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The Social Significance of Barking in New Zealand Dogs (*Canis familiaris*)

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Abstract

In Auckland, New Zealand, approximately one third of annual complaints to authorities about dogs (*Canis familiaris*) are due to barking. Despite a recent increase in research in this area, further work is needed to achieve a greater understanding of the behaviour and its impact on society and to establish humane and effective strategies to manage and control unwanted barking.

In order to gain more information on problem barking in New Zealand, a survey was sent to two thousand people randomly selected from the electoral roll. The survey evaluated the demographics of dog owners in New Zealand and investigated how potentially disturbing the New Zealand public consider barking to be and why they consider it to be disturbing.

The aetiology of problem barking was evaluated in a retrospective study of 107 cases of problem barking presented to an Auckland animal behaviour clinic over a two -year period. The effects of barking on human response were evaluated in a study that exposed 79 volunteer students to recordings of the two main types of barking (barking due to separation anxiety and barking due to territorial guarding). Risk factors for the occurrence of problem barking and for people being bothered by barking were established. Average daily parameters for barking in dogs left at home during the day, that were not problem barkers were established to provide a baseline with which barking complaints could be compared. This was achieved by recording dogs belonging to volunteers over an eight-hour period for five days. Common triggers for barking were established by asking owners to document barking events while they were at home over 24 hours for seven days. Potential methods of preventing and managing problem

barking were identified by comparing husbandry protocols used with 107 problem dogs to those used with 80 dogs that were not problem barkers.

The typical dog owner in New Zealand was profiled as a person aged between 18 and 55 years, with a positive personality score, educated to secondary school level or above and living in a rural or suburban area and in a house rather than a flat. In addition, the typical dog owner tends to be married or in a de facto relationship with children over the age of one year, considers pet dogs to be very important to society and does not consider a dog bite likely to represent a serious health risk. A typical non-dog owner is likely to be over 65 years, have a university education, live alone in a flat, consider that pet dogs are not very important to society and have a negative personality score.

Results confirmed that barking is regarded as a significant problem by many in New Zealand society. Barking and howling were ranked as significantly more annoying than other common suburban noises including lawn mowers, skill saws, and crying babies.

Risk factors for being bothered by daytime barking were: age (>35years), being home during the day, not owning a dog, and considering a dog bite to be a serious health risk.

Risk factors for being bothered by night-time barking were: being divorced, considering dog bites to pose a serious health risk and having been frightened by a dog. People were also more likely to be disturbed by night-time barking if they had a child under one year of age and if English was not their first language.

Two types of barking were particularly bothersome, barking due to separation anxiety, and barking associated with territorial guarding. Students who listened to examples of these two bark types found them equally irritating or difficult to ignore but felt most sorry for dogs barking due to separation anxiety. Risk factors predisposing most to the occurrence of problem barking due to separation anxiety included; leaving dogs alone

for more than four hours, keeping only one dog, lack of owner experience with keeping a pet dog, not providing a morning walk and lack of provision of toys and bones. Risk factors for problem territorial barking included; lack of daily training, lack of owner experience with keeping a pet dog, not providing a morning walk and lack of provision of toys .Common triggers for barking that was not due to anxiety were predominantly associated with human activities (63% of triggers were human actions). Normal parameters for barking in 40 suburban dogs were established at an average of 0.54 bouts per hour (range 0-3.5) with an average length per bout of 30 seconds.

Information from this study will be useful in implementing strategies for the prevention and management of problem barking. Such strategies might include educating owners and new puppy owners about husbandry techniques that will help prevent problem barking and establishing pre-pet counselling in veterinary clinics. The average barking parameters established may be used to help assess cases of barking reported to the authorities.

