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Noise sensitivity in 17 dog breeds: Prevalence, breed risk and correlation with fear in other situations

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ABSTRACT

A web-based survey was conducted to estimate prevalence of noise sensitivity in 17 dog breeds in Norway ($n = 5257$). Major focus was on noise from fireworks, loud noises (bang/gunshots), thunderstorms and heavy traffic. The study also investigated risk factors as well as correlation with some other fear responses. On average approximately 23% of the dogs were reported to be fearful of noises. Fear in situations with fireworks had the highest frequency; situations with loud noises/gunshots, thunderstorms and heavy traffic following in decreasing order. Across the 17 breeds there was significant ($p < 0.01$) differences in the frequencies of fearful dogs. Norwegian Buhund, Irish Soft Coated Wheaten Terrier and Lagotto Romagnolo were breeds that had the highest frequency of noise sensitivity while Boxer, Chinese Crested and Great Dane had lower frequencies of fear created by noise. There was a significant trend of increasing fear with older age. Response to fireworks, loud noises/gunshots and thunderstorms frequently co-occurred. Female dogs had higher odds of noise sensitivity compared to male dogs (OR = 1.3 $p < 0.001$), and neutered dogs had higher odds of being fearful of noises than intact dogs (OR = 1.73 $p < 0.001$). The dogs most fearful of noises also had higher odds of showing separation related behavior, being fearful in novel situations and required longer time to calm down after a stressful event compared to dogs less fearful of noises.

1. Introduction

Noise sensitivity is a common behavioral problem in dogs (Levine, 2009; Overall et al., 2001). One survey including 383 dog owners reported that almost half (49%, $n = 188$) of the owners stated that their dog was fearful of loud noises (Blackwell et al., 2005). In an online survey including more than 3500 dog owners, 2577 owners reported having a dog with noise sensitivity (Iimura, 2006). A survey including veterinary practitioners in Spain found that noise phobia was the fifth most frequent canine behavioral problem (Fatjó and Ruiz-de-la-Torre, 2006). Incidence data from behavior clinics may underestimate the underlying prevalence, since only a small number of dog owners are likely to seek specialist help. A study from New Zealand reported that only 15.8% of the owners with dogs that displayed a fearful response in situations with fireworks sought professional treatment (Dale et al., 2010). A Danish study found that owners of dogs with shooting phobia were less inclined to seek help with the behavior than owners of dogs with separation anxiety (Rugbjerg et al., 2003). Wells and Hepper (2000) reported that 68.3% of dogs purchased from an animal rescue shelter showed undesirable behavior within the first month and the majority, 53.4%, specified fearfulness as the major problem behavior. Behavioral responses of dogs with noise sensitivity can be extreme in nature and it may represent a serious welfare issue for the dog.

Dogs can be fearful of many different noises but the most commonly reported are fear of thunderstorms, fireworks, gunshots and engine noises (Levine, 2009; Sherman and Mills, 2008). A study found that fireworks was the most commonly reported noise aversion, followed by thunderstorms and gunshots (Iimura, 2006). Dogs with noise sensitivity may show a range of signs including restlessness/shaking/trembling, pacing, increased startle response, increased vigilance, hiding, panting, drooling, destructiveness, defecation, urination, vocalization, withdrawal, self-mutilation, loss of appetence, freezing, vomiting, expression of anal sacs, owner-seeking and yawning (Mills, 2005).

The fear response is a normal and self-protecting behavior, which can enable the dog to escape potential dangerous situations, but may, in some cases become inappropriate and negatively impact the dog's welfare. The terms anxiety, fear and phobia are often used interchangeably but they have different definitions.

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Anxiety describes the situation where the dog anticipates a negative outcome; it is an emotional response occurring prior to a stimulus/situation that the animal perceives as dangerous. In other words the dog shows signs of anxiety to a situation or stimuli which might occur, but the anxiety may be displayed in the absence of an identifiable stimulus as well (Landsberg et al., 2013). Fear is an adaptive response where a response starts when the animal perceives the presence of stimuli considered to potentially be dangerous. The fear response allows the dog to avoid dangerous situations and increase chances of survival. Phobia is a sudden, excessive and profound fear. The phobic symptoms persist after the stimuli are removed or have disappeared and the phobic reaction may occur in the absence of the trigger. Phobias are not an adaptive response and interfere with normal functioning (Palestrini, 2009).

