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An Examination of Community-Level Correlates of Animal Welfare Offenses and Violent Crime in Finland

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Abstract
There is very little research that provides a truly sociological assessment of the structural correlates of animal crime. There is also no comparative, community-level research on animal crimes in countries other than the U.S. In this exploratory study, we examine correlates of animal crime across Finland. Taking advantage of Finnish data on reported animal crime for 294 municipalities over a 10-year period, we (1) compare community-level predictors of violent and animal crime and (2) examine whether there is a relationship between violent crime and animal crime. While several economic, structural, and cultural variables are related to violent crime, we find that poverty is a common correlate of both violent and animal crime in Finland. We also find that, in contrast to the U.S., violent crime and animal crime are not related in Finland at the community level. We discuss implications for future research and the ways animal crime differs in the U.S. and Finland.

Keywords Animal crime · Violent crime · Finland

Introduction

The problem of animal crime has largely been ignored within the discipline of sociology. Historically, studies of animal cruelty took an individualistic approach to the problem, treating it as the product of some kind of psychopathology and conveying interest only when the animal violence in question escalated to violence against humans. Policy, law enforcement, and funding responses to animal crime reflect a similar sentiment: animal crime is rarely considered a social problem unless it is linked to human crime. Even with the recent decision by the Federal Bureau of Investigation (FBI) to collect data on animal cruelty under the National Incident Based Reporting System (NIBRS), the rhetoric around the decision is clear, with The National Sheriffs' Association, one of the leading advocates of the FBI initiative, describing animal cruelty as a "gateway crime" (National Sheriffs' Association, 2018).

This connection between animal crime and human violence is important, and has been empirically documented, especially within families and through the lens of polyvictimization, which describes the ways in which animal abuse may be both a precursor to and consequence of spousal and child abuse (Ascione et al., 2003; Baldry, 2003; DeGue & DiLillo, 2009; Thompson & Gullone, 2006). However, broader patterns of animal crime and their structural roots have been under-examined (Bierne, 2002). Fortunately, recent research has sought to correct this oversight, and there are now a handful of studies addressing the sociology of animal crime. These studies have examined the sociodemographic characteristics of animal abusers, as well as structural correlates of rates of animal abuse (Burchfield, 2016; Hughes et al., 2020; Levinthal, 2010; Mowen & Boman, 2020; Reese et al., 2020; White & Quick, 2019). Significantly, this research suggests that some of the leading sociological explanations of human violence, including social disorganization theory, may also help explain animal crime. In this exploratory study, we compare a set of macro-level correlates of violent and animal crime in Finland, and examine whether there is a relationship between rates of violent crime and animal crime.

Background

Much of the research in the field of human-animal studies concerns our awareness of the many benefits that animals

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bestow on humans. However, the question of how animals are useful *to* humans reflects the anthropocentrism that often leads to animal exploitation and abuse by humans. Recent critical studies of human–animal relationships examine how our treatment of animals is socially and spatially constructed (Philo & Wilbert, 2000; Yarwood & Evans, 2000). Specifically, those animals that we define as companions are encountered often, come into our homes, and are afforded relatively better care. Those animals that we define as commodities or tools exist at a geographic and emotional distance, as does their suffering (Gibbs, 2021; Philo & Wilbert, 2000). Thus, much of what we know about animal cruelty is shaped by a construction of animals that prioritizes some animals and defines their suffering as more problematic than others (Gibbs, 2021). Although a full examination of the complex and contradictory relationships between human and non-human animals is beyond the scope of this paper, this critical approach is useful to ground our understanding of the ways in which our definitions of animals in turn shape our definitions of animal cruelty and crime.

The study of animal crime is further complicated by a lack of data that reflects its neglect within the science of criminology as well as the criminal justice system. Although laws against animal cruelty have been in place since the 1800s, as recently as 40 years ago, Bryant (1979) criticized criminologists and sociologists for ignoring the "zoological connection," and for tending to "ignore, or to neglect (some critics might say deservedly so) the influence of animals, or their import for, our social behavior, our relationships with other humans, and the directions which our social enterprise often takes (p. 399)." The reason for this ignorance may be because, as Flynn (2012) argues, violence toward humans is seen as more important; few cases of animal abuse are ever reported; and animals, as victims, cannot speak for themselves. Perhaps most challenging to a sociology of animal crime is the perception that crimes against animals, particularly companion animal abuse, are seen as isolated, individualistic incidents. National crime reports and survey data challenge that assumption. The FBI NIBRS data previously mentioned collected data on 1100 instances of animal cruelty in 2016; in 2017, that number more than doubled to 3200, or one for every 33,000 people; by 2019 that number was up to 9956. Data from the only nationally representative survey to measure lifetime prevalence of animal cruelty reveal 1.8% of U.S. adults have admitted to such acts (Vaughn et al., 2009). Extrapolating this to the U.S. population, that is almost 6 million Americans. Specifically, those who reported a history of animal cruelty were more likely to be young, male, African-American, Native-American, Asian, native born, and have lower levels of income and education. There were no differences reported between those who lived in urban versus rural areas, although the reported prevalence of animal cruelty is higher in Western regions of the U.S. Animal cruelty was also less likely among those who had never married, compared to married, widowed, or divorced individuals. Antisocial behaviors, including bullying, as well as more serious violent offenses, including robbery and assault, were more common among those with a history of cruelty to animals. Animal cruelty was also associated with higher rates of psychiatric disorders, alcohol use, gambling, and a family history of antisocial behavior (Vaughn et al., 2009). These statistics are not without their limitations; namely, FBI data only capture official police reports of animal crime, and survey data are influenced by sampling strategy. In general, most studies of animal cruelty are biased toward what might be considered "(1) socially unacceptable, (2) intentional or deliberate, and/or (3) unnecessary" abuse of *companion* animals (Agnew, 1998, p. 179). Estimates of the extent of animal abuse thus often exclude the vast numbers of animals harmed or killed by hunting, factory farming, and animal experimentation, or those impacted by wildlife trafficking and poaching (Agnew, 1998; McFann & Pires, 2020).

