

Factors Associated with Behavioral Euthanasia in Pet Dogs

Miranda Hitchcock

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Erica N. Feuerbacher (Chair)

Miranda K. Workman

Audrey Ruple

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ABSTRACT

When pet dogs demonstrate unwanted or problematic behaviors, particularly severe behaviors, owners may choose to euthanize. While the topic of behavioral euthanasia is becoming more common among dog behavior experts, shelters, and rescues, there has been little research in this area. The Behavioral Euthanasia in Pet Dogs Questionnaire was developed to gather detailed information about dogs that were euthanized for behavior reasons. This exploratory study found that aggression, particularly aggression toward people, was the most common behavior that led to euthanasia. Results indicated that behavioral euthanasia occurs across a wide age range of dogs, and that most of these dogs had been living in their home and exhibiting the problem behavior for a long time prior to euthanasia. Additionally, reports of bites and self-harm indicate the severity of the problematic behaviors that led to euthanasia. This research provides a foundation for future study and provides an overview of the behavioral factors associated with behavioral euthanasia.

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INTRODUCTION

1.1 Behavior Problems in the Pet Dog Population in the United States

In the United States, dog ownership is popular and up to 53% of households (69 million) own at least one dog (*AVMA Pet Ownership and Demographics Sourcebook: 2017-2018 Edition*, 2019; *Pet Industry Market Size, Trends & Ownership Statistics*, 2022). At least 85% of dog owners view their dogs as members of the family (*Gauging Family Intimacy*, 2006).

While many owners report positive associations and experiences with their dogs, undesirable behaviors can lead to dissatisfaction; particularly when those behaviors differ from the owners' expectations (Powell et al., 2018; Serpell, 1996). Studies report that the percentage of dogs with reported behavior issues ranges from 40% up to 92% (Adams & Clark, 1989; Campbell, 1986; Chung et al., 2016; Didehban et al., 2020; Martínez et al., 2011; O'Farrell, 1992; Salonen et al., 2020; Voith, 1985; Wells & Hepper, 2000; Yang et al., 2021).

The true prevalence of behavior problems in pet dogs is difficult to ascertain, in part because of wide differences in categorization and terminology (Anderson et al., 2022; D. S. Mills, 2003; Ramos et al., 2020; Stelow, 2018). Some surveys specifically ask questions about fear or anxiety-related behaviors, while others ask about a broad range of behaviors. Some researchers provided detailed subcategories or descriptions of behaviors, while others are more general.

Undesirable nuisance behaviors may be more prevalent across the general population, but do not often warrant a veterinary behavior visit or surrender to a shelter (Anderson et al., 2022; Campbell, 1986; Tamimi et al., 2013; Yamada et al., 2019). In general, dogs at a veterinary behavior clinic (or being surrendered to a shelter) are likely to demonstrate behaviors deemed problematic versus tolerable. Dogs being referred to a veterinary behaviorist may even be "extremely disruptive to the household or potentially dangerous to people, other animals, or themselves" (Landsberg, 1991).

There are also key differences between general dog owners and owners bringing their dogs to a veterinary behavior clinic. These owners are more likely to have the financial means to pay for a specialist and to live in a geographical area where a specialist works. Cultural or experiential factors may also determine an owner's willingness to bring a dog to a specialty behavior clinic. Due to the wide variation in terminology, categorization of behavior, and sample bias, drawing conclusions about the prevalence of behavior issues across the pet dog population is extremely difficult.

Despite these challenges, we can still gain insights into dog behavior issues through previously published reports. Surveys of the general dog-owning population tend to show high percentages of minor, nuisance behaviors, while studies at veterinary behavior clinics will tend to show more serious, problematic behaviors (Beaver, 1994; Didehban et al., 2020; Dinwoodie et al., 2019).

1.2 Prevalence of Common Problem Behaviors: Aggression, Fear/Anxiety, Separation Anxiety, and Compulsive Behaviors

The most common reason for dogs to be seen at specialty behavior clinics is aggression, whether toward people or other animals. Aggression has been shown in as many as 59% to 72.2% of dogs in studied veterinary behavior clinics (Anderson et al., 2022; Ramos et al., 2020; Takeuchi et al., 2001). One of the challenges in investigating aggression is that it is not a specific diagnosis or disorder. Rather, it is a label applied to a range of behaviors, from mild to severe and species-typical to rare or abnormal. The “motivation” for the behavior may appear obvious (such as guarding a particular resource), but some aggression may have unknown or multiple motivators (Stelow, 2018).

Within the broader category of aggression, there are a number of potential subcategories. Anderson et al. (2022) split aggression into four primary categories based on the target of the

aggression: Human-directed, Inter-dog, Predatory, and Territorial. In their work, Human-Directed Aggression represented almost 80% of aggression cases and Inter-dog Aggression represented 19%. Another research team broke down aggression based on the trigger or reason for the aggression, such as fear-induced aggression, pain-induced aggression, or resource guarding/possessive aggression (Luescher & Reisner, 2008). Similarly, Borchelt divided aggression into categories like “punishment-elicited aggression” and “protective aggression” (Borchelt, 1983).

Ultimately, seeking more detail about aggression is essential for understanding what behaviors owners are actually seeing in their dogs. Aggression may be categorized in many ways: by victim (people, dogs, other animals), by circumstance or trigger (high-arousal situations, grooming), or by motivation (fear, pain). A combination of these factors may be used to better compare dogs’ behaviors and potential risk factors. Examining the context and severity of bites and aggressive incidents will offer a clearer picture of the behavior versus an overarching label of aggression.

Despite the complexity and variation in aggression, many studies only list it as a single broad category. This means that serious safety risks such as severe bites may be lumped in with barking or even play-biting (Guy et al., 2001; Yang et al., 2021). Without a better understanding of the prevalence of particular types of aggression, behavior practitioners cannot adequately identify potential treatment options.

One interesting categorization of human-directed aggression is that of aggression specifically toward the owner. Aggression toward the owners makes up a large portion of reported aggression toward people, indicating that this is a major concern for owners getting expert support (Bamberger & Houpt, 2006; Takeuchi et al., 2001).

Aggression can be especially concerning when it leads to bites, impacting the safety of people and other animals. In one study, 15% of owners reported that their dog had bitten a household member, though this included play behavior and did not specify whether the bite had

broken skin (Guy et al., 2001). In another study, 34% said their dog had bitten a person or dog (Yang et al., 2021). Again, these statistics must be taken with some caution, as bites might include play-biting or puppy mouthing. Even assuming that a substantial portion of these bites were accidental, playful, or non-injurious, the remaining bites still indicate a safety concern. Of these bites, some percent are serious and might result in shelter surrender or euthanasia.

After aggression, fears, phobias, and anxiety are typically the next most commonly reported behavior problems in veterinary behavior clinics, present in up to 20.1% of dogs (Anderson et al., 2022; Ramos et al., 2020). Stelow (2018, p.344) defines these related diagnoses as follows: anxiety refers to “a state of arousal as a response to uncertainty or the prospect of real or imagined danger.” They also define phobia as “an excessive and usually persistent fear of a specific and discernable object or situation,” and fear as an “alarm response to a threatened or present danger.” In one online survey of several thousand owners, 26% reported generalized fear and 17% said their dog was showing separation anxiety (Tiira et al., 2016).

Separation anxiety prevalence ranges widely across studies, even within the overarching anxiety category. In one study, separation anxiety accounted for 49.2% of anxiety cases, whereas generalized anxiety made up 40% of dogs (Anderson et al., 2022). In another study, only 12% of dogs were reported to have separation-related problem behaviors (Yalcin & Batmaz, 2007). Two studies in different cities in Brazil found different results regarding separation anxiety. One study of dogs at a veterinary behavior clinic found almost no cases of separation anxiety, while the other study of dogs in the general population found that 56% of dogs showed separation anxiety (Ramos et al., 2020; Soares et al., 2010). This difference could be in part due to the sample populations, or a variation in living situations between cities. However, it may also indicate a difference in what behaviors people will report in a general survey versus what might cause them to visit a veterinary behaviorist.

Another behavioral category, repetitive or compulsive behavior, is less commonly reported but may represent up to 11% of dogs visiting veterinary behavior clinics (Ramos et al.,

2020; Yalcin & Batmaz, 2007). In some cases, this behavior may even be diagnosed as Canine Compulsive Disorder (CCD) and researchers have sought to understand genetic, medical, and environmental causes (Luescher, 2003; Sulkama et al., 2022).

Some dogs appear to demonstrate only one problematic behavior, while many dogs present with multiple co-occurring problem behaviors (Bamberger & Houpt, 2006; Borchelt, 1983; Lund et al., 1996; Wright & Nesselrote, 1987). There is a high comorbidity among anxiety behaviors, with many dogs demonstrating two or more fear and anxiety behaviors (Tiira et al., 2016). In one study, 82.8% of dogs with separation anxiety were found to have comorbidities, particularly noise sensitivity (Storengen et al., 2014). Comorbidities among problematic behaviors might change the overall manageability or prognosis for a dog. For example, a dog that bites visitors to the home might be manageable if they could be left in a separate room or in a crate. However, if that same dog demonstrated separation anxiety, their aggression might be much less manageable.

It is important to note that owners' perceptions of dogs (and perceptions of dog behavior) also impact the behaviors they report as being problematic as well as the perceived severity of those behaviors (Hsu & Serpell, 2003; Mornement et al., 2012; Powell et al., 2021). Owners who see their interactions with their dog as being negative are more likely to consider relinquishment to shelters (Payne et al., 2015).

There are also large cultural differences between dog ownership in the United States and other countries as well as between different regions in the United States (Herzog & Rowan, 2019; Wan et al., 2009). International research may provide insight into the prevalence of dog behavior issues globally, but may not be directly analogous to pet dog populations in the U.S. Even within North America, regional differences can influence reports of behavior problems. For example, three veterinary behavior practices in the United States and Canada reported the prevalence of behavior problems in their client dogs (Landsberg, 1991). In all three locations, aggression was the most common behavioral issue, followed by inappropriate elimination and destructive

behavior. However, one practice saw a significantly lower percentage of aggression (42%) versus the clinics in two other cities (75% and 59% respectively). This highlights the potential variation between practices, geographic regions, or even individual practitioners.

While there are wide ranges and discrepancies in the reported prevalence of dog behavior problems across populations, a few key points stand out. Among dogs being seen at specialty behavior clinics, aggression is by far the most commonly reported behavior. Particularly, aggression toward people (and more specifically toward the owner) is a problem that leads owners to work with a specialist. After aggression, fear, anxiety, and phobias are typically the next most prevalent behaviors leading to visits with behavior specialists. Other behaviors such as separation anxiety or compulsive/repetitive behaviors may also lead to visiting a behavior specialist, and many dogs demonstrate multiple problem behaviors.

1.3 Impacts of Dog Behavior Problems

Dog behavior issues can have a negative impact on the bond between owners and their companion dogs, which can have consequences for both the dog and the owner (Bennett & Rohlf, 2007; Houpt et al., 1996). Research suggests that living with a pet with behavior issues has a day-to-day impact on owners and increases the owners' anger and social isolation (Buller & Ballantyne, 2020). Particularly when the dog demonstrates aggression or self-harm, environmental management is critical and may include restrictions on activities or other intensive interventions (Grigg, 2019; Reisner et al., 1994). Certain behaviors might have additional impacts on the owner; for example, owners of a dog with human-directed aggression might also face complex emotions around their dog's behavior, including fear, guilt, or betrayal (Reisner et al., 1994).

Behavior issues, particularly aggression, can also pose a public safety concern. Dog bites lead to more than 335,000 emergency department visits per year in the United States (Loder,

2019a). In a Canadian survey of veterinary clinic clients, 15.6% of all dogs were reported to demonstrate biting behavior toward humans (Guy et al., 2001). While the actual prevalence of dog bites varies based on reporting methods, bites have profound impacts on individuals and communities, leading to injuries and medical expenses (Blackshaw, 1991; Weiss et al., 1998).

Behavior problems might negatively impact dogs' welfare and physical health as well. Some behavior problems, such as fear, might actually be correlated with a shorter lifespan and increased health problems (Dreschel, 2010; D. Mills et al., 2014). Several types of skin issues are considered psychophysiological, and can be worsened or brought on by stress or anxiety, presenting a welfare issue for these dogs (Virga, 2004).

Even beyond direct health and lifespan, an additional welfare concern is the relinquishment of dogs to shelters (Coe et al., 2014). Of the millions of dogs who end up in shelters each year, approximately 25% were surrendered by their owners (Shelter Animals Count, 2019). Behavior problems play a role in owners' decision to surrender their dogs, and may even lead to euthanasia (*Euthanasia for Behavioral Issues: A Complicated and Difficult Decision*, n.d.).

1.4 Behavioral Euthanasia: Definitions and Conversations

In some cases, problematic behavior may lead to euthanasia despite the dog being physically healthy: behavioral euthanasia (Gibeault, 2021; Lilly, 2020). This is sometimes considered necessary when the dog presents a risk to the safety of people or other animals (Pugliese et al., 2022). Euthanasia for behavior issues like aggression may be considered "contextually justified" even when the physical health of the dog is considered acceptable (*BVA Guide to Euthanasia*, 2016). An owner may pursue behavioral euthanasia with their own vet, or in some cases may request euthanasia through a local shelter or emergency veterinarian. Shelters and rescues may also decide to euthanize a dog they feel is unsafe or unfit to be adopted (Best Friends Animal Society, n.d.; Fieser, 2019; McMillan, n.d.; Pawsitive Hearts, n.d.).

There is very little research on behavioral euthanasia, in part because it is often seen as controversial or taboo, and dog behavior professionals refer to it as being stigmatized or difficult to talk about (de Marinis, 2022; Marrs, 2021; Rayment, 2020; Summerfield, 2017; Thomas, 2020a; Walker, 2020). It is commonly referred to as being kept in the shadows, despite professionals suspecting that it happens far more than it is talked about (DeGioia, 2013; Pachel, n.d.). However, veterinary behaviorist Dr. Chris Pachel noted in a conference presentation: “If your professional role includes counseling pet owners through consideration of available intervention options for behavioral problems, it is inevitable that you will experience a situation in which the option of euthanasia is on the table” (Pachel, n.d.).

In recent years, several veterinary behaviorists and behavior experts have spoken about behavioral euthanasia at conferences, in webinars, on podcasts, and in blog posts and articles (Euthanasia for Behavioral Issues: A Complicated and Difficult Decision, n.d.; Haug, 2011; Haug, 2011; Lilly, 2020; Martino, 2022; McMillan & Ballantyne, 2022; Pachel, n.d.). There are also many personal accounts of owners’ experiences with behavioral euthanasia in blog posts and in the grief support group Losing Lulu on Facebook (Billis, 2021; Fitzpatrick, n.d.; McMillan & Alexander, 2019; Miller, 2023; Thomas, 2020a). In 2019, Trish McMillan and Sue Alexander, both professional dog trainers, created the Facebook group “Losing Lulu” as a grief support group for people who had euthanized a pet for behavior (McMillan & Alexander, 2019). As of January 2023, the group had over twenty-three thousand members worldwide. Now there is even a course for dog professionals on how to talk to clients about behavioral euthanasia (McMillan & Alexander, 2022).

In many cases, behavior experts refer to behavioral euthanasia as an appropriate option for dogs who have demonstrated aggression that leads to safety risks for owners, other pets, or the general public (*Euthanasia for Behavioral Issues: A Complicated and Difficult Decision*, n.d.; Gibeault, 2021; Grigg & Donaldson, 2019; Marrs, 2021; Stremming, 2017). This often includes dogs with severe bite histories, but several practitioners note that a dog may be considered unsafe

even if they have not previously bitten. Behavior experts cite several common factors when assessing a dog's potential safety risk and whether euthanasia should be considered. These include: predictability of aggression; warning signals prior to bites; number of previous bites; severity of bites; size of the dog, and ability to avoid triggers (Gibeault, 2021; Haug, 2011; Haug, 2011; Summerfield, 2017; Thomas, 2020b). Predatory behavior toward children or "offensive aggression" (aggression that occurs when a dog moves toward a person to aggress, versus defensive aggression where the intent is to increase distance) are often seen as cause for behavioral euthanasia (Fieser, 2019). Similarly, many people and organizations look at whether bites or incidents were provoked or unprovoked when making euthanasia decisions (Pawsitive Hearts, n.d.).

