	1990 census	Median household monetary income in 1989.
% below 100% poverty	2000 census	Percentage of total population living in households with income below 100% of poverty level in 2000.
% below 200% poverty	2000 census	Percentage of total population living in households with income below 200% of poverty level in 2000.
College graduate rate	2000 census	Percentage of total population 25 years or older whose highest level of educational attainment is a college Bachelor's Degree, in 2000.
High School diploma Rate	2000 census	Percentage of total population aged 25 years or older whose highest level of educational attainment is a high school diploma or equivalent, in 2000.
Number of Households (2000)	2000 census	Total number of households in 2000.
Number of Households (1990)	1990 census	Total number of households in 1990.
Population	2000 census	Total population in 2000.
Population under 18	2000 census	Percentage of total population that is under 18 years of age in 2000.
Population over 18	2000 census	Percentage of total population that is over 18 years of age in 2000.
Families (1996 - 1999)	Sums	Total Families in blockgroup (96-06)

Appendix C: **Reported Animal Maltreatment Maps**

Rate of Reported Animal Abuse
Philadelphia, PA
1996 - 2006

Rate of Reported Animal Abuse

	0.000000000 - 0.001901141
	0.001915709 - 0.006079027
	0.006172840 - 0.013745705
	0.014084507 - 0.066666667

0   1.5   3   6 Miles

Rate of Reported Animal Neglect
Philadelphia, PA
1996 - 2006

Rate of Reported Animal Neglect

	0.000000000 - 0.027863777
	0.027985075 - 0.073846154
	0.074270557 - 0.250000000
	0.384615385 - 0.38000000

0   1.5   3   6 Miles

Rate Of Reported Dog Fighting
Philadelphia, PA
1996 - 2006

Rate of Reported Dog Fighting

0.000000000 - 0.001560062
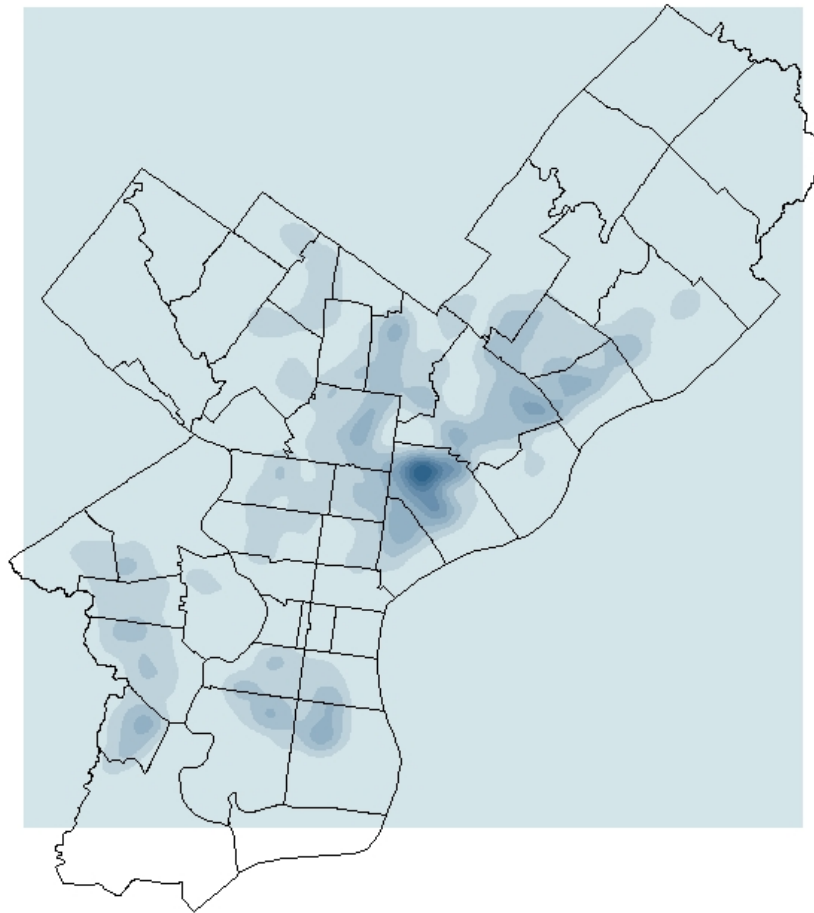0.001644737 - 0.005347594
0.005464481 - 0.011718750
0.012500000 - 0.026548673