The "Link"

Despite the pervasiveness of animal abuse and its relationship to a range of social-demographic variables, much of what we know about animals and crime has come from the field of psychology, specifically a framework commonly referred to as the "link," which initially described the relationship between violence against animals and human violence as unidirectional and causal (Ascione, 1993; Flynn, 2001). Empirically, there is a lot of evidence that supports the "link," demonstrating that animal abuse is associated with other forms of violence (see DeMello, 2012; Flynn, 2012). Many of these studies rely on clinical samples or surveys of incarcerated individuals and find that violent criminals often report more animal cruelty in their childhood than non-violent criminals or non-criminals (Ascione, 2005; Douglas et al., 2008; Kellert & Felthous, 1985; Tallichet & Hensley, 2004; Verlinden et al., 2000; Wright & Hensley, 2003). More recent studies examining the "link" reveal its complexity, suggesting the relationship between animal cruelty and human crime is bidirectional, and not specific to human violence. This research supports a deviance generalization hypothesis; that is, offenders who commit animal crime engage in a wide range of offenses, both violent and non-violent, suggesting they are generalists, rather than specialists, committing a variety of offenses over time that happen to include animal crime (Arluke et al., 1999; Burchfield, 2018; Degenhardt, 2005; Piquero et al., 2003; Walters, 2013).

There are some criticisms of the "link" framework, including its solely individualistic framework, its failure to consider the origins of the initial animal abuse, the pathways

connecting it to human violence, and whether the relationship is causal or due other underlying mechanisms (Flynn, 2012; Patterson-Kane & Piper, 2009). Thus, sociologists have begun examining the social nature of animal crime within the context of family and peer socialization (see Hensley & Tallichet, 2005) and neighborhood social disorganization (see Levinthal, 2010; White & Quick, 2019), and whether and how the abuse of animals is similar to or different from other crimes (see Burchfield, 2018; Walters, 2013). Importantly, these studies have helped to define the social and structural predictors of animal crime, as well as identify those predictors that are also related to human crime. A brief review of this recent research will summarize the role that socialization processes and social structural factors may have in influencing animal crime.

Socialization and Animal Crime

Though progress has been made in recent decades, there are very few truly sociological studies of animal crime, and even fewer theories that speculate about whether and how the social structure contributes to variation in rates of animal crime. Agnew's (1998, p. 194) social-psychological theory of animal abuse points to the role that early childhood and peer socialization play in animal abuse, suggesting that children may model the abusive behavior they witness being committed by adults and other role models. Children may be exposed to beliefs and behaviors that, at least implicitly, support animal abuse. For example, from an early age, many children witness adult role models kill and consume animals, justify or ignore animal cruelty, or engage in direct acts of abuse towards animals (Agnew, 1998). Frequent exposure to violence leads to the belief that violence is an available response to a perceived threat or means of punishment. Moreover, early childhood socialization experiences conducive to violence may mediate the relationship between sociodemographic characteristics and perpetration of animal abuse.

Research has shown that children and adolescents who witness animal cruelty are more likely to later be the perpetrators of it, consistent with social learning theory (Baldry, 2003; DeGue and DiLillo, 2009; Gullone & Robertson, 2008; Shahinfar et al., 2001; Thompson & Gullone, 2006). A study in Russia and Ukraine, where the prevalence of animal abuse is much higher than in the U.S., also found support for social-learning processes, particularly for men (Hughes et al., 2020).

Social Structure and Animal Crime

Beyond individual and micro-level processes, there is an emergent, but limited number of studies that examine how community context is related to rates of animal crime. These studies are informed by social disorganization theory, which describes the local neighborhood as an important context for the social control of crime and deviance (Sampson et al., 2002). According to this theory, structural disadvantages like poverty, unemployment, and segregation weaken cultural consensus and informal social control, leading to higher rates of crime and violence (Bursik & Grasmick, 1999; Sampson et al., 1997; Warner, 2003). Most of this research on animal abuse is based on data from the U.S., a society characterized by high levels of inequality, lethal violence, and highly segregated disadvantaged urban neighborhoods (Peterson & Krivo, 2010; Sampson & Wilson, 1995). It is possible that social disorganization theory is not as applicable in a rural context, like much of Finland. Critical criminologists have suggested that rural communities exhibit their own form of organization which may actually facilitate some types of crime (Donnermeyer & DeKeseredy, 2008). However, many of the structural predictors of crime utilized in the social disorganization framework have received support in studies of rural crime (Bouffard & Muftić, 2006; Li, 2011; Moore & Sween, 2015; Osgood & Chambers, 2000). Likewise, many of these same structural predictors have received support in recent studies of animal crime.