Professionals note that management strategies may fail and that dogs that pose a significant safety risk may be good candidates for euthanasia (Alexander, 2012; Orenchuk, 2020). This falls into a category of responsibility to the "greater good" for safety (Roark, 2015; Stremming, 2017). Shelters and rescue organizations must often consider this perspective of responsibility when making euthanasia decisions. They must consider the safety of their staff and volunteers, as well as the potential impact of one of their adopted dogs causing harm (Best Friends Animal Society, n.d.; Fieser, 2019; Pawsitive Hearts, n.d.). Shelters and rescues consider a variety of factors when making behavioral euthanasia decisions (Workman, 2016a, 2016b, 2018).

Additionally, quality of life is cited as a reason for considering behavioral euthanasia (de Marinis, 2022; *Euthanasia for Behavioral Issues: A Complicated and Difficult Decision*, n.d.; Falconer, 2017; Gibeault, 2021; Grigg & Donaldson, 2019; Marrs, 2021; McConnell, 2015; Orenchuk, 2020; Rayment, 2020; Thomas, 2020b). While management may prevent safety risks, it may also create limitations on the dog's ability to perform natural behaviors. The limitation of physical activity, enrichment, and social engagement may pose serious challenges to providing adequate welfare in some cases (Best Friends Animal Society, n.d.; Fieser, 2019; Rechline, n.d.;

Thomas, 2020b). Quality of life concerns may also include extreme anxiety or fear that compromise a dog's well-being even when aggression is not present. Because of this, self-injurious behavior may also be a factor in considering euthanasia (Haug, 2011).

Behavior specialists point out that medical causes of aggression or other problem behaviors should be ruled out prior to considering euthanasia (*Euthanasia for Behavioral Issues: A Complicated and Difficult Decision*, n.d.; Falconer, 2017; Walker, 2020). However, prognoses for treating behavior problems vary widely and some behavior problems may not be effectively treatable (Dakin Humane Society, n.d.; DeGioia, 2013). Experts also acknowledge that resources, including the environment, finances, or living situation may all contribute to the euthanasia decision (*Euthanasia for Behavioral Issues: A Complicated and Difficult Decision*, n.d.; Falconer, 2017). Additionally, the presence of children, immunocompromised people, or family members with disabilities might impact the ability to safely manage a dog with aggressive behavior (Haug, 2011). Practitioners also mention the difficulty of inconsistent behavior, where a dog might behave normally or safely the majority of the time (or in certain situations), but show severe aggression in others (Jasny, 2021; McConnell, 2015). This can lead to difficulty in making the euthanasia decision. Additionally, decisions around euthanasia for behavior may receive backlash and controversy, with conflicting opinions about when a case is severe enough to warrant euthanasia and what options should be considered first (Rechtine, n.d.).

In short, while formal research on behavioral euthanasia is rare, there are conversations taking place between dog behavior professionals, shelter and rescue groups, and members of the public around this issue. Many experts agree on some fundamental pieces of the prognosis: things like the bite history of the dog, types of triggers or scenarios for aggression, and quality of life. These factors are commonly noted as part of the decision-making process for euthanasia, but little research exists to identify how much certain factors might play a role in that decision.

1.5 Behavior-Related Shelter Surrender and Shelter Euthanasia

Despite the lack of direct research into behavioral euthanasia in pet dogs, the increasing information about dogs that are relinquished to or euthanized in shelters for behavior reasons may provide insight. Over the past decades, animal shelters in the United States have begun reporting more detailed statistics on their animal intakes and outcomes (Rowan & Kartal, 2018). Databases like Shelter Animals Count collect data from thousands of animal shelters, and in 2019 reported an overall canine euthanasia rate of 7.1%, amounting to approximately 252,800 dogs euthanized (Shelter Animals Count, 2019). This is a significant change from earlier years (in the late 20th century and beginning of the 21st) when the number of estimated shelter dog euthanasias was in the millions (Scarlett et al., 2002).

It is difficult to know what percentage of dogs surrendered to shelters are being relinquished for behavioral reasons, either solely or in part. A number of studies over several decades have reported that behavior is one of the most common reasons for relinquishment. Hemy et al. (2017) reported that of all adult dogs being surrendered to an animal shelter in Australia, 22% had been surrendered for behavioral problems, second only to changes in the owner's circumstances at 29%. However, the authors noted that their data collection only allowed owners to state one reason for surrender, while many owners likely had multiple reasons.

Behaviors such as aggression, anxiety, destructive behavior, and excessive vocalization can lead to surrender to animal shelters, as well as euthanasia once in the shelter (O'Neill et al., 2013; Polo et al., 2015; Salman et al., 2000). A number of studies have attempted to understand what percentage of dogs are surrendered to shelters due to behavior, but there is a lot of variation across these studies' methodologies, terminology, and samples (Kass et al., 2001; Lambert et al., 2015). Recently, a literature review and analysis of these previous studies questioned the idea that behavior is a main reason for relinquishment (Patronek et al., 2022). They hypothesized that because behavioral reasons for surrender were lumped together and other causes (such as medical issues or housing issues) were more finely split out, behavior disproportionately looks like a large

factor. However, despite differing opinions on the true prevalence of behavior concerns as a reason for relinquishment, it is clearly a cause worth exploring.

Comparison between dogs being surrendered and those living successfully in homes may further indicate what behavioral concerns can lead to relinquishment. New et al. (2000) conducted in-person surveys of thousands of owners surrendering dogs at 12 shelters, and compared findings against a mail survey of current dog owners. The surrendered dogs were more likely to have bitten a person in the month before the survey completion and were reportedly more destructive and fearful on average.

Another study surveyed recent adopters and found that of those who returned their adopted dog, 89.7% of them listed undesirable behavior as the primary reason (Wells & Hepper, 2000). In the United Kingdom, behavior was one of the most common reasons for surrender, and dogs who showed aggression were more likely to be returned after adoption (Diesel et al., 2008, 2010).

Additionally, some shelters may provide an owner-requested euthanasia service that can provide more data on reasons for euthanasia. Of 615 dogs that had been brought to an animal shelter for owner-requested euthanasia, 16% were there due to behavioral reasons: primarily aggression toward people or other animals (Kass et al., 2001). This indicates that behavior problems, particularly aggression, are considered by some dog owners to warrant euthanasia.

Unfortunately, large variations in methods and terminology across studies and surveillance systems make it difficult to gather precise information about which behaviors might lead to shelter surrender or euthanasia and how often. Some studies only allow owners to choose a single surrender reason, leading to a loss of some meaningful data via secondary or competing reasons. Additionally, many studies refer to broad categories of behavior that leave room for personal interpretation: for example, asking about aggression in general versus specific information such as bites that broke skin. Several of these studies are also now several decades old, which makes them less and less salient as the animal sheltering industry (and dog ownership

culture) in the United States continues to change.

1.6 Behavior-Related Euthanasia in Owned Dogs

When looking at owned dogs outside the shelter environment, the picture of behavior-related euthanasia (or behavioral euthanasia) is even murkier. Older studies in the United Kingdom have indicated that behavior may be a factor in a significant portion of dog euthanasia, from 5.9% to 17.7% (Edney, 1998; STEAD, 1982). In one review of cases being brought to a behavior veterinarian over the course of several years, 5.5% of cases were either recommended for euthanasia or actually euthanized (Lund et al., 1996).

One study in 1999 attempted to estimate the number of behavior-related euthanasias in the United States. Patronek and Dodman asked small-animal veterinarians in private practice to rank their confidence in behavior issues, and also asked about their average behavior-related euthanasia cases by year (Patronek & Dodman, 1999). This data was averaged and extrapolated to the number of veterinary practices across America, estimating that 127,071 dogs might be euthanized for behavior by veterinarians in the United States per year (Patronek & Dodman, 1999). However, no further studies have attempted to estimate the prevalence of behavioral euthanasia in the community.

While the actual number may not be known, behavior is likely responsible for a significant portion of dog euthanasia each year. A recent study with a large veterinary database found that behavior problems had the second-greatest odds of leading to euthanasia in dogs, preceded only by poor quality of life due to medical causes (Pegram et al., 2021).

Several studies have looked at behavior-related euthanasia in young dogs up to age three, though I have been unable to find information on the rationale for this age grouping. In the United Kingdom, 33.7% of euthanasias in these young dogs were attributed to problem behaviors (Boyd et al., 2018). Similarly, an Australian study found that 29.7% of dogs three years and younger that were euthanized over a five-year period were euthanized due to a behavior issue (Yu

et al., 2021). In general, euthanasia for behavior reasons was demonstrated to be more prevalent in young dogs than in those older than three (O'Neill et al., 2013).

Aggression is the behavior that leads most often to euthanasia in dogs. In one veterinary behavior clinic, 12% of dogs brought in for aggression were ultimately euthanized (Blackshaw, 1991). Another study looking at all causes of euthanasia (including medical, not just behavioral reasons) found that 9% of euthanasia cases were due to aggression (Gorodetsky, 1997).

Aggression was the most common behavioral reason stated for euthanasia, accounting for approximately 11% of euthanasia of all dogs up to three years old in Australia (Yu et al., 2021).

A retrospective study of dogs visiting a veterinary behavior clinic found that dogs were at greater risk of euthanasia if they demonstrated aggression toward familiar people, or had a history of biting (Siracusa et al., 2017). An earlier, similar study focused on aggressive dogs found a number of behavioral factors associated with euthanasia. The euthanized dogs were more likely to have shown unpredictable aggression, to have had a more severe aggressive incident, and to have had at least one multiple-bite incident (Reisner et al., 1994).

Additionally, the intervention of a behavior consultation with a professional often does not prevent a euthanasia outcome: in a study of dogs presenting to a behavior consultation with aggression toward family members, eight dogs were euthanized shortly after the initial consultation and an additional 27% of dogs were euthanized before the follow-up report (Reisner, 2003). Dogs with aggression are particularly at risk of euthanasia due to the serious potential consequences to other pets and humans, including physical or emotional damage (Col et al., 2016; Polo et al., 2015).

The decision-making process may also be impacted by the participating veterinarian. For example, veterinarians may decide not to provide euthanasia in cases where they think treatment or rehoming may be possible (Yeates & Main, 2011). When interviewed, veterinarians agreed that euthanasia was warranted for dogs that showed “an obvious danger to society,” but often disagreed upon the criteria for that categorization (Morris, 2012). While aggression was generally

considered the most legitimate behavioral cause for euthanasia, some veterinarians would ask for details about the case and determine whether to perform the euthanasia based on their perception of severity (Morris, 2012).

A recent behavioral euthanasia research project analyzed the content of six months of posts within the Losing Lulu Facebook group, as well as surveying group members about their animal's behavior, and interviewing over 80 participants worldwide. While the survey focused on animal behavior, the content analysis of posts and the interviews focus primarily on the socioemotional impacts and the experiences of people making the behavioral euthanasia decision for a variety of species of companion animals. Publication of results is in preparation (M. Workman, personal communication, December 7, 2022).

1.7 Gaps in the Research on Behavioral Euthanasia in Pet Dogs

Dog behavior professionals and dog owners are talking about behavioral euthanasia across conferences, podcasts, articles, and even a large grief support group on Facebook, yet almost no research examines this topic. Additionally, there are few data on the types of behaviors that may lead to euthanasia and the specifics and severities of those behaviors. The existing studies on problematic behaviors that lead to specialty treatment, shelter surrender, or euthanasia, leave a number of gaps. Many are decades old or conducted in other countries with different cultures around dogs and dog behavior. Others use only general categories of behavior, such as “aggression,” but do not allow for investigation of what severity or specific aggressive behaviors were present or deemed a problem.

One of the challenges in comparing literature on undesirable behaviors in dogs is the variation in terminology and questionnaire design. Veterinary behavior experts have attempted to create frameworks for diagnosing syndromes such as separation-related problems, but there is little consensus across the field. Veterinary behaviorists disagree about using medical models versus functional models of behavior, and whether to label behavior problems with diagnoses

(which imply a reason or cause) versus descriptions of behavior (de Assis et al., 2020; D. S. Mills, 2006; Overall & Burghardt, 2006)

There have also been changes in the terminology used for behavior concerns over time. For example, older studies refer to aggression toward a dog's owner as "dominance aggression" (Reisner et al., 1994). However, more recent papers refer to this as "owner-directed aggression" or "conflict-related aggression" due to a lack of evidence that these behaviors are caused by dominance or rank (Luescher & Reisner, 2008).

The following exploratory research developed the Behavioral Euthanasia in Pet Dogs survey to identify the behaviors associated with behavioral euthanasia in an owned dog population. It includes questions regarding the specific behaviors displayed, which allow for a much more in-depth look at what behaviors might lead to euthanasia. For example, while participants were asked to indicate whether their dog demonstrated aggression toward people, they were also asked about the types of people targeted, the situations in which aggression occurred, whether bites occurred (and how serious those bites were). These factors can be used in the future as a more standardized, detailed set of measurements when operationalizing problem behaviors and lead to more accurate comparison between studies.

Detailed behavioral information will help dog behavior experts better understand potential risk factors for euthanasia, or develop treatment or counseling options for particular behavior issues. This information will also help shelters, rescues, or other organizations develop more robust criteria or risk assessment tools for behavioral euthanasia. Research on this topic and understanding the severity of behaviors will also provide legitimacy to the topic, allowing more professionals and owners to speak freely about behavioral euthanasia and reduce psychosocial stigma.

METHODS

2.1 Questionnaire Design

The Behavioral Euthanasia in Pet Dogs Questionnaire was designed to collect a broad range of information about dogs that were euthanized primarily for behavior-related issues. Due to the exploratory nature of the research, only a portion of the questions used in this questionnaire could be obtained from validated questionnaires that were previously published. For example, several questions about the dog and its living situation were adapted from questionnaires used in the Dog Aging Project (A. Ruple, personal communication, May 20, 2022) (Creevy et al., 2022). Human demographic information questions were retrieved from the 2020 U.S. Census (U.S. Census Bureau, 2020). The remaining questions were written based on the consensus opinion of more than twenty experts in dog behavior. These experts included board certified veterinary behaviorists, animal behavior researchers, certified dog behavior consultants, and dog trainers who specialize in complex cases.

The Behavioral Euthanasia in Pet Dogs questionnaire was designed to focus on simple, descriptions and lay terminology wherever possible. This limits potential differences in responses based on level of behavioral education. Additionally, the use of descriptions and definitions rather than technical terminology allowed for the application of labels after-the-fact, versus potentially shaping the responses. Questionnaire questions used situational descriptions such as whether the dog showed aggression when “approached while eating,” versus potential labels or causes for that behavior (e.g. dominance, resource guarding).

2.2 Questionnaire overview

The questionnaire had 118 total questions and was divided into eight sections (Appendix A). Participants first responded to questions about the dog and about their living situation prior to the dog’s euthanasia. Participants were asked to rank up to three categories of problematic

behavior that led to the decision to euthanize. These included aggression toward people (AP); aggression toward dogs or other animals (AD); separation anxiety (SA); compulsive behavior (Com); fear, anxiety, or stress (FAS); and other (O).

Participants were then asked detailed questions about the types of behaviors that they had previously selected and ranked. For example, a participant who ranked aggression toward people as one of the primary behaviors leading to euthanasia would be asked questions about bites to people and situations where the dog would show aggression toward people. Participants would see up to three of these detailed sections, depending on the primary behaviors they chose.

The questionnaire also captured information about interventions attempted, and whether other factors impacted the decision to euthanize. Finally, participants provided standard demographic data as well as marked how they found out about the questionnaire. A submission confirmation page included a link to grief support through the University of Tennessee Veterinary Social Work Program and instructions to email the author if participants would like to be notified of the research results.

The questionnaire was distributed using the software QuestionPro. A pilot group of individuals completed the questionnaire to gain an estimated completion time average and ensure question accuracy and proper functioning of the technology including skip logic between sections. The responses from pilot participants were not included in the analysis.

2.3 Institutional Review Board (IRB)

This research project was approved by the Virginia Tech Institutional Review Board, with exemption under 45 CFR 46.104(d) category(ies) 2(i) with IRB number 22-311.

2.4 Participants and selection

Participants were adults who had previously euthanized an owned, pet dog due to behavioral reasons. Participants had to meet three criteria in order to participate. They needed to:

- Be over the age of 18.
- Have euthanized a pet dog primarily due to behavior problems any time on or after January 1st, 2017. The dog must have been owned by the participant, not a dog in a shelter or foster environment.
- Have been living in the United States at the time of euthanasia.