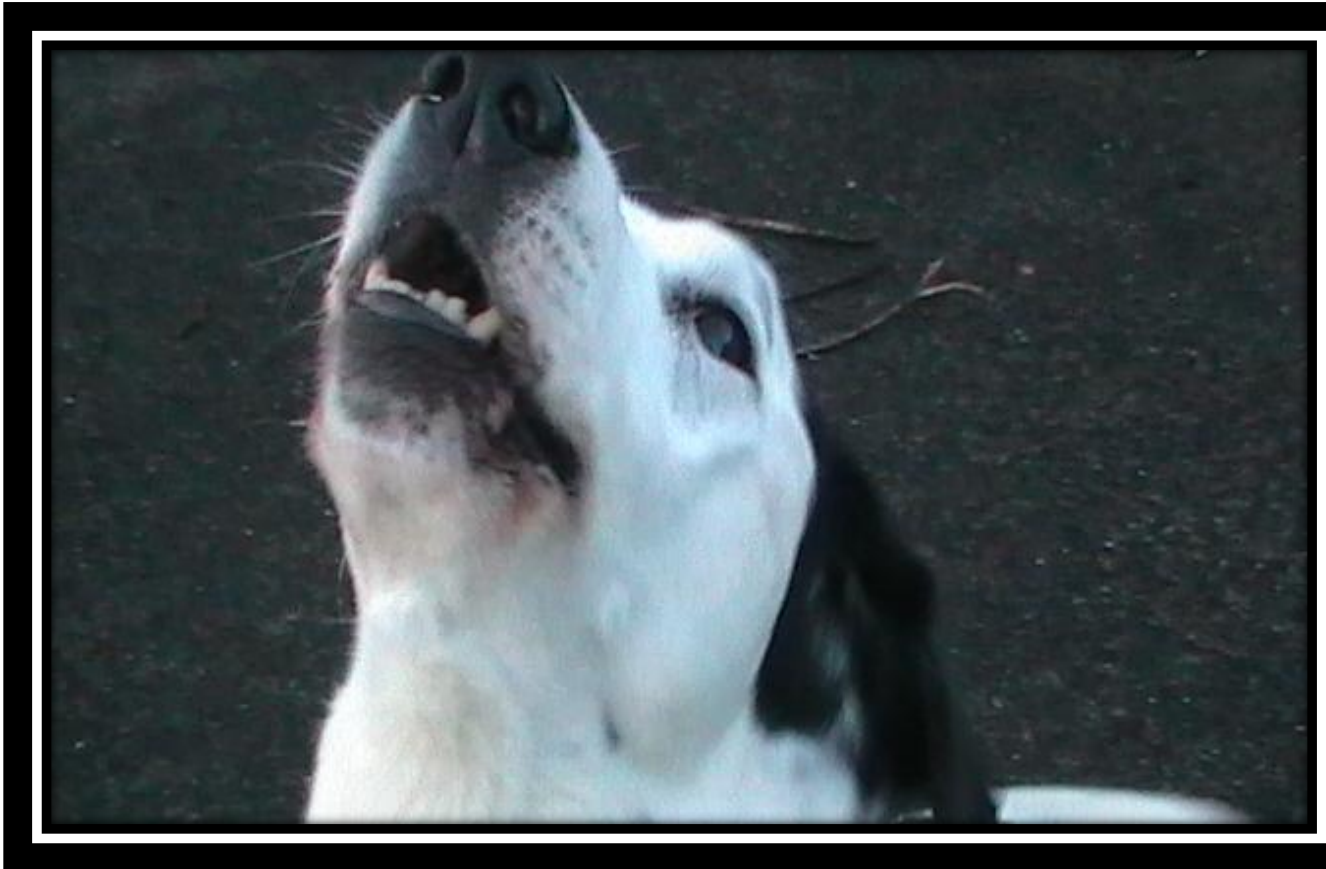
Frontispiece

I bark when I see one who might threaten me, or the owner I hold so dear,

I bark in the night at the cats when they fight and at noises you can't even hear

I bark when I'm glad and of course when I'm sad and when my dinner is late

Barking for me is like your ABC, it helps me communicate.



List of Publications

1. Flint E. L. The Tragedy of a Quick-Fix Approach to Canine Behaviour Problems: A New Zealand perspective. In: Mills D, editor. Fifth International Veterinary Behavior Meeting; 2005; Minnesota: Purdue University press; 2005:255-256.
2. Flint E. L, Minot E. O, Perry P. E, Stafford K. J. Characteristics of adult dog owners in New Zealand. New Zealand Veterinary Journal 58, 69-73, 2010.
3. Flint E. L. The function, social implications and management of barking in dogs. CAB Reviews 2012 7, No 039.
4. Flint E. L, Minot E.O, Perry P. E, Stafford K. J. Public attitude toward barking dogs in New Zealand. In press New Zealand Veterinary Journal 2012.
5. Flint E. L, Stevenson M, Minot E.O, Perry P. E, Stafford, K. J. Husbandry practices and owner and dog characteristics as risk factors for problem barking in New Zealand dogs. In press Journal of Veterinary Behaviour 2012 .
6. Flint E. L, Minot E. O, Stevenson M, Perry P. E, Minot E. O. Barking in home –alone suburban dogs (*Canis familiaris*) in New Zealand. In press Journal of Veterinary Behaviour 2012.

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CHAPTER ONE

Introduction

Excessive or “Problem” barking is a common reason for dogs to be presented to animal behaviour clinics world-wide (Uchida, 1996; Cross et al. 2009). In the Animals with Attitude animal behaviour referral practice (Auckland New Zealand), over a two year period, 42% (107/256) of cases were initially presented for problem barking. It is a behaviour problem with the potential to cause significant distress to both dog owning and non-dog owning members of the public and to the animals themselves.