Levinthal (2010) used data from the Pennsylvania Society for the Prevention of Cruelty to Animals to examine the relationship between animal crime and age composition, poverty, and other crime rates across urban neighborhoods. This research revealed that these neighborhood variables predicted animal abuse, though with very limited explanatory power. In another study using data from police reports of animal crime in Chicago neighborhoods, Burchfield (2016) found that animal crime was more prevalent in economically disadvantaged and racially segregated communities, with high rates of violent and property crime. A separate study examining companion animal welfare in Chicago revealed that neighborhoods with high rates of poverty and crime also reported the highest number of calls for stray animals, animal bites, animal cruelty, and animal crime arrests (Fischer, et al., 2010). Another study using social disorganization theory to examine animal cruelty in Detroit found that neighborhood structural conditions, including economic stress, vacant housing, neighborhood blight, and rates of murder, were correlated with police reports of animal cruelty, and better explained animal cruelty than individual-level variables (Reese et al., 2020). Finally, White and Quick (2019) examined animal cruelty in Virginia Beach, Virginia, applying social disorganization theory to the block groups of this suburban city. Consistent with the other research cited here, they found block groups with higher levels of social disorganization, operationalized as a factor including economic disadvantage, ethnic heterogeneity, residential mobility, family disruption, as well as disorder, had higher rates of animal cruelty. Animal cruelty was also positively related to

aggravated domestic assaults (White & Quick, 2019). It is worth noting that all of these studies utilized official crime reports, which may underestimate the true extent of animal crime and more accurately reflect the subjective nature of police arrest decisions.

In addition to the few studies that attempt to correlate structural variables to rates of animal crime, Fitzgerald et al. (2009) examined the effects of slaughterhouse employment on surrounding communities and found that it was associated with increased rates of arrest for violent crime, rape and other sex offenses, more than other comparable industries. They argue for a "Sinclair" effect whereby the institutionalized support for violence and the abuse of animals might spillover to the surrounding community. In this way, it may be that higher rates of societal animal violence are "linked" to broader forms of violence against humans.

Little comparative criminological research on animal crime has been conducted using data from other countries and geographic contexts. We now turn to the Finnish case, to provide some perspective on animals in Finland, and how the crimes against them may be similar or different from animal crime in the U.S. Finland, as an advanced Nordic social-welfare democracy, is characterized by comparatively lower levels of crime and inequality, has a national policy designed to protect animal welfare, and has uniform data on animal crime, and thus provides a unique opportunity to examine the effects of community-level predictors.

Animal Crime in Finland

Regarding the role of animals in Finland, statistics indicate that fewer homes have companion animals there, compared to the U.S. According to the Household Budget Survey of 2016, around 31% of Finnish households had a pet, most often dog and cats. However, over 65% of US households have at least one pet (American Pet Products Association, 2020). Like in the U.S., Finnish families with children are more likely to own pets than those without children. It is suggested that the prevalence of pets, particularly dogs, in Finnish culture reflects a transition from rural to urban life that has characterized Finnish population change over the last 50 years. Despite the move toward urbanization in Finland, farmers are more likely to have pets compared to other types of animals, and pets are more common in rural areas compared to urban areas. However, in recent years, there has been an increase in the popularity of pets, partly linked to rising levels of wealth and leisure. The role of a pet has increasingly come to resemble that of a family member, much like in the U.S. In addition, much like the U.S., spending on pet products in Finland has increased more than spending on any other area of leisure in the recent years (Nurmela, 2014).

At the same time, Finland's livestock economy has also undergone a major structural shift in the last several decades. While the number of farms has declined rapidly, the size and automation of farms has increased (Statistics Finland, 2016). In the beginning of the 1990s, there were about 65,000 livestock farms in Finland, whereas in the early 2010s the number was around 20,000. At the same time, the number of larger farm animals, like cattle and pigs, has decreased, while the number of poultry has increased dramatically (Natural Resources Institute Finland, 2021).

In Finland, the issue of animal welfare began to be discussed in the first half of the nineteenth century (Nieminen, 2001). Finland's first animal welfare association was established in Turku in 1871. Its activities were aimed at improving the treatment of cattle, horses and other animals used for human benefit. Shortly thereafter, in 1874, the Helsinki Animal Protection Society was established. For its first year of operation, the Helsinki Animal Protection Society employed its own prosecutor, who remained in post until the end of 1886. The role of the prosecutor was to bring criminal charges against any individual suspected of committing an offence against an animal. Later, the Animal Protection Society had a special animal protection police officer at its service, tasked with carrying out inquiries and taking the necessary measures based on notices received by the Animal Welfare Protection Society.

The right of certain animals to live without being needlessly maltreated was first laid down in Finnish law in an Imperial decree of 1864, which provided for fines for intentional maltreatment of an animal. If a person was unable to pay the fine, they would be sent to jail. However, this decree provided protection only for animals that someone owned. The decree was transferred into the Penal Code of Finland in 1889, and at the same time, the threat of punishment was intensified so that a maximum sentence of 3 months in prison could be imposed for the offence. In 1914, the provision was extended to protect all animals, whether someone owned them or not. The protection of animals in Finland is now primarily provided for under the Animal Welfare Act (AWA), which is a framework of laws applicable to all animals that contain detailed provisions on the keeping and treatment of animals, providing additional protection for them.

In Finland, animal welfare inspections are carried out by an animal welfare authority, usually a municipal veterinarian. The authority's primary task is to give instructions to enhance the welfare of the animal and to correct faults. However, the AWA provides that if the animal welfare authority suspects that animal welfare regulations have been violated, it must notify the police without delay. The criminal procedure for an animal welfare offense begins based on such notification, or when police themselves observe non-compliance (Koskela, 2021).