Participants were recruited via social media posts in online groups related to dog training/behavior. This included Facebook groups and dog training email lists. Posts used the Recruitment Text (Appendix B) and participants were recruited based on their self-reported history of euthanizing their own dog(s) for behavior reasons. Upon clicking the link to the questionnaire, the Information Sheet (Appendix C) text preceded the eligibility questions.

The online questionnaire was published for public access and was available from July 5, 2022 through July 20, 2022. The questionnaire software allowed multiple responses from the same person, as some respondents had euthanized multiple dogs for behavior reasons. Questionnaires took an average of 24 minutes to complete (for those who completed at least the first section, including the Primary Behaviors section).

DATA ANALYSIS

Summary descriptive statistics were performed on survey response data using JMP Pro Version 16.0.0.

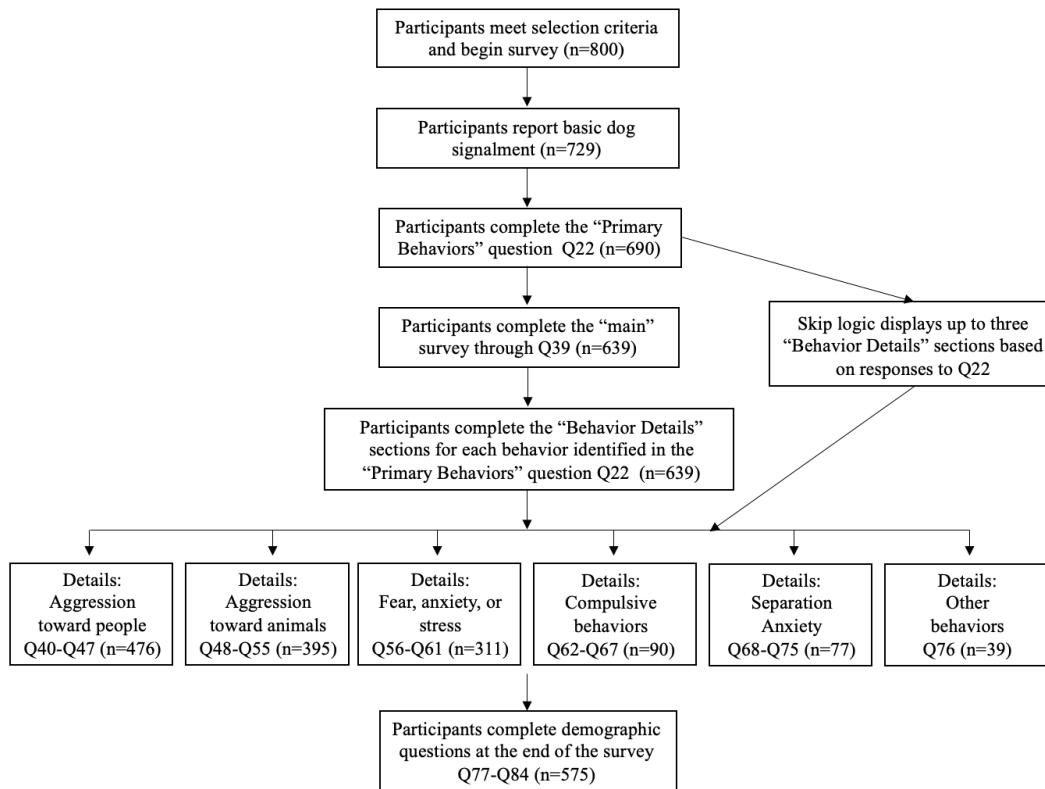
RESULTS

4.1 Owner and Dog Demographics

A total of 904 participants started the Behavioral Euthanasia in Pet Dogs questionnaire. Of these, 104 were terminated due to not meeting participation criteria. Of those remaining, 729 completed the information about dog signalment and general information, and 690 completed the ranking of primary behaviors that led to the decision to euthanize (Figure 1). 639 participants completed the entire main questionnaire prior to the behavior details sections. 575 participants completed the entire questionnaire including the demographic questions at the end. Data analysis of each question included all responses to that question; therefore, the response count (n) varies by question.

Figure 1

Participant Response Count (n) at Different Points in the Behavioral Euthanasia in Dogs Questionnaire



The vast majority of the 575 respondents who completed the questionnaire through the demographic questions identified as women (94.5%), and 91.3% identified as White, Non-Hispanic. The largest portion of participants were 25-34 years old at the time the dog was euthanized (34.3%), followed by 35-44 years old (21.9%), 45-54 years old (20.2%). Only 16.2% of participants were 55 or older at the time of euthanasia, and 9.0% were between 18 and 24 years old. The majority of participants (68.4%) had a bachelor's degree or higher (Master's degree, professional degree, or doctorate). Another 27% had some college, vocational training, or associate's degree; 6.1% had a high school diploma or GED; and 1% had some high school. Participants' annual household income at the time of their dog's euthanasia was under \$50,000 for 21.2% of participants completing the demographic section, and between \$50,000 and \$99,999 for 34.1%. Another 29.1% had an annual household income between \$100,000 and \$199,999, while 8.8% had an income over \$200,000 per year.

Of the 575 participants who completed the demographics section at the end of the questionnaire, 73% said they found the questionnaire through the Facebook group, "Losing Lulu." The next most common responses were "other dog-related social media group" (12.7%) and "friend/family/coworker" (6.1%). Some participants also found the questionnaire through a trainer or behavior professional (5.2%), "Other" (2.6%) or from a veterinarian (0.5%).

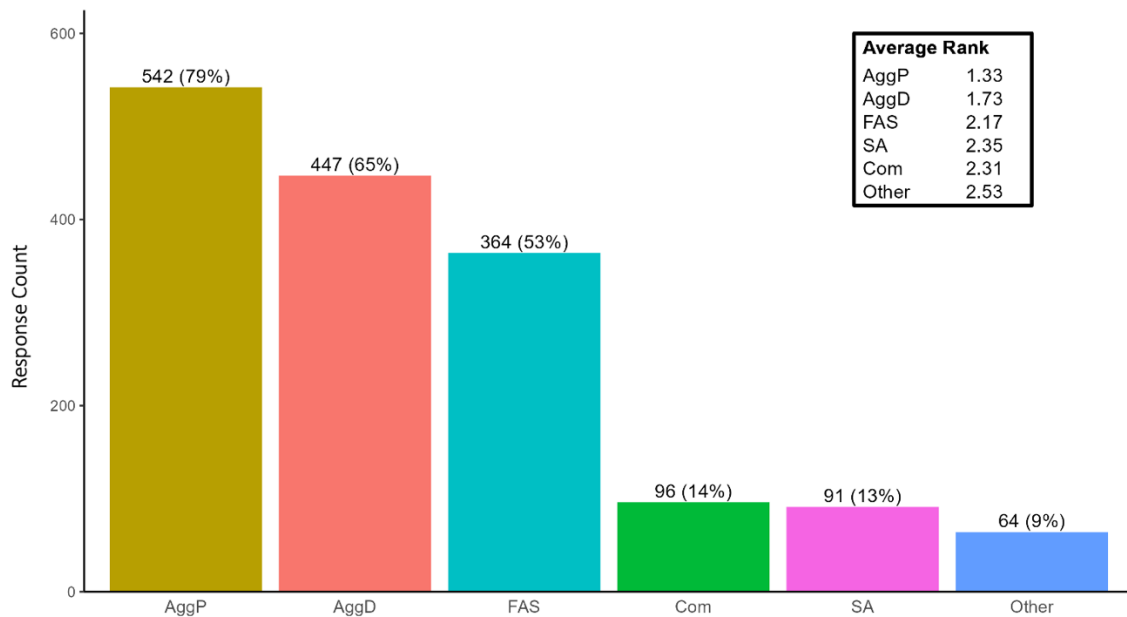
Of the total dogs represented in the questionnaire (n = 729), 69.4% were male and the remaining 30.6% were female. The majority (89.2%) of dogs were spayed or neutered. They ranged in weight from six pounds (3 kg) to 225 pounds (102 kg), with a mean of 61.7 pounds (28 kg) and a median of 60 pounds (27 kg). The majority of dogs (57.5%) were acquired at under one year of age, while the remaining 42.5% of dogs were one-year-old or older at the time of acquisition.

4.2 Prevalence and Ranking of Primary Behavior Problems

A total of 689 respondents completed the Behavioral Euthanasia in Pet Dogs Questionnaire at least as far as the “Primary Behaviors” question, where they were asked to choose and rank up to three categories of behavior that led to the euthanasia decision. The most commonly reported behavior (by number of overall selections, regardless of rank) was aggression toward people (34%), followed by aggression toward other animals (28%) and fear, anxiety, or stress (23%) (Figure 2). Separation anxiety and compulsive behaviors received 6% of responses, while the “other” category was selected only in 4% of cases.

Figure 2

Primary Behavior Categories that Led to Owners’ Decisions to Euthanize

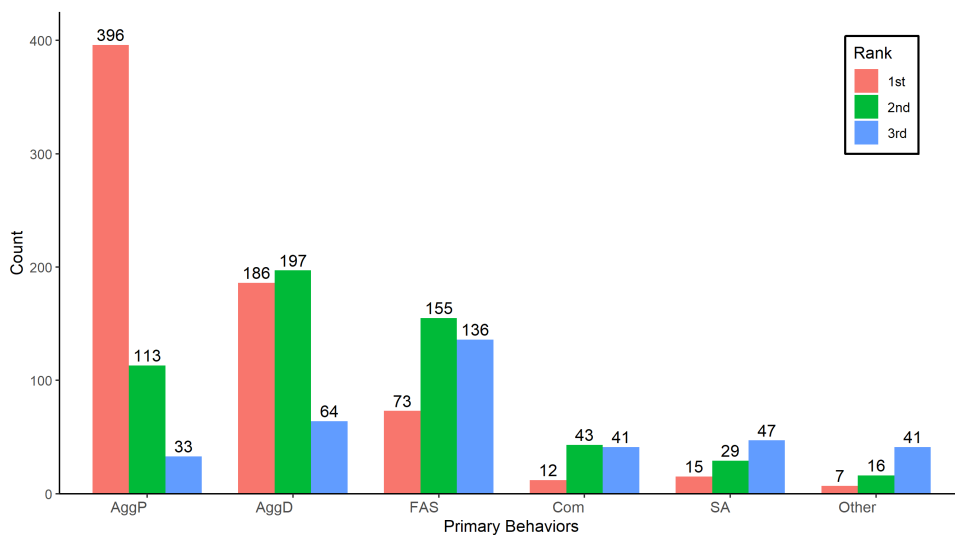


Note. Total number of responses (regardless of rank) by behavior type. Total response count = 1609, total number of respondents $n = 690$. Participants could rank up to three behaviors. Percentage represents portion of respondents (690), not responses. Categories from left to right are aggression toward people (AggP); aggression toward dogs or other animals (AggD); fear, anxiety, or stress (FAS); compulsive behaviors (Com); and separation anxiety or separation-related problem behaviors (SA).

When weighted according to ranking (first, second, or third), aggression toward people was even more pronounced as the primary problematic behavior (see Figure 3). Aggression toward people had an average ranking of 1.33, with 57.4% of all respondents marking it as their primary behavior, and 78.6% of participants marking it in their top three. While aggression toward people was most commonly ranked first (versus second or third), all other behaviors were more often ranked second or third. The category of fear, anxiety and stress was commonly ranked second (155 respondents) or third (136 respondents), and less frequently ranked first (73 respondents).

Figure 3

Problem Behaviors Leading to Euthanasia, Ranked as Primary, Secondary, and Tertiary Reasons



Note. Response count of 1609 and n = 690. Participants could rank up to three behaviors. Percentage represents portion of respondents (690), not responses. Categories from left to right are aggression toward people (AggP); aggression toward dogs or other animals (AggD); fear, anxiety, or stress (FAS); compulsive behaviors (Com); and separation anxiety or separation-related problem behaviors (SA).

4.2a Comorbid Behaviors

Most participants selected more than one primary behavior as the reason for euthanasia (80.3%), with only 19.7% marking a single behavior as the sole behavioral reason for euthanasia. Of the participants who marked multiple comorbid behaviors, 27.6% noted two behaviors while 52.7% ranked three (the maximum allotted). Of the 19.7% (n = 135) who ranked only one behavior, 66.2% selected aggression toward people and 30.1% selected aggression toward dogs. Only six participants (0.9%) selected fear, anxiety, and stress as the sole behavior issue, while two (0.2%) chose “Other” and one (0.1%) chose compulsive behavior as the sole behavior issue.

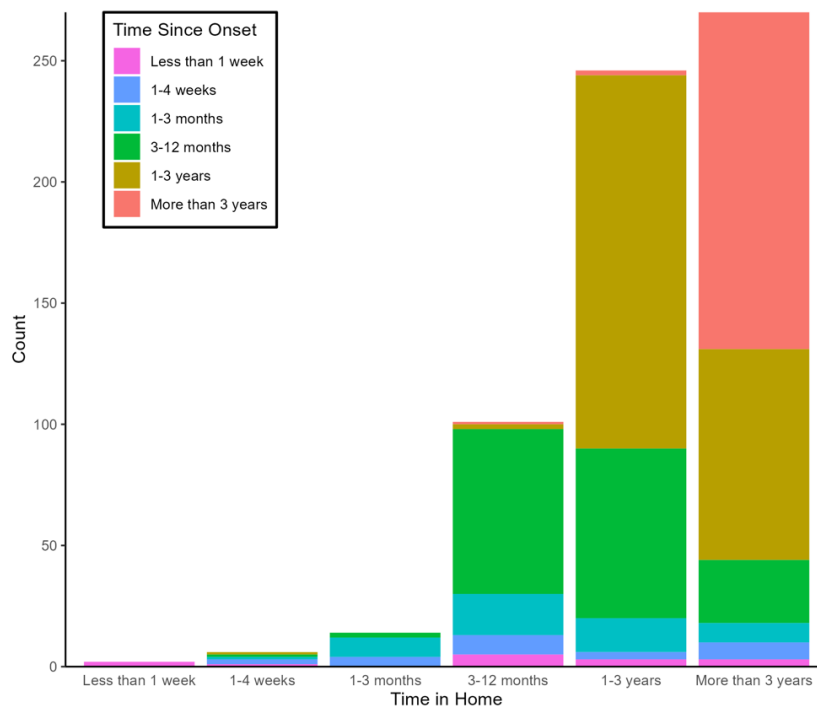
Of responses in which participants chose more than one behavior, the most common combination of ranked behaviors (26.8%) was aggression toward people (ranked first) and aggression toward dogs or other animals ranked second. The next most common combination (12.9%) was aggression toward people (ranked first) and fear, anxiety, or stress ranked second. In order to better understand whether dogs that demonstrated aggression toward people were also likely to be aggressive toward animals (or vice versa) these combinations were compared. Of the dogs who had aggression toward people ranked first, 46.7% had aggression toward animals ranked second. Conversely, of those that had aggression toward dogs ranked first, only 38.2% had aggression toward people ranked second.

4.2b Time in the Home, Duration of Behavior Issues, and Age at Euthanasia

The majority of dogs had begun exhibiting their problem behavior(s) at least one year prior to the euthanasia (60%), followed by 26% of dogs that had been exhibiting the behavior for between 3 and 12 months (n = 639, Figure 4). Only a small portion (6%) of dogs had begun exhibiting the behavior less than one month prior to euthanasia. Many dogs were in the home for months or years prior to the onset of behavior problems. While 42% of all participants had owned the dog for three or more years, only 22% of the dogs showed the behavior issue for that long. On average, dogs were in the home longer than the behavior problem had occurred.