Effects of Problem Barking on Humans

Many people find barking disturbing. Owners seek help to modify barking behaviour and there are regular complaints about it to authorities. In Auckland, New Zealand, approximately 35% of annual complaints about dogs to authorities are due to barking (Anonymous, 2009). There are, however, few studies to date that investigate why many humans find barking so disturbing. Trimmel et al (2006) included barking in an investigation of noise disturbance and concluded that background noise, even at low intensity, is associated with energy consumption by the receiver and therefore can be potentially tiring and may cause impaired performance in spatial attention. Kaiser et al (2002) showed that barking caused humans to orient to the source of the sound. This appears to be the result of a direct effect on the brain and is not under voluntary control so direct physiological effects may go some way towards explaining human reaction to barking. It is also possible, given the ability of humans to recognize the emotionality of

barking (Yin and McGowan 2004; Pongracz 2005) that it is the emotion conveyed by the bark that is difficult to ignore. A third contributing factor may be social conditioning, including response to media coverage around dog attacks, expectations about what barks may signify and the fact that barking is considered by authorities to be a public nuisance. This social conditioning has not been quantified.

Repercussions on the dogs

People complaining about barking probably give little thought to possible reasons for the barking. They simply want it stopped. Social intolerance of barking may lead to mistreatment of the dogs concerned through the implementation of “quick-fix” solutions. These include anti-bark collars which deliver an electric shock or an aversive substance whenever the dog barks, or on occasion, even surgical devocalisation (severing of the vocal cords).

Problem, or “nuisance” barking, defined by some authors (Cross et al, 2009) as ‘Barking that is of sufficient frequency to cause distress or interruption of the life of the dogs’ owners or other residents within the neighbourhood,’ is difficult to quantify. Noise that is disturbing to one person may pass unnoticed by another.

In New Zealand, due to a lack of resources for investigating complaints, there is a tendency for the authorities to respond in proportion to the persistence and intensity of the complainants. Owners are usually ordered to stop the barking and if there are still complaints after 7 to 10 days they can be fined or in extreme cases, their dogs may be removed and destroyed (New Zealand Dog Control Act 1996).

One of the common ‘solutions’ suggested by authorities is the use of electric anti-bark collars (collars that produce an electric shock in response to the vibration that occurs during barking) .These collars can cause vocalisation in response to pain which can

trigger further shocks and may precipitate a state of learned helplessness where animals shut down all activity being terrified to move for fear of pain (Overall 1997). Where barking is due to anxiety, the use of collars may exacerbate the condition.

There is no accepted ‘normal’ amount of barking for suburban dogs against which complaints may be measured. The only ‘definition’ of unacceptable barking that is given in the dog control regulations is ‘loud persistent barking’. This is extremely subjective. In several cases of barking investigated by the Animals with Attitude Animal Behaviour Clinic, Auckland, New Zealand because owners have received noise abatement orders from authorities, tape recordings and video studies over several days revealed minimal barking, while in other cases barking was extremely frequent or even continuous throughout the day. This suggests that the actual amount of barking is not being assessed when a complaint is made to authorities or that because they have no documented level to use as a baseline, even minor barking that is perceived as irritating by a neighbour becomes a punishable offence.

Barking that is constant throughout the day is often due to separation anxiety. Cases of separation anxiety need proper assessment, anti -anxiety medication and a behaviour modification program (Overall 1997; Juarbé-Diaz; 1997; Cross, 2009).

More information is needed about why people find barking disturbing and the causes of problem barking need to be established in order to identify strategies that may prevent its occurrence and to improve methods of investigation and management.

This study was undertaken to investigate problem or “nuisance” barking in New Zealand suburban dogs, with the following aims:

- To determine if excessive barking is in fact a significant social problem in New Zealand

- To evaluate the demographics of New Zealand dog owners.
- To discover how people feel about barking in comparison to other suburban noises and why it bothers them.
- To determine risk factors for people being bothered by barking dogs.
- To investigate owner, dog and management factors that influence problem barking and to determine risk factors for it.
- To evaluate the level of public understanding about the possible reasons for problem barking and strategies for management.
- To understand whether different types of barking evoke different reactions in humans.
- To establish average parameters for barking in normal suburban dogs to provide some sort of guide to be used as a baseline against which complaints could be assessed.
- To determine how management and prevention strategies for this problem might be improved.

This thesis is a collection of scientific papers that are published in or have been submitted to peer reviewed scientific journals, or will be presented at a conference. As a result the chapters vary in format according to journal requirements.

Each of the chapters following the literature review (Chapter Two) presents data from studies undertaken to achieve the aims listed above. Chapters Three and Four use information derived from a public survey of 2000 people randomly selected from the electoral roll to assess the characteristics of New Zealand dog owners and to evaluate

the public attitude toward barking dogs. Chapter Five is a retrospective analysis of data derived from cases of problem barking presented to the Animals with Attitude Animal Behaviour Clinic, Auckland, New Zealand over two years compared to data gained by questionnaire on control dogs from a veterinary clinic (Shore Vets, Devonport, Auckland, New Zealand). Chapter Six reports on a research exercise in which 79 university students listened to a series of recorded barks and were asked to identify the type of bark and to indicate how irritating they found it. Chapter Seven reports data from taped recordings of barking made by volunteer owners over a five day period. From these data, average parameters for barking were calculated. Chapter Eight, investigates common triggers for barking in suburban dogs in New Zealand. The findings of the thesis are discussed in Chapter Nine.