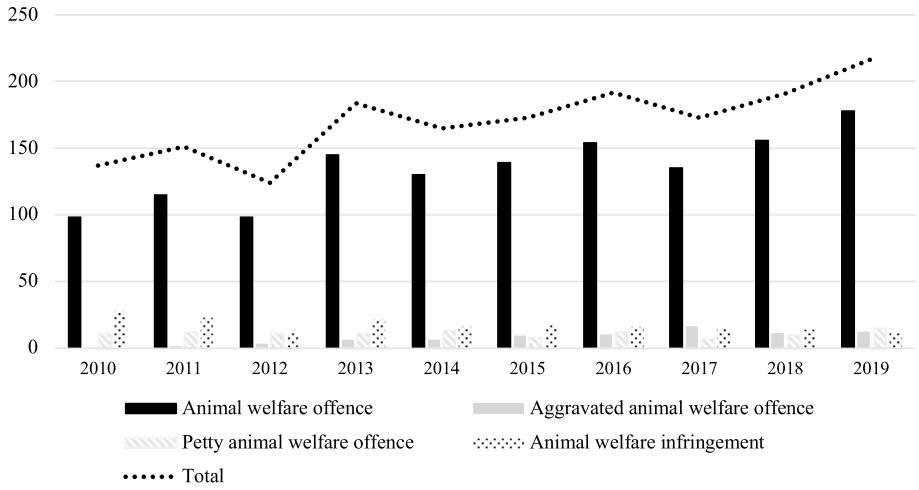

Fig. 1 Animal welfare offenses in Finland, 2010–2019

The number of animal welfare inspections has increased significantly from 2007 to 2019. In particular, there has been an increase in the number of inspections on pets. The increase in inspections is based on the establishment of surveillance veterinarian posts in Finland under the Veterinary Care Act, established in 2009. This law obliges municipalities to set up posts for those veterinarians whose role it is to monitor animal welfare. Generally, farm animals were most often the subject of inspection, but starting in 2013, pets became target of inspections. A study of district court judgements in animal welfare cases (Koskela-Laine, 2012) found that about 53% of cases involved pets, 41% involved farm animals, and 6% wild animals.As expected, cases involving farm animals were somewhat more common in less densely populated rural areas, while cases involving pets were more common in urban areas.For both pets and farm animals, municipal veterinarians give advice and instructions to the owner or possessor of the animal. The number of urgent measures, such as removal or euthanasia of the animal, taken to protect pets and farm animals is quite low, though both have increased since 2011.

Criminal offenses against animals are characterized by the infliction of unnecessary suffering, pain and agony on an animal intentionally or gross negligence. The essential elements of animal crime vary depending on the species, the breed, and the use of the animal. The provisions concerning cruelty towards animals are regulated mainly in the Criminal Code. These provisions are split into three types of offenses to be described below: animal welfare offences, aggravated animal welfare offences, and petty animal welfare offences. Animal welfare infringement, the least severe form of animal crime, is regulated separately in the AWA. All have generally increased over the last decade. Figure 1 shows the trend in the number of animal welfare offenses in Finland.

The Present Study

Building on the limited macro-level research in the U.S., we (1) compare macro-level predictors of violent and animal crime in Finland, and (2) examine whether there is a relationship between violent crime and animal crime. Examining predictors of animal crime in Finland provides a unique opportunity to make comparisons with findings from U.S. studies, while also offering certain methodological advantages because of the availability of nationwide data over a 10-year period for a large number of municipalities, including a range of predictor variables not available in U.S. data. We explore the potential effects of a wider range of structural, cultural, and civic engagement variables than previously examined. In particular, based on insights from social disorganization theory, we examine the effects of variables that indicate the potential for formal and informal community control of violent and animal crime. According to social disorganization theory, crime and disorder is reduced when there is a higher degree of community involvement and cohesion which facilitates social control (Markowitz et al., 2001). Our analyses include macro-structural variables drawn from social disorganization theory and prior criminological research, including gender and age composition, poverty, population density, and family disruption, as well as variables related to alcohol consumption and animal welfare.

We are especially interested in the ways in which community social control is affected by structural conditions, including economic disadvantage and family disruption. Disadvantage affects crime not only directly, but indirectly through lowered civic engagement and participation, and through frustration and hostility, often expressed in interpersonal violence (Bernard, 1990).Similarly, in communities where economic disadvantage is higher, residents may feel greater stress and strain, and thus may perpetuate higher

rates of animal crimes, as hostility is 'taken out' on animals (Parfitt & Alleyne, 2016).

We employ the percent who vote in municipal elections as an indicator of civic engagement.Voting reflects the extent to which residents care about, and are willing to act in ways that affect local conditions. While civic engagement as measured by voting has generally been linked to less crime (Coleman, 2002; Lee & Bartowski, 2004; Weisburd et al., 2014)), we are interested in whether similar processes hold for animal crimes. Residents in more engaged communities may, for example, be more willing to report visible animal abuse and neglect. We will also be able to examine whether these effects are generalizable to Finland, where voter turnout is generally higher than in the United States, but where voting is also associated with socioeconomic factors such as income and social class (Martikainen et al., 2005).

Moreover, communities with a greater share of family disruption, as measured in this study by single-households, divorce and child welfare cases, may have more violent and animal crime because of less informal and formal social control at the family and community-level; that is, these communities are expected to experience a lowered capacity for effective supervision and a weaker-density network of persons willing to share information with each other and authorities when instances of abuse or neglect are known (Sampson & Groves, 1989; Sampson et al., 1999).

We also examine the effects of alcohol consumption because of its relationship to violent crime and animal cruelty. Alcohol consumption has long been associated with violent crime (Parker & Auerhahn, 1998). This may be because of the disinhibiting effects of alcohol; however, some studies also suggest that the availability of alcohol, especially to adolescents, is associated with less informal and formal social control (Fagan, 1990). Further, in the only nationally representative survey to measure animal cruelty, with one item asking about lifetime incidence of cruelty to animals, lifetime alcohol abuse was strongly associated with animal cruelty (Vaughn et al., 2009).