Figure 4

Length of Time the Dog Had Been in the Home Versus Time Since Problem Behavior Onset



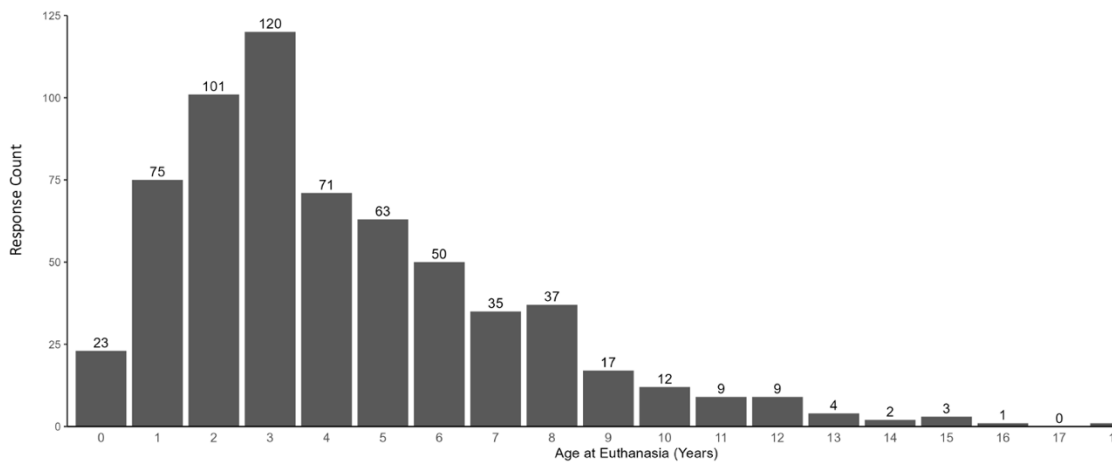
Note: n = 639. There are a few discrepancies; for example, owners reporting that the dog had been in the home 1-3 years but had begun demonstrating the behavior more than three years prior to euthanasia. It is possible that these were adopted dogs with known behavior issues prior to the owner acquiring the dog, or errors.

The age of the dog at euthanasia varied from less than one year old to 19 years old (median = 3 years old; mean = 4.31 years old; Figure 5). Only 3.6% of dogs were under one year old at euthanasia, and 6.9% were at least ten years old. Of the dogs that were ten or older at the time of euthanasia (n = 42), 81% had been in the home for more than three years. The other 19% had been in the home somewhere between one month and three years. However, the onset of behavior problems within these dogs was more varied. While 42.9% of dogs that were 10 or more years old had been demonstrating the problem behavior(s) for three or more years, 21.4% had only shown it for one to three years and another 23.8% only showed it for between three and twelve months. The remaining 11.9% began showing the problematic behavior(s) less than three

months prior to euthanasia, with one of those dogs (2.4%) beginning the behavior problem less than a month before being euthanized.

Figure 5

Age of the Dog at Time of Behavioral Euthanasia



Note: N = 634, mean age = 4.31 years, SD = 3.08

Participants were asked whether a single incident, final incident, or no specific incident contributed to the decision to euthanize. The majority (78%) of respondents (n = 639) said that euthanasia occurred after a final incident. Another 16% said there was no specific incident, and only 6% said euthanasia was the result of one single incident.

4.3 Aggression Toward People

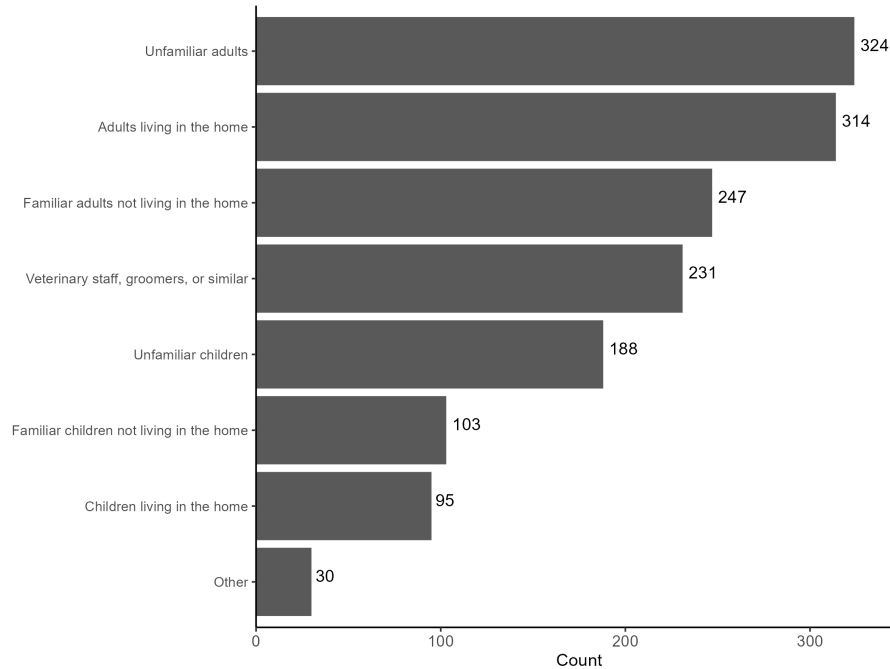
4.3a Targets of Aggression Toward People

Participants who selected aggression toward people as one of the dog's primary behaviors were asked to identify what types of people the dog demonstrated aggression toward, for example, adults in the home or unfamiliar children. Participants selected a mean of 3.2 targets of

aggression, with almost 84% (399) of respondents selecting multiple targets and only 16% (77) selecting a sole target for the dog's aggression (Figure 6).

Figure 6

Total Responses for Potential Targets of Aggression Toward People



Note. N = 476 respondents who said that their dog's aggression toward people was one of the primary reasons for euthanasia. Respondents were able to choose as many categories as applied. Total response count = 1532.

Participants who reported that their dog showed aggression toward people (n = 476) were able to select all the types of people that elicited aggressive responses: for example, adults in the home or unfamiliar adults. Of these participants, 10% said the dog was solely aggressive forward adults in the home. The next most common response (7%) was all adults (unfamiliar adults, adults living in the home, familiar adults not living in the home, and veterinary staff, groomers, or similar). The third most common response (5%) was to select all options (except Other), indicating aggression toward all people. Of the participants who only listed one target (77), over half (49) indicated that the dog aggressed toward adults living in the home.

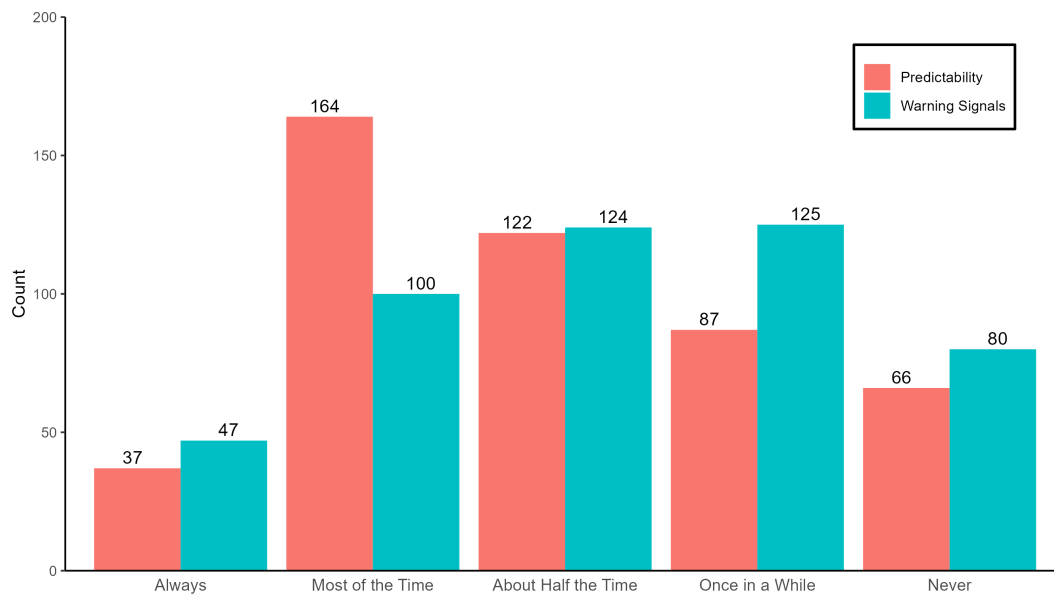
Only a small portion of participants (2.7%) marked aggression only toward children. Choosing only a specific child target was even less prevalent, with 1.9% of all respondents indicating the sole target of aggression was children in the home, and another 0.4% noted the sole target as being familiar children not living in the home.

4.3b Predictability and Warning Signals for Aggression Toward People

Participants were asked to rate how often they could predict situations when their dog would show aggression, as well as how often they saw their dog demonstrate warning signals before aggression. Both predictability and presence of warning signals averaged at “about half the time,” but many participants expressed being able to predict their dog’s behavior most of the time (Figure 7). Overall, participants were able to predict their dog’s aggression in specific situations more often than they saw clear warning signals prior to incidents.

Figure 7

Owner-Reported Predictability and Owner-Reported Warning Signals of Aggression Toward People



Note. N= 476 respondents who reported that their dog demonstrated aggression toward people.

Predictability question: “How often were you able to predict situations where the dog would show aggression toward people? (for example, you knew which situations were likely to cause an aggressive response)”

The presence of warning signals: “How often were there clear warning signals leading up to aggressive incidents? (for example, you were able to see signs like growling, ears pinned, or other body language that indicated an aggressive response was coming)”

4.3c Triggers for Aggression Toward People

Participants were asked to select all triggers or circumstances that led to aggression toward people, and on average selected 5.12 circumstances (Table 1). Only 60 participants (12.6%) selected a single trigger. The most common circumstances in which dogs demonstrated aggression toward people were being approached by an unfamiliar person while walking on leash, or when a person moved quickly or erratically.

Table 1

Total Responses of Types of Triggers or Circumstances for Aggression Toward People

Trigger or Circumstance	Count	Percent of Responses	Percent of Respondents
When an unfamiliar person approached while walking on leash	226	9.3	48.5
Person moving quickly or erratically	215	8.8	45.2
When mailmen or other delivery workers approached the home	189	7.7	39.7
Being touched, handled, or picked up	188	7.7	39.5
Having someone approach their preferred person	172	7.1	36.1
Being groomed, bathed, or examined (for things like veterinary care or nail trims)	167	6.8	35.1
Being approached in/on a preferred space, such as a couch or bed	164	6.7	34.5
Being approached while playing with/chewing on a favorite toy, bone or other object	156	6.4	32.8
A “redirection” where the dog was reacting to something else but bit the person instead, for example when the dog was reacting on leash or running along the fence	155	6.4	32.6
Being startled while sleeping or resting	148	6.1	31.1
Being approached while eating	130	5.3	27.3
Other/None of the above	124	5.1	26.1
When a person intervened in a dog fight	118	4.8	24.8
During an escalation in play/excitement	110	4.5	23.1
When scolded or corrected, or given a command	87	3.6	18.3
When the dog was injured or sick	65	2.7	13.7
I don’t know/didn’t see	27	1.1	5.7

Note. Number of respondents indicating targets of aggression toward people N= 476, total response count =

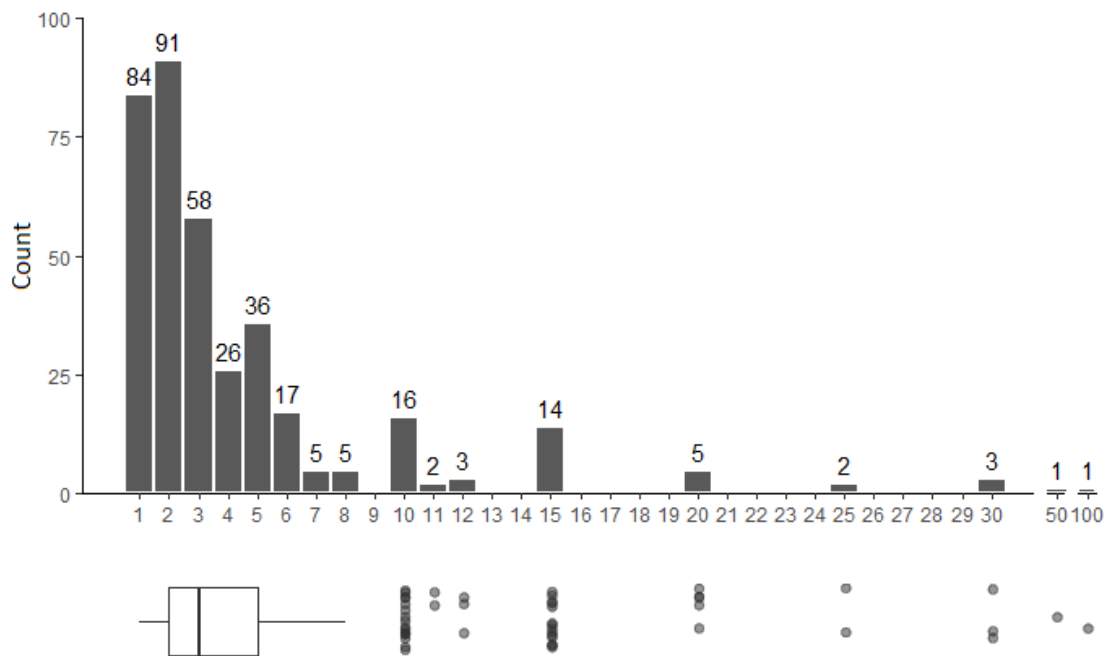
2441. Participants were able to select multiple triggers, so percent of respondents will not add up to 100%.

4.3d Skin-Breaking Bites to People

Of the dogs that demonstrated aggression toward people per their owners' responses, 78% (369) had bitten a person and broken skin (Figure 8). The median number of bites for these dogs was three, and there were several high outliers listing as many as 50 or 150 bites. Of the dogs who had bitten a person and broken skin, 25% had bitten twice while 23% had bitten once. Almost 37% of the biting dogs were reported to have bitten people at least four times, and 12.7% had bitten ten or more times.

Figure 8

Number of Skin-Breaking Bites Reported Per Dog with Aggression Toward People



Note. N = 369 and the two highest outliers (50 bites and 100 bites) were broken from the main axis for better visual representation of the main data.

Participants whose dogs had bitten someone and broken skin were also asked to describe the severity of the bites by way of wound type. Of the dogs who had bitten at least once, the most common type of injury (70.5%) noted was “1- 4 small punctures from a single bite” (Table 2).

The next most common responses were tears and lacerations. Participants were asked to select all wound types that applied to bites their dogs had inflicted, so a single respondent might select both 1-4 small punctures and crushing injuries. For those reporting several bites, the data do not suggest how many bites caused each type of wound. While 37.5% of bites were reported as minor (1-4 small punctures from a single bite) and 18.4% were from small tears/lacerations (also potentially from a single bite), 41.8% of these bites required stitches, left large lacerations/wounds, or would have involved multiple bites within the same incident. Of those, 29.1% would be considered as the most severe types of injuries.

Table 2

Types of Wounds Inflicted in Skin-Breaking Bites to People by Dogs With Aggression Toward People

Injury Type	Severity	Count	Percent
1-4 small punctures from a single bite.	Least Severe	260	37.4
1-3 small tears or lacerations (up to ½ inch).	Moderate	128	18.4
5-8 punctures from the same incident	Severity Moderate	89	12.8
Tears or lacerations greater than ½ inch, or fatty tissue, muscle, etc exposed.	Severity Most Severe	94	13.5
More than 3 tears or lacerations from multiple bites in the same incident	Most Severe	59	8.5
Crushing injuries or broken bones	Most Severe	31	4.5
9-15 punctures from the same incident	Most Severe	13	1.9
16+ punctures from the same incident	Most Severe	5	0.7
Other	Unknown	9	1.3
I don't know	Unknown	8	1.1

Note. Response count = 696 and n = 369 participants that reported that their dog had bitten a person and broken skin.

In addition to total responses of each bite type, the most severe bite per dog was tracked (Table 3). Again, the most common bite type was a single bite with small punctures (33.1%). But when considering the worst bite per dog, 37.6% were in the most severe category. When comparing these worst bites per dog to the overall reports of bites, the bite severity per dog is higher than the bite severity per bite across all responses (37.6% versus 29.1%).

Table 3*Severity of Worst Bite Incident Per Dog that Demonstrated Aggression Toward People*

Injury Type	Severity	Count	Percent
1-4 small punctures from a single bite.	Least Severe	122	33.1
1-3 small tears or lacerations (up to ½ inch).	Moderate Severe	70	19.0
5-8 punctures from the same incident	Moderately Severe	31	12.8
Tears or lacerations greater than ½ inch, or fatty tissue, muscle, etc exposed.	Most Severe	79	21.4
More than 3 tears or lacerations from multiple bites in the same incident	Most Severe	26	7.0
Crushing injuries or broken bones	Most Severe	31	8.4
9-15 punctures from the same incident	Most Severe	3	0.8
16+ punctures from the same incident	Most Severe	0	0
Other	Unknown	2	0.5
I don't know	Unknown	5	1.4

Note. N = 369.