Animal Maltreatment Point map – Philadelphia, PA 1996 - 2006

Animal Maltreatment
Philadelphia PA
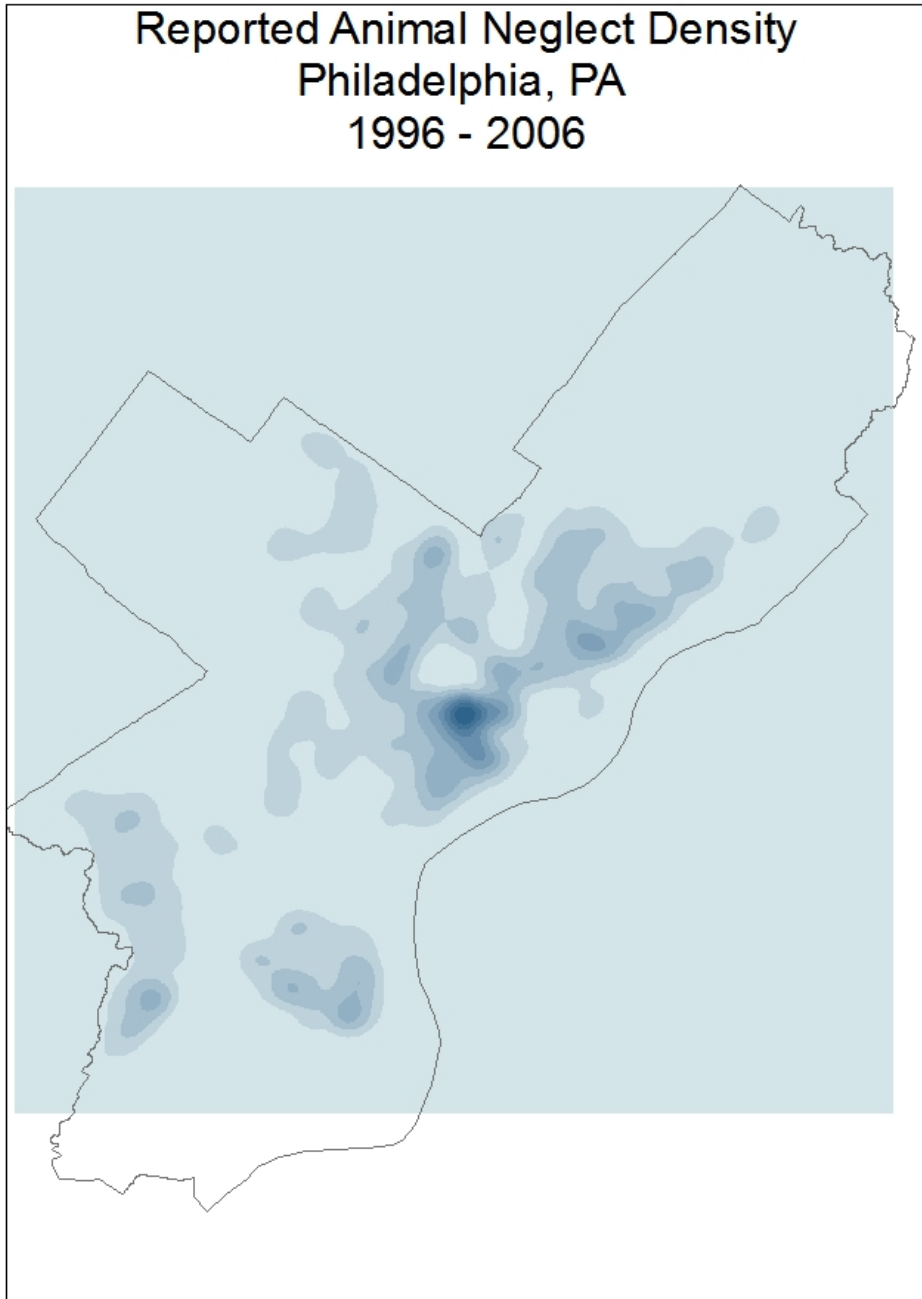1996 - 2006