The final set of variables we examine are related to the opportunity to commit animal crime. Numerous studies have documented the widespread mistreatment of companion animals in the home, particularly when other forms of abuse are present (Nelson, 2010); ironically, this dynamic appears to be due to pets' role as "family member" thus marking them as another vulnerable victim of family violence (Pallotta, 2019). However, recent community-based studies also suggest that the presence of pets may have a positive effect on communities, providing opportunities for neighborly interaction and the exchange of social capital (Wood et al., 2005). Based on prior criminological research, the number of farms and farm animals present in a community provides not only a "suitable target" but also might perpetuate the cultural spillover discussed by Fitzgerald et al. (2009) whereby farm animal cruelty permeates violence in the community.

Methods

Data

Our data include reported animal crimes and predictor variables in 294 municipalities over a 10-year period (2010–2019), with very little missing data, yielding a strongly-balanced, municipal-level panel dataset with a total of 2940 observations. Following other research on crime in Finland, we exclude the municipalities associated with the autonomous Åland Islands region. The municipalities are served by 11 police-districts. All data were obtained from Sotkanet and Statistics Finland.

Our approach is informed by Savolainen (2005), who examined the effects of community-level variables on crime across Finnish municipalities. Because Finland is a smaller country, municipalities are the contexts in which community dynamics of crime and crime-controlling forces operate. Municipalities are responsible for administering a range of social services and community safety programs. While victimization surveys are limited, crime data for each of the municipalities is consistently recorded. Savolainen (2005) examined the effects of a range of ecological variables on crime, including education, percentage of young males, unemployment, marital status, percent immigrant, and alcohol use. We include these variables, but add several additional ones, that may be relevant for community control of both violent and animal crime.

Measures

Crime

There are four categories of *animal crimes* reported, 'animal welfare offenses', 'aggravated animal welfare offenses', and 'petty animal welfare offenses.' Animal welfare offenses include cruel, violent, or neglectful behavior towards animals that causes suffering. Less common are aggravated offenses that are exceptionally cruel, on a larger scale, or committed for financial benefit. Also less commonly reported are petty offenses (e.g., comparatively minor, yet physical, punishment, or unclean living conditions). For each of these offenses, we computed the rate per 1000 persons in each municipality. Because there are a much smaller number of aggravated and petty offenses compared to more commonly reported 'animal welfare offenses', we focus on

those in our analyses.[1] *Violent crime rate* includes the total number of assaults, rapes, robberies, and homicides (per 1000 persons) in each municipality. The majority of violent crimes reported are assaults (Savolainen, 2005).

Predictor Variables

Following theory and research related to social disorganization, macro-level crime research in Finland, and the limited community studies of animal crimes in the U.S. (Burchfield, 2016; Huhta, 2012; Levinthal, 2010; Reese et al., 2020; Savolainen, 2005; White & Quick, 2019), we consider the effects of several variables. These include *percent of males between ages of 15 to 29* in each of the municipalities. It is well-established that young men are disproportionately involved in violent crime. Although Finland has comparatively lower levels of economic inequality relative to many other developed nations, there is still significant variation in levels of socioeconomic status. We include one socioeconomic status indicator. *Poverty risk* is the percent of persons living in households with less than 60% of the median disposable income. Other structural variables include *population density* as measured as the number of persons per square kilometer. On one hand, crime tends to be higher in more densely populated areas; on the other hand, a higher density may provide greater chances for animal crimes to be seen by others and possibly reported. Since about 42% of animal welfare offense convictions (and 56% of aggravated offenses) involve mistreatment in farming and livestock operations (Koskela-Laine, 2012), we examine effects of *number of farms* per 1000. *Percent voting in municipal elections* is an indicator of civic engagement. In line with social disorganization theory, areas with higher levels of civic engagement may have less crime. We also examined the effects of *percent divorced* among those aged 25–64 per 1000 married persons of the same age and percent of *single-person households*. Areas with a greater share of family disruption and single-person households may have lowered levels of ties that could weaken crime control.

We also include a number of additional variables shown to be related to violent or animal crime. *Alcohol consumption* is measured by annual number of liters per person sold. Alcohol intoxication is a common characteristic of persons arrested and macro-level research indicates that higher alcohol sales are associated with violent crime across communities in Finland (Savolainen, 2005). *Child welfare cases* represent the percent of children (under age 17) who are placed in foster care. This serves as an indicator of the extent of abuse and neglect of children, which may be associated with other serious violence and animal crimes. *Percent of pet-owning households* for each municipality are derived from survey estimates of pet-ownership in major regions throughout Finland, with each municipality assigned the estimate from the region in which it is located. Pet ownership is an indicator of the opportunity to commit animal crimes.

Table 1 Descriptive statistics ($N = 2942$)

	Mean	Overall SD	Between SD	Within SD
Violent crimes	5.530	2.371	2.558	1.513
Animal crimes	.107	.192	.077	.176
Males 15 to 29	7.605	1.417	1.339	.469
Poverty Risk	14.543	4.091	3.941	1.121
Density	59.181	231.374	231.578	8.366
Farms	25.795	18.272	18.179	2.118
Divorce	13.891	5.266	3.550	3.915
Alcohol sales	6.978	4.760	4.730	.593
Child welfare cases	1.042	.545	.526	.223
Voting	62.220	5.501	5.305	1.485
Pet ownership	32.668	2.944	2.518	1.532
Single households	39.262	5.879	5.726	1.373

Analysis Plan

First, we report descriptive statistics for all study variables and trends in animal and violent crimes across the study period. We then estimate a series of fixed effects (maximum likelihood) and random-effects (generalized least squares) multiple regression models for the partial relationships between each of our predictor variables and animal and violent crime rates, noting differences between the crime types and between the different estimation techniques. One of the advantages of fixed effects models is that they take into account unobserved heterogeneity and time-invariant differences across municipalities, and estimate the net effects of predictor variables on within-unit, over-time variation (Allison, 2009).[2] By controlling for municipal-level differences in fixed effects models, this takes into account stable differences in the type of municipality—particularly whether the community is urban vs. rural. However, because

[1] We examined how our results differed by using rates per 1000 households and per 1000 pet-owning households, based on estimates of the number of pet-owning households across major regions in Finland. Because the number of households, pet-owning households, and persons are highly correlated, our results are very similar for each of the measures, thus we present the results of analyses using rates per 1000 persons for direct comparability with violent crime.