Factors proposed to contribute in development and progression of noise aversions are genetic, traumatic experience associated with noise exposure, social transmission (learned from other fearful dogs), and owner responses (inappropriate owner response or responses reinforcing the dog's fear) (Landsberg et al., 2013). Breed has been reported as a risk factor for fear sensitivities and Blackwell et al. (2013) found that twelve breeds or breed types were less likely to show fear responses to noises than cross-breeds and their data suggest that some breeds may predisposed to fear of loud noises. Iimura (2006) found that noise sensitivity with an acute onset seem to be associated with a fear response; while noise sensitivity with less acute onset seem to be associated with an anxiety response. These factors also showed significant association with breed, the age the dog was obtained and the age at onset of the problem; Owners of hounds, toy breeds and mixed breeds more commonly reported an acute-onset history with fear-related problems, whereas owners of terriers, intact bitches and dogs rehomed around 1 month of age more typically reported a non-acute onset (Iimura, 2006; Sherman and Mills, 2008). Rugbjerg et al. (2003) reported a significant effect of owner types (the owner not being a dog breeder was found a risk factor), and that some breeds (Poodles, retrieving/flushing dogs, Sheepdogs, Spitz dogs and terriers) had a higher odds of shooting phobia. Vucinic et al. (2013) did not find any significant differences in the incidence of noise related fears among dogs of mixed or pure breeds, male or female or among intact or neutered dogs. A survey of 69 cases of thunderstorm phobia in dogs indicated that there may be a predisposition among some herding breeds (McCobb et al., 2001).

The primary aim of the study was to describe the distribution of noise sensitivity in different dog breeds. Furthermore the aim was to investigate the influence of sex, age, and neuter status and the co-morbidity of fear responses.

2. Materials and methods

An extensive web survey on noise sensitivity was conducted in collaboration with 17 breed clubs. The included breeds represent breeds where the breed clubs had participated in a voluntarily general health and behavior survey. Dog owners were encouraged to participate in the survey with information about their dogs, including dogs presently alive and dogs that were recently deceased.

The owners answered four items concerning reactions to loud noises including gunshots, fireworks, thunderstorms and heavy traffic. The questions were:

- Does your dog show signs of being fearful during loud noises/gunshot?
- Does your dog show signs of being fearful in situations with fireworks?
- Does your dog show signs of being fearful during thunderstorms?
- Does your dog show signs of being fearful in situations with heavy traffic?

The answers were in a scale from 1 to 5;

1—no signs,
2—mild signs,
3—moderate signs,
4—strong signs,
5—very strong signs.

Two new variables were created, both based on the score in all the four fear groups. A dog was classified as "fearful" if it had a score of minimum 4 in at least one of the 4 categories and was treated as a categorical variable (1 = fearful, 0 = not fearful). The other variable "sumfear" was a simple sum of the scores in the four categories and was treated as a continuous variable.

In addition, the following fear responses were included in this study based on the questions; "Does your dog show signs of separation related behavior when left alone?" (1—no signs, 2—mild signs, 3—moderate signs, 4—strong signs and 5—very strong signs), "Does your dog show signs of being fearful in novel situations?" (1—no signs, 2—mild signs, 3—moderate signs, 4—strong signs and 5—very strong signs), and "Does your dog quickly calm down after being in a stressful situation?" (1—very quickly, 2—quickly, 3—neither quickly nor slowly, 4—slowly and 5—very slowly).

A total of 5257 dogs were included in the study distributed over 17 breeds. The number from each breed is shown in Table 1.

2.1. Description of the studied population

The mean age of all the dogs was 4.93 years (4900 had information about age), if the owner has given information about a deceased dog, the age given is the age of the dog when it died.

The sex distribution of the total material was 54.8% ($n = 2876$) females and 45.2% ($n = 2372$) males. Nine owners did not report sex. In total 13.43% ($n = 693$) of the dogs were neutered, the neuter frequency between the sexes is almost the same 13.57% (382) of the females and 13.28% (311) of the males are neutered.

2.2. Statistical analysis

All statistical analyses were performed using Stata version 12.0.

An analysis of variance (ANOVA) was performed to explore potential effects of breed in the four different categories followed by a Tukey post hoc test. An ordinal logistic regression model was performed to measure the association between noise sensitivity, breed, sex and age. Noise sensitivity was the dependent variable and breed, sex and age were independent variables. Co-occurrence between the categories of noise aversions was measured with Spearman's correlation test, odds ratios (OR) were utilized for measurement of co-occurrence between noise aversions and fear responses in other situations.

3. Results

3.1. Noise sensitivity

Most fearful dogs reacted to fireworks and gunshots, while the reaction to heavy traffic and thunderstorms was less pronounced. 21.17% (1076 of 5082) showed strong or very strong signs of being fearful during fireworks, 14.4% (740 of 5139) showed strong or very strong signs of being fearful in situations with loud noises/gun shots, 10.14% (520 of 5128) showed strong or very strong signs of being fearful during thunderstorms and 2.85%, (148 of 5175)