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CHAPTER TWO:

Literature Review:



The function, social implications and management of barking in dogs

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Abstract

The function and social significance of barking in domestic dogs (*Canis familiaris*) is still not fully understood. Barking is poorly tolerated by some people, is frequently identified by owners as problem behaviour, is cited as a reason for the relinquishment of dogs to animal shelters and is a common cause for complaint to authorities. It is as yet unclear why many humans find barking disturbing. Despite a recent increase in research in this area, further work is needed to achieve a greater understanding of the behaviour itself and its impact on society and to establish humane and effective strategies to manage and control this “socially unacceptable” canine behaviour. This paper reviews information on the purpose of and factors influencing barking in domestic dogs, the possible reasons for its negative impact on humans and methods of control and management.

Keywords: Barking; Dogs; Communication; Behaviour; Society; Understanding; Management

Review Methodology: Data bases used to source information included Web of Science, Medline, CAB Abstracts and Biological Abstracts. Other sources included collegial discussion and personal investigation.

Introduction

Barking by the domestic dog (*Canis familiaris*) is often considered undesirable. It is commonly reported to authorities and may result in dogs being removed from properties by these authorities (usually dog control officers from the local council) or fines being issued to owners. In Auckland, New Zealand, 35% of annual complaints to local authorities about dogs are due to barking and in one Auckland based animal behaviour clinic (Animals with Attitude, Devonport, Auckland) 42% of cases are presented, initially, for problem barking. The explanation for this is unclear. There is a need for greater understanding of this behaviour, its form and function, the factors that influence it and the reasons why humans find it so difficult to cope with. More detailed knowledge in these areas may enable appropriate management and prevention strategies to be implemented that will not only address the human need for canine companionship but will consider the welfare of dogs kept as suburban pets.

The function of barking.

The purpose of barking in dogs has been subject to some controversy. However, recent studies on canine vocalisation have helped to elucidate its function. Most recent studies focus on the communicative function of barking in dogs, both intra- and interspecific, with an emphasis on dog – human communication.

Intraspecific communication

It is now recognized that barking is a significant and variable form of communication used by domestic dogs that is context specific [1-3] and not, as some have suggested in the past, limited in purpose to territorial guarding [4] or random and with no specific function [5].

While barking may indeed be part of territorial defence, alerting the rest of the pack to the presence of intruders,[6, 7], it may also signify excitement during play, before a walk or in response to the return of pack or family members [8]. It may be an expression of distress, a calling back of pack members when a dog is left alone, or an expression of extreme anxiety caused by isolation [8]. Short range vocalizations that accompany social interactions in wild canids are important in forming and maintaining bonds between pack members and minimizing conflict [8]. In domestic dogs, growls recorded in different situations (play, response to a stranger, and food guarding) evoke quite different responses when played to dogs approaching a bone, indicating that the dogs are receiving and understanding specific information about the reason for the growl [9]. Similarly recent studies emphasise the communicative function of barking [10-12] and have shown that dogs of various breeds use barks that are similar sonographically when exposed to various stimuli or situations [3].

It is believed that canine vocalizations may also disclose information about an individual's sex [10] and identity [12]. Taylor [13] and Farago [14] showed that growling (evoked by food guarding) is correlated to body size and that individuals hearing a growl then appear to form a mental image of the size of the growling animal. It is possible that similar information may be conveyed by territorial barking however this has not been tested.

It is to some extent understandable that people may become irritated when subjected to frequent, persistent noise for which they see no purpose. Understanding that barking is a relatively complex behaviour with specific functions may help people to be more tolerant of it. This information can be used in public education.

Interspecific communication

Recent research has confirmed that dogs can use barking to successfully communicate with humans as well as conspecifics; however, there is little information available on efficacy in communicating with other species. The structure of barking in specific situations is significantly different when analysed acoustically [1]. Owners become adept at recognizing the meaning of their dogs' barks [2] being able to distinguish whether their dogs are guarding, playing, welcoming a returning family member or seeking attention. In the domestic situation barking may be used to draw attention to an empty food dish or water bowl, to inform an owner of the location of an inaccessible toy [15] or to request that a door be opened. This suggests that barking is important in enabling dogs to communicate successfully with humans, although some authors [15] propose that when intentionally directed at the owner this communication is limited to requesting something that the dog needs or wants rather than disseminating information and so is manipulative rather than truly communicative.