[2] Because there were many municipalities without any reports of animal crime, we also estimated the animal crime equations using procedures for count variables (e.g., Poisson regression). The results were very similar to those we present that allow for direct comparison of effects of predictors of both types of crime, in the same metric.

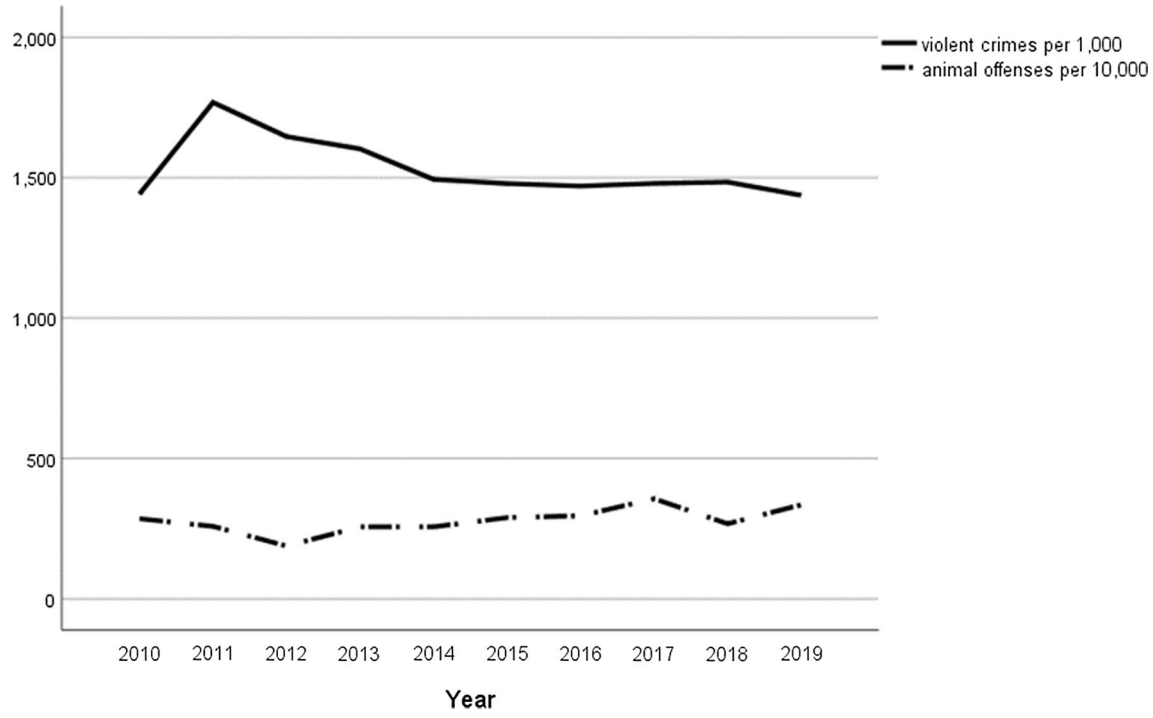

Fig. 2 Violent and animal crimes in Finland 2010–2019

the variation, or changes in some predictor variables across time within the municipalities, is modest, and differences in crime rates are also likely to be due to differences between municipal units, we also estimate random effects models (Bell & Jones, 2015). The random effects model provides estimates of the effects of the predictor variables that are a weighted average of the within and between-unit effects. This allows us to better examine the effects of time-invariant variables, including population density and number of farms, which reflect urban–rural differences in the level of animal crime. However, the random effects model assumes that unmeasured causes of the dependent variable are uncorrelated with the other independent variables. This is a tradeoff—by estimating fixed effects, we can only explain within-municipality variation, but in an unbiased way (Clark & Linzer, 2015). By estimating random effects, we are able to capture between-municipality variation, but run the risk of some bias in our parameter estimates. Because our analysis is exploratory in nature, we present estimates from both types of models and compare their results.

Results

Descriptive statistics for all variables are shown in Table 1. Figure 2 shows the trend in the rates of reported violent and animal crimes over the study years.[3] Here, we see that rates of reported animal welfare offenses are substantially lower than violent crimes. Although it is impossible to estimate the true extent of animal crime, research suggests that detection or reporting is far less likely to occur, compared to interpersonal violence (Ascione, 2008). In general, after an uptick in violent crime around 2011, it has been declining since. At the same time, since 2012, reported animal crimes in Finland have increased somewhat. A closer inspection of regional differences shows that violent crime rates are somewhat higher in the most 'urban' area of Helsinki-Uusimaa compared to the other areas, where rates are comparatively lower (such as Ostrobothnia and Western Uusimaa). For animal crimes, however, the situation is somewhat reversed, with rates higher in more rural Ostrobothnia, but lower in the Helsinki-Uusimaa district.

Initial variance components analysis shows variation in violent crime rates is mostly due to differences between municipalities (60%), while only 16% of the variation in animal crime is between-municipality. Moreover, variance components analysis also shows that for our predictor variables, the higher proportion of variance is generally between municipalities, with somewhat smaller over-time variation within municipalities. Thus, we estimate both fixed and random effects models, allowing us to consider the effects of predictor variables on variation in crime rates within and between municipalities (Allison, 2009). A table with correlations among all study variables is shown in Appendix 1. Examination of regression diagnostics indicated that there

[3] Because the number of animal crimes are substantially lower than violent crimes, they are rescaled per 10,000 for visual clarity.