PSPCA REPORTS

- Abuse
- Neglect
- Misuse
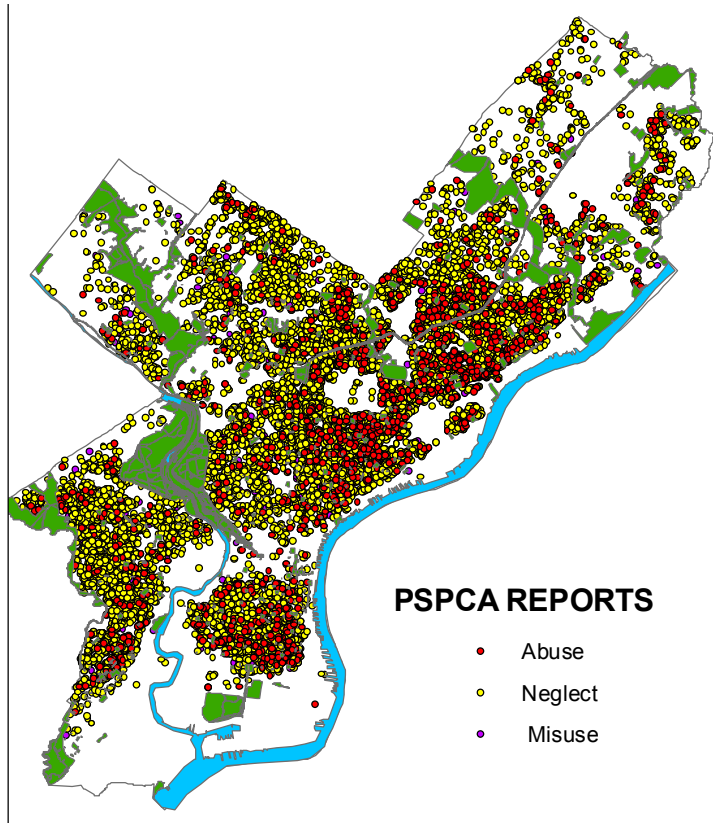
Density of Reported Animal Maltreatment
Philadelphia, PA, Zipcodes
1996 - 2006