Individual variation in context specific barking allows owners and other dogs to identify individuals by their barks [10-12]. This individual variation in context specific barking does not seem to alter human ability to correctly interpret the bark. It has also been shown that people who are not dog owners, with no prior experience of dogs and who have never seen accompanying body language can correctly identify the situation in which a bark is occurring and the emotionality of the bark [2]. In fact, infants as young as 6 months of age may be capable of differentiating between aggressive and non-aggressive barking [16]. It is interesting that studies have shown that while humans can accurately interpret barking they are not so successful with growling. Humans repeatedly incorrectly classify growls from large dogs as aggressive [17]. It has been

suggested that this is the result of social conditioning resulting in preconceived ideas about large dogs. Whatever the reason, it emphasizes the fact that barking has a unique communicative function as barks also vary with size but seem not to be misinterpreted in the same way.

Some authors suggest that because barking in domestic dogs occurs under a wider range of circumstances than was true of their ancestors, barking could be largely an acquired behaviour, developed as a consequence of domestication, to facilitate communication with humans [18]. This may be true, especially of non-territorial barking. Territorial barking, however, was probably a vocalisation developed to warn conspecifics of a real or perceived threat [7] that, through experience humans learned to recognize as such, rather than one developed by dogs with the intention of communicating with humans. Recognising the meaning of territorial barking may well have conferred a survival advantage on humans living in close association with dogs.

More study in this area may help to confirm the relative significance of this inherent human ability to detect emotionality and meaning in canine vocalisations with respect to human reaction to barking in modern day life.

What Influences Barking Behaviour?

To manage a particular behaviour it is important to know what motivates it. It is generally accepted within the literature that barking, like most behaviour, is influenced by genetics, environment, experience and physiological state.

Influence of Genes

Barking occurs more frequently and under a wider range of circumstances in the domestic dog than in other canids [19]. In the wolf (*Canis lupus*) barking is rare [6] however it is more common in the African wild dog (*Lycaon pictus*). Since repetitive high frequency harmonic vocalizations have been shown to be more prevalent in young African wild dogs than adults and are associated with soliciting and contesting food [20], it has been hypothesised that early selective breeding for neotenic (puppy like) traits in domestic dogs has increased their tendency to bark [8]. Adult domestic dogs show significant etepimelectic (care seeking) behaviour patterns in the form of submissive gestures and these are often accompanied by vocalizations which could also be consistent with neoteny [8]. There are probably as yet insufficient scientific data to support or refute this theory [18].

The frequency of barking may be influenced by the breed of dog and although it is unclear whether early selection for neotenic traits did in fact occur we know that dogs have been selectively bred over centuries for specific purposes and in many cases one of the traits selected for, particularly in hunting dogs, is a propensity to bark. It is generally accepted that terriers which were bred for chasing and digging bark readily, especially when excited [21, 22] and many working farm dogs were bred for strong persistent barking. Conversely selection towards other traits can result in dogs that rarely bark such as Chow-Chows, Shar peis and some sheepdogs.

There is also evidence of individual variation within breeds. Karjalainen [23] found that barking behaviour could be influenced by selective breeding in Finnish Spitz. Seksel [24] found individual variability in the vocal response of puppies to novel stimuli irrespective of breed. Gogoleva [25] discovered that specific vocalizations could be

selected for in silver foxes (*Vulpes vulpes*) and that these were linked to tameness and aggression. This not only provides further evidence that barking may be selected for or against but should serve to remind us that selection for one trait may inadvertently result in the expression of another.

As yet there have been few studies done to examine the influence of breed on problem barking although Cross [26] concluded that the greatest risk for nuisance barking in a sample of dogs in Brisbane, Australia occurred with dogs of herding type. This is not surprising given that with the exception of eye dogs, herding dogs are bred to bark. The knowledge that barking may be selected against may be helpful in preventing problem barking, allowing us to selectively breed dogs less predisposed to this behaviour that may be more suitable as suburban pets.

Environment

The environment in which a dog is kept can influence barking behaviour. It is known that dogs bark in response to environmental stimuli and that such stimuli may be auditory, olfactory or visual [21].

Few quantitative studies have been made to identify the relative significance of auditory, olfactory and visual stimuli to problem barking, however, the sound of other dogs barking has been identified as a particularly significant stimulus [27, 28]. The intensity of response elicited is related to the factors provoking the barking dogs. For example, if the dog responsible for the stimulus is reacting to an intruder and feels threatened, the intensity of the reacting dog's response will be greater than if the dog providing the stimulus was barking at a passing cat [27].

Other auditory stimuli are also significant in provoking or decreasing barking [29].