The majority of bites (35.9%) were treated at home without professional medical attention (Table 4). However, 10.8% of all 702 bites required more than ten stitches, other surgery, or admission to the hospital. When looking at the worst bite reported by each respondent (versus total responses), the percentage of bites requiring such extensive medical treatment jumps to 13.8% (n = 369).

Table 4*Medical Care Sought for Wounds from Skin-Breaking Bites to People*

Medical Care	Response Count	Percent of Responses	Respondent Count	Percent of Respondents
Treated at home (including cleaning, bandaging, over-the-counter medication)	252	35.9	143	38.8
Treated at emergency center/emergency room	109	15.5	28	7.6
Treated at urgent care	91	13.0	39	10.6
1-10 stitches	77	11.0	66	17.9
Treated at a doctor's office	42	6.0	19	5.1
None	33	4.7	18	4.9
11-20 stitches	26	3.7	19	5.1
Other surgery required	21	3.0	21	5.7
21+ stitches	16	2.3	9	2.4
Admitted at the hospital (usually at least overnight)	13	1.9	2	0.5
Ambulance	9	1.3	1	0.2
Other	9	1.3	0	0
I don't know	4	0.6	4	1.1

Note: response count = 702, n = 369

4.4 Aggression Toward Dogs or Other Animals

4.4a Targets of Aggression Toward Dogs or Other Animals

After aggression toward people, aggression toward dogs or other animals was the second most commonly reported problem behavior. The most commonly reported target of aggression toward other animals was another dog(s) in the home (31%), followed by unfamiliar dogs (28%) and to a lesser extent, familiar dogs not living in the home (17.5%, Table 5). Aggression toward dogs (whether familiar or unfamiliar) made up 76.7% of all responses. Overall, 63.5% of participants marked that their dog was aggressive toward other dogs but not toward any other species. The most common response overall was aggression toward other dogs in the home (22%); toward unfamiliar dogs (9%); or a combination of the two (11%).

Table 5

Total Responses of Types of Targets for Dogs' Aggression Toward Other Dogs or Other Animals

Target/Victim	Response Count	Percent of Responses	Percent of Respondents
Other dogs in the home	283	31.2	71.7
Unfamiliar dogs	253	27.9	64.1
Familiar/known dogs not living in the home	159	17.6	40.3
Unfamiliar cats	101	11.2	25.6
Cats in the home	81	8.9	20.5
Livestock	9	1.0	2.3
Small wildlife	7	.8	1.8
Unspecified/ "all animals"	5	.6	1.3
Large wildlife	4	.4	1.0
Chickens	4	.4	1.0

Note. Response count = 906, n = 394. Responses in the "Other" category were aggregated into Livestock, Large wildlife, Small wildlife, and Chickens based on the provided responses.

Of the 394 dogs who were reported to demonstrate aggression toward other animals, only 133 were listed as having a sole target of that aggression. Of these, 88 (66.2%) aggressed only toward other dogs in the home (Table 6). This was followed by 36 (27.1%) aggressing toward unfamiliar dogs, and small percentages for cats in the home (3.8%) and familiar dogs living

outside the home (3.0%). No other targets (e.g. unfamiliar cats, wildlife, livestock) were represented as sole choices and were reported only when other targets were also listed. Other potential targets for aggression included cats, wildlife, and livestock of various types.

Table 6

Targets for Aggression Toward Animals When Only One Target Was Selected

Target/Victim	Response Count	Percent of All Responses	Percent of 133 Respondents with 1 Trigger
Other dogs in the home	88	22.3	66.2
Unfamiliar dogs	36	9.1	27.1
Familiar/known dogs not living in the home	4	1.0	3.0
Unfamiliar cats	5	1.3	3.8
Cats in the home	0	0	0
Livestock	0	0	0
Small wildlife	0	0	0
Unspecified/ "all animals"	0	0	0
Large wildlife	0	0	0
Chickens	0	0	0

Note. 133 respondents chose only a single target of aggression toward dogs or other animals.

4.4b Triggers of Aggression Toward Dogs or Other Animals

Participants indicated circumstances in which the dog had shown aggression toward dogs or other animals. These responses varied widely, but some of the most commonly reported triggers were being approached while on leash (10.4%), an escalation in play/excitement (9.5%), being approached while engaging with a preferred object like a toy or a bone (9.4%), and predatory behavior (9.4%, Table 7).

Table 7*Circumstances or Triggers for Aggression Toward Animals*

Circumstances	Count	Percent
Being approached directly by the other animal while the dog was on leash	154	10.3
Being approached while playing with/chewing on a favorite toy, bone, or other object	141	9.4
Escalation in play/excitement	141	9.4
Predatory behavior (attempting to hunt or prey on the other animal)	140	9.4
When an animal entered the dog's yard or home	137	9.2
When a preferred person was approached by the other animal	127	8.5
Being approached in/on a preferred area, such as a couch or bed	120	8.0
Being approached while eating	112	7.5
A "redirection" where the dog was reacting to something else but bit the other animal instead, for example when the dog was reacting on leash or running along the fence	88	5.9
Other	59	4.0
When woken up from sleeping or startled	57	3.8
I don't know	53	3.6
Joined in when other dog(s) were already fighting	50	3.4
The other animal attacked, cornered, or otherwise threatened the dog	39	2.6
None of the above	27	1.8
The dog itself was injured, sick, etc	26	1.7
Changes in health or appearance of the other animal	22	1.5

Note: Response count = 1493

4.4c Predictability and Warning Signals of Aggression Toward Dogs or Other Animals

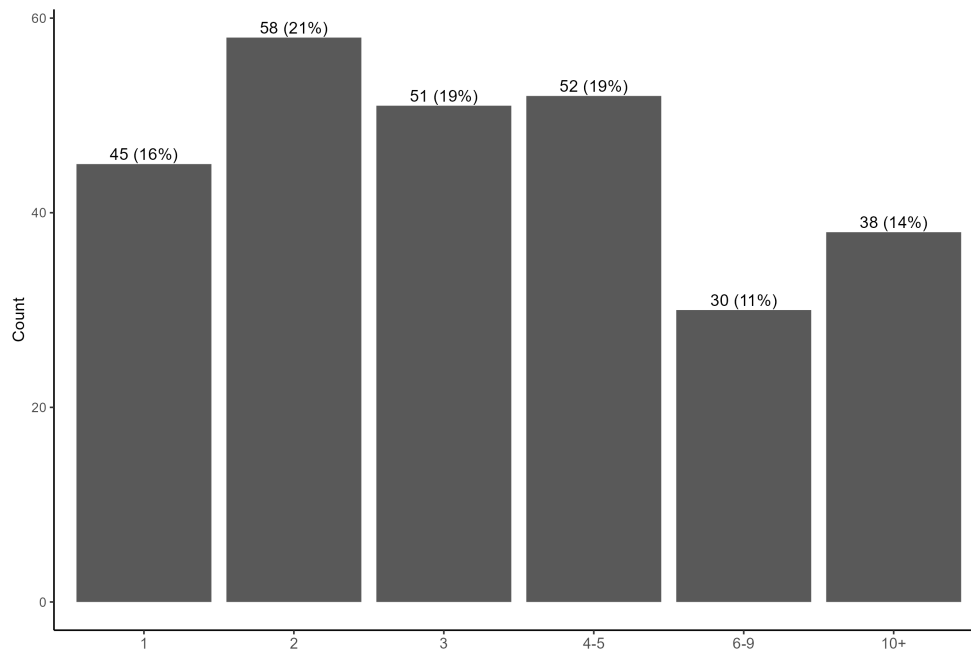
The predictability and presence of warning signals of aggression toward dogs and other animals mirrored those for aggression toward people. While both measures averaged at "about half the time," more respondents (45.9%) said they could predict situations that would elicit aggression always or most of the time while only 33.4% said they could identify warning signals always or most of the time.

4.4d Skin-Breaking Bites to Dogs or Other Animals

Of the dogs that demonstrated aggression toward dogs or other animals per their owners' responses (n = 395), 69% had bitten an animal and broken skin. Of these dogs, 16% only broke skin once (Figure 9). Another 21% and 19% inflicted two or three bites, respectively. Almost 44% of dogs who had broken skin while biting had done so four or more times, with 38 dogs (14%) reported to have broken skin ten or more times.

Figure 9

Number of Skin-Breaking Bites to Dogs or Other Animals



Note. N = 274. Responses were aggregated for visual representation.

Of the dogs who had bitten another animal and broken skin, the majority of wounds (29.5%) were minor, causing 1-4 small punctures from a single bite (Table 8). On the severe side of the spectrum, 30 responses (10.9%) indicated that the other animal was killed in the bite incident and 18 respondents (6.6%) said the other animal was wounded badly enough to require euthanasia. Of the respondents who reported that the dog had either killed another animal or wounded it badly enough to require euthanasia, three of the victims were confirmed as wildlife, four were confirmed as cats, and at least 18 were dogs. In one case the dog had killed two cats and one dog in the home, and in another case, the dog had killed two different dogs in the home. The remaining cases could not be confirmed due to the combination of targets and bites reported.

Table 8*Types of Wounds Inflicted in Skin-Breaking Bites to Dogs or Other Animals*

Injury Type	Count	Percent
1-4 small punctures from a single bite.	175	29.5
1-3 small tears or lacerations (up to ½ inch).	85	14.3
Tears or lacerations greater than ½ inch, or fatty tissue, muscle, etc exposed.	84	14.1
5-8 punctures from the same incident	70	11.8
More than 3 tears or lacerations from multiple bites in the same incident	58	9.8
Killed the other animal	30	5.1
Crushing injuries or broken bones	24	4.0
9-15 punctures from the same incident	20	3.4
Wounded the other animal badly enough for the animal to require euthanasia	18	3.0
Other	13	2.2
16+ punctures from the same incident	13	2.2
I don't know	3	0.5

Note. Response count = 594

Participants reported whether medical attention was sought for the dogs or other animals that had been bitten. The majority either received care at a veterinary clinic (30.5%) or were treated at home (27.7%; Table 9).

Table 9*Medical Care Sought for Wounds from Skin-Breaking Bites to Dogs or Other Animals*

Medical Care	Count	Percent
Wound care at a veterinary clinic	156	30.5
Treated at home (including cleaning, bandaging, over-the-counter medication)	142	27.7
1-6 stitches	46	9.0
Surgery required	44	8.6
7-20 stitches	41	8.0
Other animal died or was euthanized due to its injuries	32	6.3
None	22	4.3
21+ stitches	17	3.3
I don't know	8	1.6
Other	4	0.8%

Note. Response count = 512

4.5 Fear, Anxiety, or Stress

The category of fear, anxiety, and stress was the third most frequently reported behavior category with 364 dogs (53%). Participants who provided details in this section (311) selected multiple triggers for their dog's fears (Table 10). The most common combination of responses (8%) was a selection of all available choices. Five circumstances (sudden noises, unfamiliar people, new locations/situations, the veterinary clinic, and unfamiliar dogs) were reported to cause fear, anxiety, or stress in at least 80% of the dogs in this category.

Table 10

Situations that Caused Fear, Anxiety, or Stress

Circumstance or Trigger	Response Count	No Visible Fear					Extreme Fear
		1	2	3	4	5	
Sudden noises	258	50	42	68	72	76	
Unfamiliar people	255	52	39	58	54	104	
New locations/situations	254	51	42	78	70	64	
Veterinarian or veterinary clinic	251	52	28	69	58	96	
Unfamiliar dogs	248	51	48	59	70	71	
New objects/items	180	125	55	56	43	26	
Familiar people	174	133	75	66	25	8	
Familiar dogs	150	150	6	53	20	11	
Being outside	161	148	57	51	29	24	
Riding in the car or other vehicle	147	156	38	46	32	32	
Passing vehicles	139	163	41	35	34	29	
Surfaces/textures (such as floor types)	88	216	50	20	10	8	

Note. Participant count $n = 311$. Participants were asked to rank the dog's fear in given situations from 1: no visible fear to 5: extreme fear. They were also given the option to select N/A rather than a number if they had not observed their dog in a particular situation.

Participants were also asked to rank each circumstance by level of fear, anxiety or stress (from no signs of fear to extreme signs of fear). While the top five most reported circumstances all impacted 80-83% of dogs in this section, these circumstances varied greatly by reported

severity. Dogs were much more commonly rated as showing “extreme” signs of fear toward unfamiliar people or at the veterinary clinic versus sudden noises, unfamiliar dogs, or new environments. While over half of dogs were reported as being fearful about new objects, familiar dogs, or being outside, those circumstances were generally reported at a lower level of fear. Overall, 33% of respondents indicated that their dog showed “extreme” fear, anxiety, or stress around unfamiliar people, and 30.1% had similarly severe behavior at the veterinarian.

Participants reported on the frequency of the dog’s fearful behaviors, with options from monthly, to weekly, to daily (including multiple times per day). The majority of participants (59%) said their dog’s fear occurred at least once per day, with 35% indicating multiple times per day and 10% indicating ten or more times per day. A smaller percentage (29%) showed fear, anxiety, or stress only weekly, and another 13% only demonstrated this behavior monthly.

Of the dogs who were reported to demonstrate fear, anxiety, or stress, 7% had injured themselves at least once due to fear- or anxiety-induced behavior.

4.6 Compulsive Behaviors

Compulsive behaviors were reported by 97 participants, making up 6% of all reported behavior problems. Of these participants, 86 completed the compulsive behavior details section of the Behavioral Euthanasia in Pet Dogs questionnaire. Participants selected an average of 2.1 behaviors, with 30 participants selecting only one compulsive behavior (Table 11). By far the most common behavior was licking, reported by 44% of participants and 21.4% of all responses. Additionally, a plurality (15%) of participants chose licking as the sole compulsive behavior their dog had exhibited. Close behind was path-running or pacing (37.8% of all respondents). Another 9% of participants only selected “Other”, and did not indicate that their dog performed any of the listed compulsive behaviors.

Table 11*Types of Compulsive Behaviors Demonstrated*

Compulsive Behavior	Count	Percent of Overall Responses	Percent of Respondents
Licking	40	21.4	44.4
Path-running or pacing	34	18.2	37.7
Fly biting/ fly snapping (staring at or snapping at the air)	24	12.9	26.7
Star gazing (staring at the sky or ceiling)	24	12.9	26.7
Light or shadow chasing	23	12.3	25.6
Other	21	11.2	23.3
Tail chasing or spinning	15	8.0	16.7
Sucking	6	3.2	6.7

Note. N = 90 and response count = 187

Participants reported on the frequency of the dog's compulsive or repetitive behaviors, with options from monthly, to weekly, to daily (including multiple times per day). The majority of participants (66%) said their dog's compulsive behavior occurred at least once per day, with 41% indicating multiple times per day and 18% indicating ten or more times per day. A smaller percentage (29%) showed compulsive behaviors only weekly, and another 5% only demonstrated this behavior monthly.

Of the dogs who were reported to demonstrate compulsive behavior 14% had injured themselves at least once while performing the behavior.

4.7 Separation Anxiety or Separation-Related Behaviors

Separation-related issues were reported by 91 participants, making up 5.6% of all primary behavior problem responses (n=1609). Separation anxiety was split from the general category of fear, anxiety, and stress in the Behavioral Euthanasia in Pet Dogs Questionnaire based on categories typically reported at veterinary behavior clinics. Of these participants, 77 completed the separation anxiety details section of the Behavioral Euthanasia in Pet Dogs questionnaire, and almost all respondents selected both restlessness and barking or whining as problem behaviors

during separation (Table 12). Chewing (86%), trembling or shaking (74%), and escaping confinement (66%) were the next most common, all reported by more than half of the participants who completed the separation anxiety section.

Table 12

Separation Related Behaviors Reported Overall and by Frequency

Behavior	Response Count	Percent of Respondents	Frequency			
			Always	Usually	Sometimes	Seldom
Restlessness/agitation/pacing	75	97	27	18	15	15
Barking or whining	73	95	28	14	17	14
Chewing/scratching at doors, floor, windows, curtains, etc	66	86	24	9	12	21
Trembling or shaking	57	74	16	16	8	17
Escaping confinement (such as a crate)	51	66	15	8	13	15
Self-harm (for example, from licking or scratching)	44	57	10	7	8	19
Urination/defecation	35	45	5	7	8	15
Escaping the area (such as a door or window)	29	38	6	6	8	9
Hiding	20	30	2	3	5	13

Note: n=77. Response count includes all responses from “always” to “seldom,” but not those who marked “never” for that behavior.