Reported Animal Abuse Density
Philadelphia, PA
1996 - 2006

Reported Animal Neglect Density
Philadelphia, PA
1996 - 2006
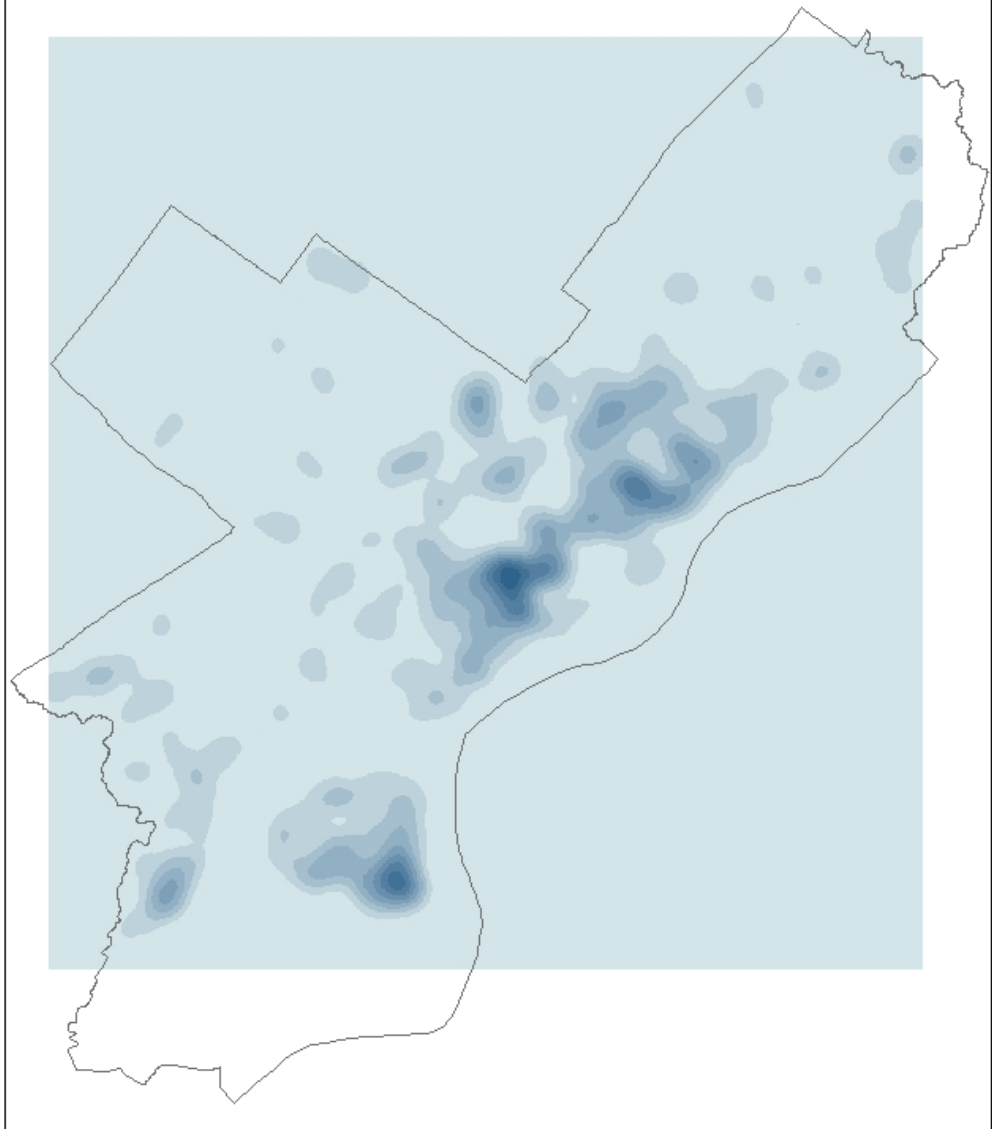
APPENDIX D: Bi-Variate Correlations (Philadelphia Census Tract)

	Animal Abuse rate	Animal neglect rate	Dog fighting rate
Animal abuse rate		.717**	.300**
Animal neglect rate	.717**		.490**
Dog fighting rate	.300**	.490**	
Domestic violence rate		.219**	.378**
Prostitution rate		.140**	
Assault rate	.210**	.338**	.385**
Robbery rate		.163**	.165**
Burglary rate	.268**	.230**	.134*
Theft rate			
Median rent	-.184**	-.301**	-.289**
Median year built	-.218**	-.340**	-.268**
% housing code violations			.405**
Mean price	-.256**	-.437**	-.365**
% tax delinquent		.237**	.420**
% water shutoff		.317**	.515**
% water suspension			.324**
% population change			-.166**
% African American change	.327**	.332**	
% Hispanic change	.363**	.453**	
% White change			.174**
% African American	-.238**		.290**
% Asian			-.130*
% Hispanic	.336**	.520**	.374**
% White	.144**		-.385**
% Under 18	.349**	.617**	.536**
Median household income	-.205**	-.323**	-.351**
% under 100% poverty	.207**	.386**	.528**
% under 200% poverty	.254**	.482**	.561**
High school diploma rate	.271**	.346**	.124*
College Graduate rate	-.313**	-.560**	-.455**

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

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