When on their home territory dogs commonly bark at unfamiliar or sudden noises and

also at familiar noises associated with things they enjoy chasing or people they are excited to see [21]. Barking triggers identified by owners are many and varied and may be animate or inanimate in origin [30]. Wells [29] found that dogs in an animal welfare centre barked more in the presence of heavy metal music than any other stimulus including human voices. Visual stimuli are often significant trigger factors too [30]. These include cats, birds, people passing the property, other dogs and toys. It is logical to assume that reactivity to specific triggers may vary according to the dog's experience and the frequency to which they are exposed to certain stimuli [21, 29].

Olfactory stimuli have not been specifically studied as triggers for problem barking. We know that the scent of prey triggers barking behaviour in hunting dogs, but this is unlikely to be of significance in a suburban situation. Olfactory stimuli are however used in behavioural therapy. Gaultier [31] showed that chamomile and lavender scent had a calming effect on kennelled dogs and reduced vocalization. Pheromones are used to calm dogs suffering from separation anxiety [32].

Activities such as play and exercise all have the potential to precipitate barking [21] due to excitement or as a method of continued solicitation. Conversely, it is postulated that lack of environmental stimulation and exercise may result in excessive barking born of frustration [32].

Dogs left alone may bark to seek attention [33, 34]. This is often a manifestation of anxiety precipitated by separation from their owners or from human or canine company in general and can escalate to a state of panic. They may also bark in response to anxiety provoking noises such as thunderstorms and fireworks [21].

Environmental influences and associated management practices are extremely important considerations in the investigation and treatment of problem barking.

Physiological State

Barking is potentially influenced by age and state of health including hormone fluctuations, levels of anxiety and level of arousal. Dogs are less responsive to auditory triggers when asleep [27] so it may be that exercise and work on a daily basis serves to decrease barking as animals spend more time asleep.

Young dogs and puppies with high energy levels may vocalize more than older animals as they engage in play or react to new stimuli [35]. Old dogs suffering from canine cognitive dysfunction (CCD, senile degeneration equivalent to Alzheimer's in people) may engage in monotonous apparently meaningless and unprovoked barking [36]. This is the result of neurological changes including amyloid deposition and tangling of neurofibrils and a reduction in levels of the neurotransmitter dopamine. Old dogs not suffering from CCD may bark less due to age related impairment in auditory and visual acuity [21].

Kim [4] found an increase in territorial aggression in ovario-hysterectomised bitches and hence in reactive barking. The reason for this is unclear, although earlier research has suggested that some female puppies situated between males in utero may be affected by testosterone and show increased levels of aggression. This seems to improve if they are not spayed before their first heat [21].

There is little research on the effects of testosterone on barking behaviour in males although it is generally accepted that overly aggressive entire male pets should be castrated to reduce reactivity. As a result, barking associated with challenge and guarding behaviour may also be reduced [21].

Dogs that are anxious or fearful may bark or otherwise vocalize as an expression of this anxiety [33-35]. This may occur in dogs that are left at home alone and suffer

separation anxiety, or in animals reacting to noxious stimuli such as fire-works or thunderstorms. Barking in these circumstances varies but is often repetitive and monotonous and may be interspersed with howling [33]. Dogs showing this behaviour tend to be neurologically different from their counterparts resulting in an inability to cope with anxiety provoking situations due to insufficient neurotransmitters (especially serotonin) or receptor sites for those transmitters [21].

Hunger and physical discomfort are also likely to contribute to increased vocalization although no studies are available to quantify this due to welfare considerations.

Human Response to Barking

Barking is cited world-wide as a behavioural problem in dogs [21, 22, 26, 29, 32, 34, 37, 38] and has been recognised as such for many years. In fact, the first dog control act written in the Bahamas in 1941 describes dogs as a nuisance [39]. As early as 1977 in a paper entitled “The Anti-Social Behaviour of Urban Dogs” authors Loew and Fryer [40] suggest that society needs a “toothless silent constipated canine” before it can be socially acceptable.

Despite our awareness of barking as a social problem, there has been very little research undertaken to investigate why humans respond negatively to barking and to elucidate human perception of this canine behaviour or to quantify public attitudes toward it.

Although we know people complain about the behaviour do we really know why?

There are studies in the field of bioacoustics that investigate the effects of suburban noise on sleep and concentration [41], but most tend to focus on traffic and human created noises. Trimmel et al [42] included barking in investigating noise disturbance

and concluded that background noise, even at low intensity, is associated with energy consumption and therefore can be potentially tiring and may cause impaired performance in spatial attention. Kaiser et al [43] showed that barking caused humans to orient to the source of the sound. This appears to be the result of a direct effect on the brain and is not under voluntary control. Riede [44] showed that measures of the harmonic to noise ratio (HNR) were useful predictors of perceptual rating by human listeners. There was a positive correlation between human classification of barks with respect to noisiness and the actual HNR measurements. This suggests that humans differentiate between barks based on HNRs and lends further support to the theory that a high noise component may be the most disturbing feature of barking.