Participants were also asked to rate the frequency of these behaviors, on a scale from always to never. Restlessness and vocalization were both predominantly listed as “always” occurring (36.0% and 38.4%,) with other frequencies all reported less commonly. Chewing, however, was most commonly reported as either “always” or “seldom.” Behaviors like urination/defecation, hiding, or escaping the area were all more frequently listed as occurring “sometimes” or “seldom” rather than more often. Of the dogs in this section, 20.8% had injured themselves at least once during a period of separation.

4.8 Other Behaviors

Participants who selected “Other” as one of the primary behavioral reasons for euthanasia (n = 64) were able to detail that behavior in an open text field. This qualitative data was not analyzed during this initial data analysis process, which focused on the quantitative data from the questionnaire.

DISCUSSION

5.1 Primary Behaviors and Rankings

To investigate the factors associated with behavioral euthanasia in pet dogs, a survey was distributed to owners who had euthanized a dog in the United States within the last five years. The Behavioral Euthanasia in Pet Dogs Questionnaire allowed participants to rank up to three types of behavior that led to their decision to euthanize. Looking at the responses by rank provides an interesting view of the relative importance of each behavior issue. For example, aggression toward people was not only the most commonly reported behavior but also much more likely to be chosen as the primary reason for euthanasia (versus a second or third reason). This may be due to the inherent safety risks involved with aggression toward humans. This may indicate a prioritization of our own species' safety.

Conversely, non-aggression behaviors were more likely to be reported as secondary or tertiary behavioral causes of euthanasia. While they were rarely the leading cause, these behaviors still influenced the euthanasia decision and may have impacted the manageability of the primary behavior. The importance of comorbidities cannot be understated, with 80.3% of participants selecting and ranking three problem behaviors (the maximum allotted) as influencing their euthanasia decision. It is also possible that data were lost by limiting participants to three categories, and further research should identify whether even higher levels of comorbidity are present. However, it is difficult to know how many people selected three behaviors because they were given that option, rather than all three categories being significant contributors to the euthanasia decision. While the questionnaire did instruct participants to rank up to three options and choose only those which contributed to the euthanasia decision-making process, the prevalence of tertiary behaviors may have been influenced by the questionnaire design.

5.2 Age at Euthanasia and Time in the Home

Previous studies looking at behavioral euthanasia have looked primarily at dogs ages three or under (Boyd et al., 2018; O'Neill et al., 2013; Yu et al., 2021). Only about half of the dogs in this sample were ages three and under at the time of euthanasia. Behavioral euthanasia was reported in dogs under a year old as well as dogs at ages 18 and 19 at the time of euthanasia, indicating that researchers may want to include older dogs in their data sets.

Additionally, the information about dogs' ages at euthanasia combined with data on time in the home indicate that the majority of these dogs were in their homes, demonstrating this problematic behavior (or behaviors) over several years. While some dogs were euthanized younger or after a shorter amount of time in the home, the majority of participants lived with the problem behavior(s) for years before making the final decision to euthanize.

Understanding the time of behavior onset may give insight into what behaviors are tolerable over a longer period of time. While a dog may be euthanized at an older age because their behavior was managed for many years, this is quite different from a dog who exhibits a problem behavior later in life, which may warrant euthanasia more quickly due to severity. Additionally, a subset of dogs appeared to develop behavior problems and be euthanized at ages 10 or older. This could be due to non-behavioral factors increasing the likelihood of the euthanasia decision, but could also indicate that age-related issues or cognitive decline might play a role. Future research into senior dogs euthanized for behavior would be informative for behavior practitioners working with older dogs.

5.3 Aggression Toward People

Aggression toward people was by far the most commonly-reported reason for behavioral euthanasia. Aggression to people was also the most heavily weighted, and was much more likely to be selected as the primary or secondary cause for euthanasia versus being ranked third.

Additionally, aggression toward people was the most common selection for participants who said there was only one behavior that led to the euthanasia decision.

Participants reported that their dogs typically showed aggression toward multiple types of people, with unfamiliar adults being the most commonly reported target (by overall number of responses). The most common single response was aggression toward adults living in the home, representing 10% of all responses. This might be due to an inability to manage aggression toward an owner versus a visitor, or due to the frequency of aggressive incidents. Additionally, this prevalence might indicate the emotional significance of aggression breaking the human-animal bond with the owner (Buller & Ballantyne, 2020; Grigg, 2019; Grigg & Donaldson, 2019; Reisner et al., 1994).

Aggression toward children was overall less reported than aggression toward adults. Children were rarely the sole target of aggression, with only 2.7% of respondents marking that their dog had aggressed toward children but not adults. This is particularly interesting when compared to national dog bite data which show dog bites happening much more frequently to children than to adults (Loder, 2019b). Survey participants who reported that their dog demonstrated aggression toward children mostly indicated familiar children as the target, indicating that aggression toward strange or unknown children was extremely uncommon in the euthanized dogs. This finding is in line with bite statistics suggesting that most pediatric bites are inflicted by a familiar dog (Jakeman et al., 2020).

Predictability of behaviors may be one mechanism for determining the severity of a behavior within a context of manageability. If aggression toward people can be successfully predicted, and the dog demonstrates clear warning signals, owners might be able to prevent this behavior from escalating (Haug, 2011a; Haug, 2011b). However, a lack of predictability might decrease attempts to manage the behavior and lead to euthanasia decisions. For this reason, questionnaire participants were asked to gauge how predictable their dog's aggression was, as well as whether their dog showed warning signals. There was a wide range in participants' ability

to predict their dog's aggression in specific situations and see clear warning signals prior to incidents. While few participants said they could "always" predict the dog's aggression toward people, over one-third (34.4%) said they could predict it "most of the time." In general, this further indicates long-term, known aggression issues.

Understanding the circumstances or "triggers" for aggression can provide another insight into the severity of the behavior. There was a wide range of circumstances leading to aggression. Because participants were able to list multiple triggers but not rank them, it is difficult to tell whether certain types of scenarios were more likely to lead to euthanasia. Given the many systems of categorizing aggression in previous studies, it is difficult to fully understand the prevalence of different types of aggression and their risk factors. The wide variety in circumstances found in this survey indicate the need for future research with consistent behavioral questions to better understand which aggressive behaviors may lead to euthanasia.

Most of the dogs reported to have shown aggression toward people had bitten someone and broken skin. About two-thirds of the dogs had bitten once, twice, or three times, but the remaining dogs (36%) had bitten four or more times. These numbers provide a strong argument for safety concerns, as dogs in this group had typically bitten more than once. While the number of bites is a strong indicator for overall behavioral concerns, the severity of the bites may also greatly influence potential euthanasia decisions. While many participants listed that their dog had inflicted at least one minor bite of 1-4 small punctures, a substantial portion of responses indicated more severe bites.

Because of the difficulty in assigning severity to bites due to multiple factors and dimensions (e.g. dog size, measurement of wounds, etc), the Behavioral Euthanasia in Dogs questionnaire also includes questions about the treatment required for wounds. These treatment responses similarly showed that many bites required little to no treatment, while others required substantial medical care.

5.4 Aggression Toward Dogs or Other Animals

While the Behavioral Euthanasia in Pet Dogs questionnaire provides opportunities for respondents to mark aggression toward non-dog animals, the overwhelming majority of responses involved aggression toward other dogs. Aggression toward other dogs in the home is particularly notable, in parallel to the prominence of human aggression toward people living in the home. This indicates the importance of a dog's ability to coexist safely with humans and dogs in their home and the consequences when they do not.

This result becomes even more prominent when looking at respondents who only listed a single target for their dog's animal-focused aggression. Again, intra-household dog aggression was the most common, with unfamiliar dogs a distant second. However, known dogs outside the home were rarely marked as a single-entry response, perhaps because these types of dogs are more likely to be avoidable. Additionally, only five participants (1% of overall respondents in the category of aggression toward animals) marked aggression toward cats in the home as their single response. Unfamiliar cats, wildlife, and livestock were never marked alone, demonstrating that aggression only toward these animals might be considered less egregious or worthy of euthanasia. However, this finding might also be the result of a more urban sample, and different demographics might yield other results.

5.5 Non-Aggression Behaviors

In total, only 107 participants (15.5%) ranked a non-aggression behavior (including fear, anxiety, or stress; compulsive behavior; separation anxiety; or other) as the primary reason for euthanasia ($n = 690$). These behaviors were more commonly ranked as second or third, contributing to the euthanasia decision but not the most important factor. This may indicate that euthanasia is chosen when there is a perceived safety risk to others more so than when the dog's quality of life is the main risk.

Most dogs reported as showing fear, anxiety, or stress experienced these symptoms in multiple scenarios. While we expected wide variation in circumstances that caused fear, a large portion of dogs were reported to be fearful in many (if not all) of the listed scenarios. Nearly a third of participants in this section indicated that their dog showed “extreme” fear, anxiety, or stress toward unfamiliar adults or at the veterinary clinic. These scenarios may be more prevalent overall across the population of pet dogs (versus fear of surfaces, dogs, etc), or may be overrepresented in dogs who are euthanized for behavior. Most participants reported that the dog was fearful or anxious at least once per day, indicating a major concern for quality of life.

While compulsive behaviors were rarely the primary cause for euthanasia, they played a larger role as a secondary or tertiary behavioral cause. The majority of participants indicated that compulsive behaviors occurred multiple times per day and that 14% of dogs exhibiting compulsive behaviors had injured themselves at least once while performing the behavior. Again, these factors indicate strong concerns for the dog’s quality of life.

Separation anxiety (or separation-related problem behavior) was less prevalent in this questionnaire than expected. It was only noted in 5.6% of responses, and only 15 participants marked it as the primary reason for euthanasia. Of the dogs who were reported to show separation anxiety, over 20% had injured themselves at least once when alone. This high rate of self-harm might be part of why euthanasia was chosen for these dogs, though destructive behaviors were also highly represented.

5.6 Limitations

A number of limitations impact this research and should be considered when interpreting its results. Due to the retrospective nature of this data collection, participant responses may have been influenced by recall bias (Jacob & Ganguli, 2016). Participation was limited to those who

had euthanized a dog for behavior after January 1st, 2017 in order to control for extended loss or change in memory over greater periods of time.

Participation was limited to those living in the United States at the time of the euthanasia, to ensure consistency across units (for example, pounds versus kilos for weight). Additionally, this limits the stark differences that may be found in euthanasia in different countries, which may be influenced by a myriad of additional factors. Dog ownership and perceptions of dogs vary greatly by country and geographic area (Herzog & Rowan, 2019; Wan et al., 2009). As such, this study's data and its conclusions should not be taken as a representation of behavioral euthanasia in other countries.

Participation was limited to the euthanasia of owned dogs, thus these results may not apply to shelter or foster dogs. Future research on behavioral euthanasia decisions for foster dogs should be investigated, as it might help delineate the roles that shelter/rescue and foster play in that decision.

This group of participants may not be representative of all owners who have euthanized a dog for behavior. First, this online questionnaire would have been inaccessible to those who did not have reliable internet or phone/computer service. Additionally, respondents largely learned about the questionnaire from dog-related groups on Facebook and similar social media sites, which further limits the sample. There is further bias in the sample, as the vast majority of respondents said they found the questionnaire through the Facebook group Losing Lulu, which is a grief support group for individuals who have euthanized a pet for behavior reasons. The participants in this group are those who self-identify as grieving and in need of support. However, there are likely people who have euthanized a dog for behavior and did not join an online support group. Because of this selection bias, and the high percentage of respondents who identified as White, female, and highly educated, this sample cannot be seen as representative of all behavioral euthanasia of pet dogs.

Another potential limitation of this study is the use of mostly original questions which have not yet been validated by other research. For the majority of questions about dog behavior and related topics, questions were developed with support and feedback from over two dozen behavior experts that included practicing dog trainers and behavior consultants, academic researchers, and veterinary behaviorists.

Another limitation is that the sample population from this study cannot currently be compared against other populations of dogs. For example, an “average” companion dog, or dogs with comparable problem behaviors who have not been euthanized. Future studies may allow a more direct comparison of similar dogs versus the general population of pet dogs. In the meantime, this data set provides information about commonalities and correlations, but cannot assign “risk factors” or compare against another set of dogs.

5.7 Further Research

This research provides an initial view into the types of behaviors that may be associated with behavioral euthanasia in pet dogs. It is intended to give exploratory information across a range of factors, to allow for more precise questions and research in the future. While this type of exploratory questionnaire research provides quantitative data on the behavioral factors associated with euthanasia, other forms of research will be essential to fully understand this area. Without centralized or consistent reporting in the veterinary field in the United States, it is currently difficult to estimate the number of dogs who are euthanized for behavior each year. Without this data, we cannot track changes over time, across regions, or measure potential interventions.

Further research into behavioral euthanasia in dogs should investigate the non-behavioral factors that contributed to the euthanasia decision. For example, are dogs more likely to be euthanized for behavior if they live in a particular type of home, or if they live with a certain number of human or canine family members? How much do factors like major life changes (expecting a child, moving, etc) impact the decision?

Understanding what interventions families seek prior to behavioral euthanasia may provide insight into future treatment options and/or ways to counsel owners through the process. Future research into behavior modification (or training) and veterinary support sought by owners prior to euthanasia may indicate strategies for preventing behavior problems before they reach this point. Additionally, understanding the management strategies that owners attempted can inform behavior professionals of potential risks or efficacy when recommending interventions to clients.

Future research on behavioral euthanasia in other companion animal species would be beneficial, as would studies in different areas of the world. Behavioral euthanasia occurs within a complex cultural context, and further research may provide insight into related cultural elements. Additionally, continuing research should be conducted over time to understand trends or changes.

Another area of future study would be in providing comparisons of dogs euthanized for behavior versus an average or normal dog, or versus dogs with similar behavior issues that have not been euthanized. Similarly, the Behavioral Euthanasia in Dogs Questionnaire could be adapted for use with shelter or foster dogs.

Additional research, including qualitative research, will be essential to understanding the human experience and thought processes around euthanasia decision-making as well as the impacts on an owner's emotional health (before and after euthanasia). Qualitative research will also yield additional commonalities or topics that need to be further explored, hopefully improving the overall thoroughness of our understanding of behavioral euthanasia.

CONCLUSIONS

This study provides an exploratory overview of the behaviors associated with behavioral euthanasia in pet dogs in the United States. The Behavioral Euthanasia in Pet Dogs Questionnaire was designed to garner specific, detailed information about behaviors that led to dog owners' decision to euthanize. The questionnaire can be used in the future to compare different populations of dogs with serious behavioral concerns, allowing for a consistent measurement system. The language in the questionnaire is accessible to the average pet owner, but the multiple data points (targets, triggers, frequency, bite severity, etc) allow professionals to better gauge overall severity and prognosis.

The resulting data from this study indicate that aggression, particularly aggression toward people, is the main driver of behavioral euthanasia. Findings also suggest that behavioral euthanasia happens across a range of ages, not just young dogs, and that most dogs euthanized for behavior likely demonstrated problematic behaviors for months or years prior to euthanasia. When combined with reports of bites, the data show an overall severe level of behavior leading to the decision to euthanize. The results also indicate that safety risks are heavily considered when making euthanasia decisions, but that non-threatening behaviors more related to the dog's quality of life are less likely to be considered cause for euthanasia.

This study lends credibility to behavioral euthanasia as a choice when a dog presents a safety risk or has diminished quality of life. The findings from this study will help reduce the stigma around discussing behavioral euthanasia, and lead to better resources for professionals and pet owners working with challenging dog behavior cases. This could include identifying effective treatment options for certain behaviors to avoid unnecessary euthanasia, or creating resources for those needing to euthanize. Additionally, this data can aid shelters and rescues in developing data-driven models for risk assessment and quality of life assessment in the context of behavioral euthanasia decision-making.

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APPENDICES

Appendix A: Questionnaire/Survey Instrument

Notes in blue are internal labels/section headers and will not appear to participants.

INFORMATION PAGE/CONSENT FORM

You are invited to participate in a research study. This form includes information about the study and contact information if you have any questions.

In order to participate in this study, you must:

- Be over the age of 18
- Have euthanized a pet dog primarily due to behavior problems any time **on or after 1/1/2017**. Note: this is for a dog that you owned, not a dog in a shelter or foster environment.
- Have been living (at the time of euthanasia) in the United States

The purpose of this study is to identify factors related to behavioral euthanasia in pet dogs. Currently there is very little information about pet dogs euthanized for behavior reasons, in part due to social stigma and limited tracking mechanisms. Better data and information may lead to improved treatment options, better prevention methods, and more support for people making this decision.