Table 2 Multiple regression equations

	Violent crime		Animal crime	
	(1)	(2)	(3)	(4)
	β fixed	β random	β fixed	β random
Violent crimes	–	–	.000	.001
			(.002)	(.002)
Males 15 to 29	.103	.338***	−.017	−.009*
	(.110)	(.053)	(.010)	(.004)
Poverty risk	.118**	.114**	.005*	.001
	(.039)	(.023)	(.002)	(.002)
Density	−.006	.001**	.001	−.000
	(.004)	(.000)	(.000)	(.000)
Farms	.021	-.015**	.001	.001***
	(.018)	(.006)	(.002)	(.000)
Divorce	−.008	−.008	−.001	−.001
	(.009)	(.009)	(.001)	(.001)
Alcohol sales	.400***	.216***	.001	.001
	(.097)	(.026)	(.009)	(.002)
Child welfare cases	.173	.214	−.003	.014
	(.140)	(.113)	(.013)	(.009)
Voting	−.035	-.053**	−.002	.000
	(.025)	(.015)	(.002)	(.001)
Pet ownership	.052	-.001	.001	.003
	(.027)	(.019)	(.003)	(.001)
Single households	−.029	.029	.003	.001
	(.039)	(.016)	(.004)	(.001)
R^2	.047	.388	.008	.048

β = unstandardized regression coefficient (standard error in parentheses)

* $p < .05$; ** $p < .01$; *** $p < .001$

were no estimation problems involving high collinearity among predictor variables.

Next, we turn to multiple regression equations that estimate the net effects of each predictor variable on crime rates. The results of the fixed and random effects multiple regression equations for violent and animal crimes are presented in columns 1 and 2 in Table 2. Equation 1 estimates the partial effects of each predictor variable (controlling for the other variables) on the within-group variation in violent and animal crime, adjusting for effects of variance common to each municipality. Equation 2 estimates a weighted average of the within and between-unit partial effect of each predictor variable (controlling for the other variables) on violent crime, adjusting for effects of variance common to each municipality.

In the fixed-effects Eq. (1), we find that poverty risk and alcohol sales are related to higher rates of violent crime. The results of the random effects Eq. (2) are fairly similar and indicate the effects of males 15 to 29, population density and single households are also statistically significant and positive. The effect of number of farms and voting is negative and statistically significant. The effect of child welfare cases, although positive, is not quite statistically significant ($p < .09$). We also considered whether there was significant variation in crime rates by regional police department, net of municipality effects. When adding controls for police district in the random effects equations for both violent and animal crimes, there were no substantive changes, except the effect of single-person households on violent crimes increased slightly and became statistically significant.

The results of multiple regression equations for animal offenses are shown in columns 3 and 4. In the fixed-effects Eq. (3), we find that violent crime rate is not associated with reported animal crime rate.[4] This is counter to results reported in studies of animal crime in U.S. cities. Poverty risk is, however, significantly associated with increases in animal offenses, which is consistent with other research that links economic disadvantage to animal crime. Also, in the fixed effects model, number of farms was unrelated to animal offenses, but in the random effects Eq. (4), it is associated with increases in animal offenses. Across municipalities, net of population density, those with a greater number of farms have more reported animal crimes, consistent with findings from court judgements that show reports of animal crimes are more common in rural municipalities with more farms (Koskela-Laine, 2012). It is important to note that just about all of the variation in number of farms is between municipalities (over 90%) and very little is within-municipality, over the study period.

We also find that, in contrast to violent crime, municipalities with a greater percent of males between 15 and 29 have less animal crime. Evidence—based on court convictions—indicates that, although over 70% of animal crime offenders in Finland are males, they tend to be older than other offenders, with the median age of 42 (Koskela-Laine, 2012). Further, municipalities with more young men also have fewer farms, which may reflect the migration of young people away from rural areas and into cities.

Discussion

Our study is the first to examine macro-level predictors of animal crimes using a panel of municipalities for an entire country. Guided by a social disorganization framework, our aim was to compare the correlates of violent and animal crime, and also to assess any differences in these relationships between the U.S. and Finland. We intend for this research to spark needed inquiry into the applicability of criminological theories of violence to the study of

[4] Property crime was also unrelated to animal crime.

animal crime, and whether this approach is generalizable across nations. We found that the only common correlates of both violent and animal crime in Finland were economic factors. In the fixed-effects equations, we found that economic strain, as measured by poverty risk, was associated with animal crimes. Poverty risk was also associated with violent crime. These results have been observed in the U.S. as well (Vaughn, et al., 2009). The materialist fallacy—simply stated, the error of assuming that economic motivations necessarily lead to property crimes—reminds us that poverty can produce structural conditions and cultural adaptations that engender aggression and violence (Sampson & Wilson, 1995). In places experiencing economic challenges, strain or frustration may be expressed as interpersonal conflict, and also 'taken out' on defenseless animals (Wright & Hensley, 2003). Further, poverty may exacerbate the challenges of animal welfare, including the costs of feeding, housing and caring for animals in a humane way.

Our results also indicate a few important differences between crime—violent and animal—in Finland compared to the U.S. We find that violent crime and animal crime are *not* related in Finland, according to national crime report data —a finding that contradicts the "link" body of scholarship, as well as macro-sociological studies of animal crime in the U.S. In the U.S., animal crime is fairly widespread across rural and urban areas, and often coexists with family violence and other forms of serious violent crime. It may be that the geographic variation across Finland exerts a greater influence on the distinctions between animal and violent crime, with violence more common in urban areas, while animal crimes are more common in rural areas because of differences in farming across municipalities.