Dogs barking in close proximity to humans may cause significant discomfort as the sound may reach levels greater than 60-75 decibels which is the level used as the upper threshold by authorities [45] when monitoring work place noise levels or noise complaints. Noise levels in kennels have been recorded at 125 decibels [46]. However, it is difficult to know if it is purely the physical effect of barking that causes people to react negatively to barking. It may be that the context of the bark has some relevance to the degree of disturbance caused. The relative disturbance of different bark types has not yet been studied in detail.

The question remains whether it is the acoustic components of the bark itself or the meaning conveyed by the bark that disturbs humans. Is the degree of disturbance a reflection of social attitude toward dogs and expectations about control and care or is it influenced by individual experience with dogs and lifestyle?

Given the ability of humans to distinguish between bark types [2,11,12], it is likely that early experiences and associations with dogs may have some influence on response to and tolerance of barking however this has not been studied.

Humans have evolved living in close proximity to canids for many years and it is highly likely that the ability to recognize a bark signifying concern and a compulsion to investigate it conveyed a significant survival advantage in earlier communities. Lord [7] theorises that barking is primarily designed as a mobbing behaviour which is a response to a perceived or real threat and shows that such “barking” vocalizations are not confined to canidae but occur in many species. This may be true of territorial barking in dogs and if so could support the theory that humans are conditioned to respond to barking dogs. If this is true, one would expect humans to find territorial barking more disturbing than play barking or barking associated with separation anxiety.

“Quick Fix” Methods used to Control Problem Barking

Several methods to control unwanted barking have been implemented over the years often without any attempt to understand the cause of the problem behaviour. One of the early solutions was the practice of debarking or ventral laryngectomy [47]. This is still performed by some veterinarians although the procedure has been prohibited in many countries. More recently there has been a move towards the use of anti-bark collars.

The use of ‘anti-bark’ collars is highly controversial. These collars work by delivering a noxious stimulus (punisher) in response to the barking behaviour. There are different types of collars for this purpose; those that deliver an electric shock, those that release a spray of citronella or cold air into the dog’s face and those that emit a high frequency

sound. Electric collars may cause significant discomfort [48] and have been banned as inhumane in some countries. Citronella collars do not inflict pain but can cause nausea in some dogs. Scentless spray collars do not cause nausea and work on the principal of interrupting the behaviour with a cold blast of air. Although anti- bark collars have been shown to temporarily stop barking behaviour [21,49], they do not address the underlying cause of the barking or permanently modify the behaviour. In many, the motivation to bark overrides the punishment from the collar [48,49]. Although punishment is delivered, no alternative behaviour is positively reinforced which does not comply with the basic concepts of behaviour modification [21]. It may also be unclear to the dog just what has triggered the collar as dogs rarely bark without performing other associated behaviours such as running or tail wagging.

Barking muzzles have also been evaluated. Cronin [50] found that while some dogs initially pawed and rubbed at anti bark muzzles, most became accustomed to wearing them and were not significantly stressed by them. However these muzzles as with any of quick-fix strategies, do nothing to address and remedy the underlying cause of the unwanted behaviour.

Recommended Methods of Diagnosis, Management and Treatment of Problem Barking.

Local authorities investigating barking complaints use varying criteria to decide if the complaint is valid. One Australian study defined problem or nuisance barking as “Barking that is of sufficient frequency to cause distress or interruption of the life of the dog’s owners or other residents within the neighbourhood” [26]. In New Zealand there is no stipulated acceptable level of barking (F.Eames, Environmental Health Officer

North Shore City Council pers.com.) Although in some instances recordings are made, assessment is purely subjective. Unfortunately a quantified universally acceptable “normal” level of barking in dogs that are not problem barkers has not been established. Such a parameter would be useful as a benchmark against which to compare problem barkers. Without an accepted normal level to use as a baseline there is pressure for owners of dogs that have been complained about to reduce the amount of barking their dogs are doing regardless of the level or the cause. As a result owners may resort to inappropriate (quick- fix strategies) such as anti-bark collars [30].

It is accepted among experts that the diagnosis of barking problems requires proper investigation.[21,22,33] After a basic health check a thorough behavioural history should be taken [21]. It is important to quantify how much barking actually is occurring over a twenty four hour period and the type and pattern of barking. This information can be gathered from the observations of cooperative neighbours, the use of video cameras, tape recorders and owner diaries .[33] From this information it is possible to distinguish between barking that is anxiety based, territorial barking, barking in response to other environmental stimuli and possibly barking due to senility [12].

Where barking is not due to an underlying pathological state there are several different strategies that may be employed to modify the behaviour without resorting to quick –fix strategies.

Dogs can be taught to respond to a QUIET command and can be redirected onto other behaviours if they are barking at some environmental stimulus, [21, 22] however often the motivation to comply with an innate drive to protect may override the training.