The survey will start with questions about the dog, and about your living situation at the time of the euthanasia. You will then be asked questions about the dog's behavior, interventions, or treatments that may have been attempted, and the euthanasia decision-making process. You will also be asked details about the dog's behaviors, based on your answers in prior sections.

The study should take approximately 15-30 minutes of your time.

We do not anticipate any risks from completing this study, except for potential psychological stress from answering questions of a difficult or emotional nature. If you need support, you may find information through the University of Tennessee Veterinary Social Work Program here: <https://vetsocialwork.utk.edu/pet-loss-support-group-2/>

You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. You may also refuse to answer any questions you don't want to answer and remain in the study. The investigator may withdraw you from this research if circumstances arise which warrant doing so.

We will do our best to protect the confidentiality of the information we gather from you, but we cannot guarantee 100% confidentiality. Your responses are anonymous, so no one can associate your answers back to you. Please do not include your name or other identifying information in your responses that can identify you.

Researcher: Miranda Hitchcock, mirandah@vt.edu

IRB# and Title of Study: 22-311 Factors Associated with Behavioral Euthanasia in Pet Dogs

If you have any questions or concerns about the research, please feel free to contact Miranda Hitchcock, mirandah@vt.edu. You are not waiving any legal claims, rights or remedies because

of your participation in this research study. If you have questions regarding your rights as a research participant, contact the Virginia Tech HRPP Office at 540-231-3732 (irb@vt.edu).

1. Are you over the age of 18?
 - a. Yes/No ([if no, terminate survey](#))
2. Have you euthanized a pet dog primarily due to behavior problems any time on or after January 1st, 2017? Note: this is for a dog that you owned, not a dog in a shelter or foster environment.
 - a. Yes/No ([if no, terminate survey](#))
3. Were you living in the United States at the time of the euthanasia?
 - a. Yes/No ([if no, terminate survey](#))

We understand that this topic may carry strong emotions, and that every behavioral euthanasia case is different. Please answer the questions honestly based on your situation, to the best of your ability and memory. Your responses are anonymous, and you may save and continue later if you need to take a break.

If you would like to participate in this survey, click START to begin.

DOG INFORMATION

Please answer the following questions about the dog that was euthanized.

4. What was the dog's sex?
 - a. Male
 - b. Female
5. Was the dog spayed/neutered?
 - a. Yes
 - b. No
 - c. I don't know
6. Was the dog a pure breed or a mixed breed?
 - a. Purebred
 - b. Mixed Breed
 - i. [3a. If Pure bred above:](#) If purebred, what was the breed? ([free text](#))
 - ii. [3b. If Mixed breed above:](#) If mixed breed, what was the breed mix? ([free text](#))
7. What was the dog's adult weight in pounds? (known, estimated, or expected) ([free text](#))
8. Where did you get the dog?
 - a. Directly from the dog's breeder
 - b. Local shelter, humane society, or rescue organization
 - c. Out of state or overseas shelter/rescue organization
 - d. Friend/Family/Coworker
 - e. Pet store
 - f. Online
 - g. Found
 - h. From a litter I bred
 - i. Other _____
9. What was the dog's age when you got him/her? (or your best estimate)
 - a. Under 8 weeks
 - b. Between 8 and 16 weeks
 - c. Between 4 and 6 months
 - d. Between 6 and 12 months
 - e. Between 1 and 3 years

- f. Between 3 and 7 years
 - g. 7 years or older
10. How long did you have this dog?
- a. Less than 1 week
 - b. Between 1 and 4 weeks
 - c. Between 1 and 3 months
 - d. Between 3 and 12 months
 - e. Between 1 and 3 years
 - f. 3 or more years
11. Is there anything else you'd like to tell us about the dog in general? (There will be more specific questions about behavior later) ([free text](#))

LIVING SITUATION

For the questions below, please answer based on your situation just prior to the euthanasia.

12. Which state did you live in?
- a. [State dropdown list for United States](#)
13. What type of home did you live in?
- a. Apartment building
 - b. Townhouse
 - c. Single-family dwelling
 - d. RV, trailer, or other mobile dwelling
 - e. Farm
 - f. Hotel or other temporary dwelling
 - g. Other _____
14. Did you rent or own the home listed above?
- a. Rent
 - b. Own
 - c. Other _____
15. What type of area did you live in?
- a. Urban
 - b. Suburban
 - c. Rural
16. Not including yourself, how many adults (18 years +) lived in the home?
- a. 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10+
17. How many children (under 18 years old) lived in the home?
- a. 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10+
 - b. 18a. [If greater than zero children above](#) What were the ages of the children in the home at the time? (select all that apply)
 - i. Under 1 year, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17
18. How many other pets (not including the dog) were living *inside* the home?
- a. Dogs ([Number scale 0-7+](#))
 - b. Cats ([Number scale 0-7+](#))
 - c. Other _____ ([Number scale 0-7+](#))
 - d. 19a. [If "Other" nonzero above](#), If you had other pets living inside the home (other than dogs and cats), what type?
19. What other pets or animals (not including the dog) were living at the home *OUTSIDE* that the dog interacted with?
- a. Dogs
 - b. Cats

- c. Small livestock (such as chickens)
 - d. Large livestock (such as sheep, cows)
 - e. Other _____
20. Where did the dog typically sleep at night?
- a. In the bedroom
 - b. Elsewhere in the house
 - c. In a garage or barn
 - d. Outside
 - e. Other _____
21. Is there anything else you'd like to tell us about the dog's living situation prior to euthanasia? (free text)

PRIMARY BEHAVIORS (Use these responses for skip logic to the appropriate details sections)

22. What were the most significant behavioral factors in the euthanasia decision? Please select up to three of the following, with the most significant ranked first. If there was only one (or two), leave the rest blank.
- Aggression toward people
 - Aggression toward dogs or other animals
 - Separation anxiety or separation-related behaviors
 - Compulsive behaviors
 - Fear, anxiety, or stress-related behaviors
 - Other (destructive behavior, house soiling, or anything else)

INTERVENTIONS

The following questions will ask about any treatments, training, or other strategies you may have attempted prior to euthanasia.

26. Did you speak to a veterinarian about the behavior?
- a. Yes
 - b. No
 - c. 26a. If yes to 26: What veterinarian recommended strategies were attempted? (select all that apply)
 - i. Physical examination
 - ii. Bloodwork or other diagnostic tests
 - iii. Referral to a Veterinary Behaviorist
 - iv. Situation behavioral medication (medication given only for specific stressful events or situations)
 - v. Daily behavioral medication (medication given at least once per day for anxiety or other problem behavior)
 - vi. Supplements, probiotics, or other non-prescription calming aids
 - vii. CBD products
 - viii. Change in diet
 - ix. Other _____
27. Did you attempt any training or behavior modification to address the behavior concerns?
- a. Yes
 - b. No

- c. 27a. [If yes to 27](#), Did you talk with a trainer, behavior consultant, or other dog behavior expert?
 - i. Yes
 - ii. No
 - iii. No, but I am a professional dog trainer or other dog behavior professional
 - iv. 27aa. [If yes to 27](#): What types of dog behavior expert(s) did you talk with? (select all that apply)
 - 1. Trainer
 - 2. Behavior consultant (a trainer/behaviorist who specifically works with behavior cases)
 - 3. Veterinary Behaviorist
 - 4. I am a dog trainer or other dog behavior professional
 - 5. Other _____
 - v. 27ab. [If yes to 27](#): How many dog behavior experts did you talk with?
 - 1. Number _____
 - d. 27b. [If yes to 27](#), What types of training equipment/techniques did you use? (select all that apply) [This list of options was randomized](#)
 - i. Prong collar or pinch collar
 - ii. Choke collar
 - iii. Clicker
 - iv. Toys
 - v. Counter conditioning and desensitization
 - vi. Electronic collar, e-collar, or shock collar
 - vii. Bark collar or ultrasonic device
 - viii. Slip lead
 - ix. Squirt bottle
 - x. Shake can/penny can
 - xi. Citronella spray, “pet corrector”, or other similar sprays
 - xii. Treats
 - xiii. Verbal praise
 - xiv. Verbal corrections
 - xv. Head halter/gentle leader
 - xvi. Alpha/energy
 - xvii. Other _____
 - e. 27c. [If yes to 27](#), What type of training did you do? (select all that apply)
 - i. Private Training
 - ii. Group Classes
 - iii. Board and Train
 - iv. Other: _____
28. Did you attempt any other strategies to deal with the behavior? (select all that apply)
- a. None
 - b. Crates
 - c. Basic obedience training
 - d. Baby gates, or exercise pens (“ex pens”)
 - e. White noise, radio, TV, or music
 - f. Muzzle
 - g. Mental enrichment
 - h. Decompression walks
 - i. Exercise
 - j. Supplements, probiotics, or other non-prescription calming aids

- k. CBD products
 - l. Change in diet
 - m. Adaptil/ DAP (Dog appeasing pheromone) collar, spray, etc
 - n. “Thundershirt” or other compression garment
 - o. Dog day care or pet sitters
 - p. Other _____
29. Did you attempt to re-home the dog?
- a. Yes
 - b. No
 - c. 25a. If yes to 25, What type(s) of re-homing did you try? (select all that apply)
 - i. Breeder
 - ii. Rehome to a friend/family/coworker
 - iii. Rehome to another home through Craigslist or similar
 - iv. Rescue organization
 - v. Shelter
 - vi. Sanctuary
 - vii. Other: _____
30. What was the total estimated cost you incurred from treatment/management and any other aspects related to the problem behavior(s)? (This includes veterinary or medical care, training, equipment, damage repair, legal expenses, and any other expenses you feel are related to the problem behavior). Approximate dollar amount: (free text)
31. Is there anything else you’d like to tell us about interventions or treatments you attempted? (free text)

DECISION-MAKING AND EUTHANASIA

Please answer the following questions about the decision-making process and the euthanasia process.

32. How long did the behavior problem occur from when you first noticed the behavior to euthanasia (or your best estimate)
- a. Less than 1 week
 - b. Between 1 and 4 weeks
 - c. Between 1 and 3 months
 - d. Between 3 and 12 months
 - e. Between 1 and 3 years
 - f. More than 3 years
33. Was there a specific incident that led to the euthanasia decision?
- a. Yes, it was a single incident.
 - b. Yes, there was a final incident, but after a previous incident(s).
 - c. No, there was not a specific incident.
34. Who, if anyone, did you consult with to help make this decision? (select all that apply)
- a. No one
 - b. Trainer/Behavior Consultant
 - c. Veterinarian
 - d. Veterinary Behaviorist
 - e. Shelter/Rescue
 - f. Friend/Family
 - g. Breeder
 - h. Other _____
35. How much did the following factors impact the decision to euthanize? On a 1 to 5 scale where 1 is No Impact and 5 is Major Impact

- The dog's quality of life
 - The dog's medical issue(s)
 - The dog showing characteristics of old age
 - Worsening behavior or lack of progress
 - Health issues of a person/people in the home
 - Expecting a baby/child
 - Quality of life for the people in the home
 - Individuals in the home with special needs
 - Incompatible with your housing situation, home layout, or physical environment
 - Upcoming travel
 - Upcoming visitors
 - Moving to a new home
 - HOA, landlord, neighbors or other housing restrictions or conflict
 - Safety of people in the home
 - Safety of animals in the home
 - Safety of people/animals outside the home/in the community
 - Legal designation of the dog (for example, Dangerous Dog, Vicious Dog)
 - Fear of legal issues or liability
 - Other legal issues (for example, lawsuits)
 - Financial limitations
 - Inability to rehome
 - Were there other factors that impacted the decision to euthanize? (free text)
36. When did the euthanasia occur?
- a. Month, Year (drop down menus)
37. What was the dog's age at euthanasia in YEARS? (If under a year, please enter "0")
- a. _____
38. Where did the euthanasia occur?
- a. Your regular veterinary clinic (the place you usually get your dog's primary medical care)
- b. Veterinary Behaviorist clinic
- c. A different veterinary clinic or hospital from where you usually get your dog's primary medical care (such as an emergency or specialty clinic)
- d. Your home or property
- e. Location away from home (such as the property of a friend or relative, or a park)
- f. Animal shelter
- g. Other _____
39. Is there anything else you'd like to tell us about the decision-making and euthanasia process? (free text)

BEHAVIOR DETAILS (Note: Skip logic based on answers in PRIMARY BEHAVIORS. Only see these questions based on what they indicated.)

We would like to better understand your experience and the specific behaviors that led to the decision to euthanize. The sections you see here are based on your responses to the previous question ranking the most significant behavior factors:

- Aggression toward people
- Aggression toward dogs or other animals
- Separation anxiety or separation-related behaviors
- Compulsive behaviors

- Fear, anxiety, or stress
- Other (destructive issues, house soiling, anything else)

Aggression Toward People

Please answer the following about the dog's aggression toward people.

40. Who did the dog demonstrate aggression toward? Select all that apply.
 - a. Adults living in the home
 - b. Familiar adults not living in the home
 - c. Unfamiliar adults
 - d. Children living in the home
 - e. Familiar children not living in the home
 - f. Unfamiliar children
 - g. Veterinary staff, groomers, or similar
 - h. Other _____
41. How often could you predict situations where the dog would show aggression toward people? (for example, you knew which situations were likely to cause an aggressive response)
 - a. Always
 - b. Most of the time
 - c. About half the time
 - d. Once in a while
 - e. Never
42. In which of the following circumstances would your dog demonstrate aggression toward people? Select all that apply.
 - a. I don't know/didn't see
 - b. Person moving quickly or erratically
 - c. Being approached while eating
 - d. Being approached while playing with/chewing on a favorite toy, bone, or other object
 - e. Being approached in/on a preferred space, such as a couch or bed
 - f. Having someone approach their preferred person
 - g. Being touched, handled, or picked up
 - h. Being groomed, bathed, or examined (for things like veterinary care or nail trims)
 - i. When an unfamiliar person approached while walking on leash
 - j. When mailmen or other delivery workers approached the home
 - k. Being startled while sleeping or resting
 - l. When a person intervened in a dog fight
 - m. A "redirection" where the dog was reacting to something else but bit the person instead, for example when the dog was reacting on leash or running along the fence
 - n. When scolded or corrected, or given a command
 - o. During an escalation in play/excitement
 - p. When the dog was injured or sick
 - q. None of the above
 - r. Other _____
43. How often were there clear warning signals leading up to aggressive incidents toward people? (for example, you were able to see signs like growling, ears pinned, or other body language that indicated an aggressive response was coming)
 - a. Always

- b. Most of the time
 - c. About half the time
 - d. Once in a while
 - e. Never
44. Did the dog ever demonstrate aggression to people without making contact with its teeth? (for example, lunging and snapping but not actually biting?)
- a. Yes
 - b. No
 - i. 45a. If yes to 45, how many times (or your best estimate) _____
45. Did the dog ever bite a person and **make contact** with its mouth **without breaking skin**? (for example, leaving bruises but not drawing blood or leaving punctures?)
- a. Yes
 - b. No
 - i. 46a. If yes to 46, how many times (or your best estimate) _____
46. Did the dog ever **bite** a person and **break skin** (for example, drawing blood or leaving punctures)?
- a. Yes
 - b. No
 - i. 47a. If yes to 47, how many times (or your best estimate) _____
 - ii. 47b. If yes to 47, Select the closest description for the bite wound(s). If there were multiple bite incidents, select all that apply.
 - 1. I don't know
 - 2. 1-4 small punctures from a single bite.
 - 3. 5-8 punctures from the same incident
 - 4. 9-15 punctures from the same incident
 - 5. 16+ punctures from the same incident
 - 6. 1-3 small tears or lacerations (up to ½ inch).
 - 7. More than 3 tears or lacerations from multiple bites in the same incident
 - 8. Tears or lacerations greater than ½ inch, or fatty tissue, muscle, etc exposed.
 - 9. Crushing injuries or broken bones
 - 10. Other _____
 - iii. 47c. If yes to 47 What medical treatment (if any) was needed after the bite(s)? (select all that apply)
 - 1. I don't know
 - 2. None
 - 3. Treated at home (including cleaning, bandaging, over-the-counter medication)
 - 4. Treated at a doctor's office
 - 5. Treated at urgent care
 - 6. Treated at emergency center/emergency room
 - 7. Ambulance
 - 8. Admitted at the hospital (usually at least overnight)
 - 9. 1-10 stitches
 - 10. 11-20 stitches
 - 11. 21+ stitches
 - 12. Other surgery required
 - 13. Other _____
 - iv. 47d. If yes to 47 On which part of the person's body did the bites occur? (select all that apply)

1. I don't know
 2. Hands or arms
 3. Feet or legs
 4. Face
 5. Trunk (groin, buttocks, abdomen, chest, shoulders, or back)
 6. Neck and back of the head
 7. Other: _____
- v. 47e. If yes to 47 Did any factors (potentially) lessen the severity of any of the bite incident(s)? (select all that apply)
1. No
 2. Sweatshirt, jacket, heavy clothing
 3. Boots or shoes
 4. Muzzle
 5. Intervention from a person
 6. Other: _____
- vi. 47f. If yes to 47 Did the dog have to overcome any barriers to bite in any of these incidents? (select all that apply)
1. No
 2. Jumped/broke a fence
 3. Jumped/broke a baby gate
 4. Crossed the room/area from at least 10 feet away
 5. Broke a collar or leash
 6. Dragged the handler on leash
 7. Other: _____
47. Is there anything else you'd like to tell us about the aggression toward people? (free text)

Aggression Toward Dogs or Other Animals

Please answer the following about the dog's aggression toward other animals.