Somewhat surprisingly, we found a positive association between pet ownership and violent crime. Areas with higher pet ownership also exhibit higher rates of violent crime. Though we can only speculate, it may be that, in areas with more violence, pet dogs are acquired for protection. There are no reliable data on rates of pet ownership in the U.S., but some ethnographic studies of urban dog ownership suggest the acquisition of certain breeds of dogs for protection in high-crime neighborhoods (Arkow, 2013; Dickey, 2017). We also note that child welfare cases were not related to animal crime, both within and across municipalities. Again, this is surprising, given the theoretical and empirical link between family violence and animal crime found in other countries.

Generally, unlike other offenses, animal crimes in Finland may not be as much of a function of structural characteristics as they are in the U.S. In the United States, there appears to be a constellation of illegal activities, including drugs and weapons offenses, associated with dog-fighting and other forms of animal crime clustered in disadvantaged neighborhoods (Burchfield, 2016, 2018; Gibson, 2005; Ortiz, 2010). Given that the only other predictor of animal crime, in addition to economic strain, was farming, it suggests that animal crime in Finland may be related to geographic or cultural variation in the ways animals are treated. Thus, social disorganization theory, originally developed to capture macro-level correlates of urban social control, may not be the most suitable theoretical framework for this research; future studies might consider a social learning or cultural deviance approach which examines cultural perceptions of animals and the normalization of violence toward them. For example, data revealed a higher number of animal crimes in Ostrobothnia; this finding may be the result of the higher numbers of factory farms in that region and a "spillover" effect similar to that hypothesized by Fitzgerald et al. (Statistics Finland, 2016).[5] Alternatively, animal crime may best be explained as an individual-level phenomenon.

Our study is, of course, not without limitations. First and foremost, our study is exploratory and we lack the necessary data to make causal claims about the relationships we examine. We don't see this as a weakness, rather as a call for further study into the underlying mechanisms linking economic factors to violent and animal crime. Second, regarding our measure of animal crime, like crimes of interpersonal violence, much animal abuse takes place out of public purview and goes unreported. For animal crime, there is obviously no 'victimization' survey analogue. As a result, arrests for animal crime are relatively rare—in both the U.S. and Finland. Future research with self-report data should examine characteristics of animal abusers and their crimes that predict arrest. Finally, the reported offense data do not permit examination of disaggregated offenses involving specific types of animals (e.g., pets vs. farm animals, for example).While our data on reported animal crimes are likely to be underestimates of the true prevalence of such crimes, we were primarily interested in the covariation of reported animal crimes with a range of macro-level variables. By taking into account unmeasured variation across municipalities, we may account for some differences due to reporting and enforcement.

Given the availability of national population-based register data in Nordic countries, one challenging, but possible direction for further research is to integrate individual and structural factors (Lyngstad & Skardhamar, 2011). For example, are persons with antisocial personalities, or those who have been arrested for other offenses more or less likely to have committed crime involving animals, and to what extent are the effects of individual-level factors exacerbated by living in areas where there is less economic opportunity, lower levels of civic engagement, or rural isolation?

[5] When we re-estimated the series of equations omitting municipalities from the Ostrobothnia district, there were no substantive differences in comparison with the results we present.

Future research might also examine the influence of the growing movement against animal consumption, whether due to its environmental impact or cruelties the of factory farming, on crime rates. That is, how might changing perceptions of animal exploitation lead to vigilante-type crimes against those who work with animals in farms and factories? These types of questions would best be addressed with qualitative studies that examine the changing meaning of animals and animal welfare.

In conclusion, we find that macro-level factors are more strongly related to violent crime than animal crime, and that animal crime is unrelated to violent crime in Finland. The effects of economic predictors of violent crime are generally similar to those in the U.S., however. While we do show a relationship between economic strain and animal crime, animal crime in Finland likely differs from the U.S. in important ways. A substantial portion of animal crime in the U.S. is associated with urban crime in areas characterized by concentrated racial segregation and disadvantage. Recent research in Finland that combines individual and community-level factors (e.g., economic disadvantage) finds that individual-level factors are more important, but not exclusive, determinants of criminal activity (Airaksinen et al., 2021). While this may also be the case for animal crime, further research is needed, ideally requiring large-scale individual-level data that includes measures of offenses against animals, as well as other offenses, background characteristics, and community structure.

Appendix

Appendix 1: Matrix of Correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Animal crime rate	1.000											
(2) Violent crime rate	−0.029	1.000										
(3) Males15–29	−0.134*	0.273*	1.000									
(4) Poverty risk	0.102*	0.277*	−0.095*	1.000								
(5) Density	−0.073*	0.210*	0.339*	−0.178*	1.000							
(6) Farms	0.188*	−0.275*	−0.315*	0.381*	−0.301*	1.000						
(7) Divorced	−0.101*	0.252*	0.252*	−0.096*	0.278*	−0.388*	1.000					
(8) Alcohol	−0.022	0.455*	0.017*	0.260*	0.044	−0.293*	0.254*	1.000				
(9) Child welfare	0.094*	0.236*	−0.219*	0.454*	0.029	0.061*	0.116*	0.251*	1.000			
(10) Voting	0.097*	−0.349*	−0.242*	−0.094*	−0.153*	0.433*	−0.385*	−0.192	−0.121*	1.000		
(11) Pet owners	0.080*	0.056*	−0.124*	0.390*	−0.311*	0.176*	−0.190*	0.071*	0.097*	−0.006	1.000	
(12) Single household	0.032	0.476*	−0.008*	0.653*	0.122*	−0.049	0.289*	0.508*	0.549*	−0.346*	0.200*	1.000

* $p < .05$

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