48. What type of animal did the dog demonstrate aggression toward? (select all that apply)
- a. Other dogs in the home
 - b. Familiar/known dogs not living in the home
 - c. Unfamiliar dogs
 - d. Cats in the home
 - e. Unfamiliar cats
 - f. Other: _____
49. How often were you able to predict situations where the dog would show aggression toward other animals? (for example, you knew which situations were likely to cause an aggressive response)
- a. Always
 - b. Most of the time
 - c. About half the time
 - d. Once in a while
 - e. Never
50. What circumstances or triggers were involved in aggression incidents toward other animals? Select all that apply.
- a. I don't know
 - b. Being approached while eating
 - c. Being approached while playing with/chewing on a favorite toy, bone, or other object

- d. Being approached in/on a preferred area, such as a couch or bed
 - e. When a preferred person was approached by the other animal
 - f. Being approached directly by the other animal while the dog was on leash
 - g. When an animal entered the dog's yard or home
 - h. When woken up from sleeping or startled
 - i. A "redirection" where the dog was reacting to something else but bit the other animal instead, for example when the dog was reacting on leash or running along the fence
 - j. Predatory behavior (attempting to hunt or prey on the other animal)
 - k. Joined in when other dog(s) were already fighting
 - l. The other animal attacked, cornered, or otherwise threatened the dog
 - m. Escalation in play/excitement
 - n. Changes in health or appearance of the other animal
 - o. The dog itself was injured, sick, etc
 - p. None of the above
 - q. Other _____
51. How often were there clear warning signals leading up to aggressive incidents? (for example, you were able to see signs like growling, ears pinned, or other body language that indicated an aggressive response was coming)
- a. Always
 - b. Most of the time
 - c. About half the time
 - d. Once in a while
 - e. Never
52. Did the dog ever demonstrate aggression **without making contact** with its teeth? (for example, lunging and snapping but not actually biting?)
- a. Yes
 - b. No
- i. 53a. [If yes to 53](#) How many times (it's ok to estimate) _____
53. Did the dog ever bite and **make contact** with its mouth **without breaking skin**? (for example, leaving bruises but not drawing blood or leaving punctures?)
- a. No
 - b. Yes
- i. 54a. [If yes to 54](#) How many times (it's ok to estimate)
54. Did the dog ever **bite** another dog or animal and **break skin**?
- a. No
 - b. Yes
- i. 55a. [If yes to 55](#) If yes, how many times (It's ok to estimate)
 - ii. 55b. [If yes to 55](#) Please select the closest description for the bite wound(s). If there were multiple bite incidents, select all that apply.
 - 1. I don't know
 - 2. 1-4 small punctures from a single bite.
 - 3. 5-8 punctures from the same incident
 - 4. 9-15 punctures from the same incident
 - 5. 16+ punctures from the same incident
 - 6. 1-3 small tears or lacerations (up to ½ inch).
 - 7. More than 3 tears or lacerations from multiple bites in the same incident
 - 8. Tears or lacerations greater than ½ inch, or fatty tissue, muscle, etc exposed.
 - 9. Crushing injuries or broken bones

10. Killed the other animal
 11. Wounded the other animal badly enough for the animal to require euthanasia
 12. Other _____
- iii. 55c. [If yes to 55](#) What veterinary treatment (if any) was needed after the bite(s)? (select all that apply)
1. I don't know
 2. None
 3. Treated at home (including cleaning, bandaging, over-the-counter medication)
 4. Wound care at a veterinary clinic
 5. 1-6 stitches
 6. 7-20 stitches
 7. 21+ stitches
 8. Surgery required
 9. Other animal died or was euthanized due to its injuries
- iv. 55d. [If yes to 55](#) On which part of the body was the animal bitten? Select all that apply.
1. I don't know
 2. Front leg(s) or shoulder
 3. Hind leg(s) or hips
 4. Snout/muzzle/face/head/ears
 5. Back or side of the body
 6. Abdomen or belly
 7. Tail
 8. Neck
 9. Chest
 10. Other _____
- v. 55e. [If yes to 55](#) Did any factors (potentially) lessen the severity of any of the the bite incident(s)? (select all that apply)
1. No
 2. Thick fur
 3. Other animal wearing harness, sweater, blanket, or other
 4. Intervention from a person
 5. Muzzle
 6. Other _____
- vi. 55f. [If yes to 55](#) Did the dog have to overcome any barriers to bite in any of these incidents? (select all that apply)
1. No
 2. Jumped/broke a fence
 3. Jumped/broke a baby gate
 4. Crossed the room/area from at least 10 feet away
 5. Broke a collar or leash
 6. Dragged the handler on leash
 7. Other _____

55. Is there anything else you'd like to tell us about the aggression toward animals? ([free text](#))

Separation Anxiety or Separation-Related Behaviors

Please answer the following questions about the dog's separation anxiety or separation-related behaviors.

56. How often did the dog show each of the following problem behaviors or signs of anxiety when left, or about to be left, alone? (Alone means being left in an area without people, though another dog might be present). [Scale from left to right of Never, Once in a while, About half the time, Most of the time, Always](#)
- a. Restlessness/agitation/pacing
 - b. Barking or whining
 - c. Chewing/scratching at doors, floor, windows, curtains, etc
 - d. Urination/defecation
 - e. Self-harm (for example, from licking or scratching)
 - f. Trembling or shaking
 - g. Hiding
 - h. Escaping confinement (such as a crate)
 - i. Escaping the area (such as a door or window)
57. Were there other signs of anxiety or separation-related behavior that the dog showed when left alone? [\(free text\)](#)
58. Where was the dog left alone when they showed the anxiety or separation-related behavior? (select all that apply)
- a. In the house (full access)
 - b. In a specific room or area gated off
 - c. In a crate
 - d. Outdoors
 - e. In a garage or barn (or similar)
 - f. Other _____
59. Did the dog demonstrate signs of distress when left with someone other than their “preferred” person?
- a. Yes
 - b. No
 - c. Sometimes
 - d. I don’t know
60. During these behaviors, did the dog ever injure itself enough to need veterinary care?
- a. Yes/No
 - b. 61b [If yes](#), how many times? (it’s ok to estimate)
61. Is there anything else you’d like to tell us about the separation anxiety or separation related behavior? [\(free text\)](#)

Compulsive Behaviors

Please answer the following questions about the dog's compulsive behaviors.

62. Which repetitive or compulsive behaviors did the dog exhibit (select all that apply)
- a. Star gazing (staring at the sky or ceiling)
 - b. Light or shadow chasing
 - c. Tail chasing or spinning
 - d. Licking
 - e. Sucking
 - f. Path-running or pacing
 - g. Fly biting/ fly snapping (staring at or snapping at the air)
 - h. Other _____
63. How frequently did the dog demonstrate compulsive behaviors?

- a. Monthly
 - b. Weekly
 - c. Once per day
 - d. Multiple times per day (2-9 times)
 - e. 10+ times per day
64. On average, how long did the behavior last?
- a. Less than one minute
 - b. 1-5 minutes
 - c. 6-30 minutes
 - d. More than 30 minutes
65. During these behaviors, did the dog ever injure itself enough to need veterinary care?
- a. Yes/No
 - b. 66a. If yes to 66, How many times? (it's ok to estimate) (free text)
66. How frequently did the compulsive behaviors disrupt the dog's ability to engage in healthy behaviors such as eating, playing, and sleeping?
- a. Always
 - b. Most of the time
 - c. About half the time
 - d. Once in a while
 - e. Never
 - f. N/A
67. Is there anything else you'd like to tell us about the compulsive behavior? (free text)

Fear, Anxiety, or Stress-Related Behaviors

Please answer the following questions about the dog's fear, anxiety, or stress. When answering this set of questions, please do not include separation anxiety.

68. How severe was the dog's fear, anxiety, or stress toward the following. (please do not include separation anxiety in this section). (on a scale of 1-5, with 1 being no fear, and 5 being extreme fear.) An N/A response is included
- a. Sudden noises
 - b. Unfamiliar people
 - c. Unfamiliar dogs
 - d. Familiar people
 - e. Familiar dogs
 - f. Being outside
 - g. New locations/situations
 - h. New objects/items
 - i. Passing vehicles
 - j. Riding in the car or other vehicle
 - k. Veterinarian or veterinary clinic
 - l. Surfaces/textures (such as floor types)
69. Were there other circumstances or situations that caused fear, anxiety, or stress for the dog? (free text)
70. How often were you able to predict situations where the dog would show fear, anxiety, or stress?
- a. Always
 - b. Most of the time
 - c. About half the time
 - d. Once in a while
 - e. Never

71. What behaviors did the dog display that indicated fear, anxiety, or stress? (select all that apply)
- a. Running away or into another room
 - b. Cowering
 - c. Hiding behind/under objects
 - d. Panting
 - e. Drooling
 - f. Whining/crying
 - g. Barking
 - h. Trembling
 - i. Freezing/immobility
 - j. Pancaking (lying on the floor without moving)
 - k. Other
72. How often did you observe signs of fear, anxiety, or stress? (on average, it's ok to estimate)
- a. Monthly
 - b. Weekly
 - c. Once per day
 - d. Multiple times per day (2-9 times)
 - e. 10+ times per day
73. On average, per episode, how long did the fear, anxiety, or stress last?
- a. Less than one minute
 - b. Between 1 and 5 minutes
 - c. Between 6 and 30 minutes
 - d. More than 30 minutes
 - e. I don't know
74. During these behaviors, did the dog ever injure itself enough to need veterinary care?
- a. Yes/No
 - b. 75a. [If yes to 75](#), How many times? (it's ok to estimate) ([free text](#))
75. Is there anything else you'd like to tell us about the dog's fear, anxiety, or stress? ([free text](#))

Other (Destructive Behavior, House Soiling, Anything Else)

76. Please describe the other behaviors that contributed to the decision to euthanize. ([free text](#))

[ALL participants go here, regardless of which primary behaviors they chose](#)

77. Is there anything else you'd like to tell us about the behaviors or other factors that influenced the euthanasia decision? ([free text](#))

DEMOGRAPHICS

In order for us to better understand our survey population, please complete the following information.

78. What is your gender identity (select all that apply)
- a. Woman

- b. Man
 - c. Transgender
 - d. Non-binary/non-conforming
 - e. Other
 - f. Prefer not to respond
79. What is your race (select all that apply)
- a. White
 - b. Black or African American
 - c. American Indian or Alaska Native
 - d. Asian
 - e. Native Hawaiian or Other Pacific Islander
 - f. Other
 - g. Prefer not to respond
80. Are you of Hispanic, Latino, or Spanish origin?
- a. No
 - b. Yes
 - c. Prefer not to respond
81. What was your age at the time of the dog's euthanasia?
- a. 18- 24 years old
 - b. 25- 34 years old
 - c. 35- 44 years old
 - d. 45- 54 years old
 - e. 55- 64 years old
 - f. 65+ years old
 - g. Prefer not to respond
82. What was the highest level of education you had completed at the time of the dog's euthanasia?
- a. Some high school
 - b. High school diploma or GED
 - c. Some college
 - d. Associate's degree
 - e. Bachelor's degree
 - f. Master's degree
 - g. Professional degree beyond bachelor's degree (for example, MD, JD, DVM)
 - h. Doctorate (for example, PhD)
 - i. Prefer not to respond
83. What was your annual household income range at the time of the dog's euthanasia?
- a. Less than \$20,000
 - b. \$20,000 to \$34,999
 - c. \$35,000 to \$49,999
 - d. \$50,000 to \$74,999
 - e. \$75,000 to \$99,999
 - f. \$100,000 to \$199,999
 - g. \$200,000 or more
 - h. Prefer not to respond
84. How did you find out about this research?
- a. Losing Lulu Facebook Page
 - b. Other dog-related social media group
 - c. Veterinarian
 - d. Trainer/behavior professional
 - e. Friend/family/coworker

f. Other _____

Thank you for participating in this research project. We understand that participation may bring up difficult emotions. If you need support, you may find information through the University of Tennessee Veterinary Social Work Program here: <https://vetsocialwork.utk.edu/pet-loss-support-group-2/>

If you are interested in participating in future research, or in receiving the results of this study, please email at mirandah@vt.edu with the subject line “STUDY FOLLOW UP”

Appendix B: Recruitment Text

Virginia Tech is researching the factors associated with behavioral euthanasia of pet dogs. This research will help better understand potential for prevention, treatment, and support for dog owners.

They are looking for people:

1. Over the age of 18,
2. Who have euthanized an owned/pet dog primarily for behavior on/after January 1st, 2017, and
3. Who lived in the United States at the time of the euthanasia.

The survey will take approximately 15-30 minutes of your time. To participate click on the link below.

<https://viriniatech.questionpro.com/t/AVe67ZtOl9>

For more information or questions, please contact Miranda Hitchcock, mirandah@vt.edu
VT IRB # 22-311

Appendix C: Information Sheet

Information Sheet for Participation in a Research Study

Researcher: Miranda Hitchcock, *mirandah@vt.edu*

IRB# and Title of Study: 22-311 Factors Associated with Behavioral Euthanasia in Pet Dogs

You are invited to participate in a research study. This form includes information about the study and contact information if you have any questions.

I am a graduate student at Virginia Tech, and I am conducting this research as part of my course work.

WHAT SHOULD I KNOW?

In order to participate in this study, you must:

- Be over the age of 18
- Have euthanized a pet dog primarily due to behavior problems any time on or after January 1st, 2017. Note: this is for a dog that you owned, not a dog in a shelter or foster environment.
- Have been living (at the time of euthanasia) in the United States

If you decide to participate in this study, you will complete a survey.

The purpose of this study is to identify factors related to behavioral euthanasia in pet dogs.

Currently there is very little information about pet dogs euthanized for behavior reasons, due to social stigma and limited tracking mechanisms. Better data and information may lead to improved treatment options, better prevention methods, and more support for people making this decision.

The survey will start with questions about the dog, and about your living situation at the time of the euthanasia. You will then be asked questions about the dog's behavior, interventions, or treatments that may have been attempted, and the euthanasia decision-making process. You will also be asked details about the dog's behaviors, based on your answers in prior sections.

The study should take approximately 20-45 minutes of your time.

We do not anticipate any risks from completing this study, except for potential psychological stress from answering questions of a difficult or emotional nature. If you need support, you may find information through the University of Tennessee Veterinary Social Work Program here:

<https://vetsocialwork.utk.edu/pet-loss-support-group-2/>

You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. You may also refuse to answer any questions you don't want to answer and remain in the study. The investigator may withdraw you from this research if circumstances arise which warrant doing so.

CONFIDENTIALITY

We will do our best to protect the confidentiality of the information we gather from you, but we cannot guarantee 100% confidentiality.

Your responses are anonymous, so no one can associate your answers back to you. Please do not include your name or other identifying information in your responses that can identify you.

WHO CAN I TALK TO?

If you have any questions or concerns about the research, please feel free to contact Miranda Hitchcock, mirandah@vt.edu. You are not waiving any legal claims, rights or remedies because of your participation in this research study. If you have questions regarding your rights as a research participant, contact the Virginia Tech HRPP Office at 540-231-3732 (irb@vt.edu). ***If you would like to participate in this survey, click NEXT to begin.***