Owners can be taught to manage dogs that bark for attention by reinforcing quiet behaviour and ignoring barking until the behaviour is extinguished by lack of positive

reinforcement. This is effective but takes time and patience, so owner compliance is often difficult especially if the dog is particularly persistent.

Dogs can also be desensitised to certain auditory and visual stimuli that provoke barking [21, 33]. If there is no opportunity for the owners to work through a desensitization program, simply putting up a screen to decrease access to visual stimuli is often effective [21]. Leaving the dog inside when it is alone is a simple solution where visual and auditory stimuli pose a problem. Leaving soothing music playing may also be useful in decreasing barking in dogs that are confined [29].

It seems reasonable to assume that dogs that have been well socialized and make positive associations with human strangers and other dogs are likely to be less intense in territorial guarding behaviour and so are likely to settle more quickly after barking in response to the presence of a stranger. Puppy socialization classes and frequent exposure to visitors (both canine and human) in the home environment are probably useful in decreasing the potential for “problem” barking related to territorial defence. However this has not been quantified.

It is noted by people working in canine behaviour that dogs receiving daily exercise and off property stimulation tend to sleep more and be less reactive when at home so owners of problem barkers are usually encouraged to run their dogs for at least thirty minutes morning and night. However, these effects have not been quantified in field studies.

Although there is no absolute data to support efficacy in the field, environmental enrichment strategies in the form of toys that release food have been trialled with some success in kennelled beagles [51] and similar strategies are used successfully in clinical behavioural practice to reduce barking. A dog that is occupied chewing a bone, working out how to extract food from treat dispensing toy, digging up toys containing food

buried in a sandpit, or tracking down hidden treats is less likely to spend time barking at extraneous environmental stimuli.

Dogs that vocalise because they are anxious about being alone i.e. suffer separation anxiety require specific medical treatment and intensive behavioural therapy.

[21,33]. Treatment should include anti-anxiety medication, ideally given over a period of several months while a behavioural modification program designed to accustom the dog to remaining alone is instituted. The medication may then be gradually withdrawn [21]. The aim in using this medication is to reduce anxiety in order to facilitate effective behavioural modification and to modify the neuroanatomy of susceptible individuals by increasing receptor sites for the relaxing neurotransmitter serotonin [21]. Permanent changes are achievable in some individuals; however some dogs require life-long medication to control the disorder. Adjunctive therapies may be used in dogs where standard treatments are not having the desired effect [52].

Pheromone therapy is a useful addition to the management of canine separation anxiety.

DAP (Dog Appeasement Pheromone) is an analogue of a pheromone produced by bitches from the mammary sulcus when they have puppies and serves as an anxiolytic. It is usually used in the form of a diffuser although sprays and impregnated collars are available in some countries [31].

Recommendations for dogs barking excessively due to senile degeneration include a mixture of medical therapy, nutritional support and behaviour modification. Drugs to increase available dopamine and drugs that assist brain perfusion are often recommended, along with dietary supplementation with antioxidants [36]. Ginkgo biloba is useful [53] and recent studies have shown that feeding medium chain triglycerides derived from coconut provides a source of nutrition for neurons in the

form of ketones which counters the decreased ability of the aging brain to utilize glucose so helping to prevent or at least delay the onset of cognitive dysfunction [54]. Environmental modification and exercises to encourage mental activity are also recommended as part of a treatment protocol [36].

Conclusions

Dogs bark for various reasons during their daily life. Although there are circumstances where it may be excessive, barking is a normal and important component of the repertoire of canine behaviours. It is unreasonable to expect that dogs living in suburbia should not bark at all.

Unfortunately there is no documented universally socially acceptable level of barking as there is for other suburban noise and there is a tendency in some cases for complaints to result in council action with little investigation. Establishing some sort of baseline expected or acceptable level of barking that could be used as a bench mark would be extremely useful even though there would probably need to be some regional variability depending on level of environmental stimuli.

Since excessive barking may indicate an inappropriate level of care or the presence of pathology, it is important that cases of problem barking should be properly investigated and appropriate treatment or modification strategies implemented.

Further research is required to investigate why people find barking so obnoxious so that we can better understand how to manage this very significant social problem. It may be that better public education about barking will lead to increased tolerance and encourage owners to seek professional advice where appropriate.

By further understanding the factors that influence barking behaviour and identifying risk factors for problem barking it may be possible to improve management strategies and implement prevention plans.

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CHAPTER THREE

Characteristics of Adult Dog Owners in New Zealand

To begin this research, it was important to understand the characteristics and demographics of the dog owning public. This information could be useful in identifying potential problem areas for barking such as regions of high dog density and in targeting sectors of the population for education about dog management by identifying risk factors for ownership.

Data were obtained by means of a questionnaire, as described in the following chapter.



Characteristics of adult dog owners in New Zealand

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Abstract

AIM: To investigate the characteristics of adult dog-owners in New Zealand and to identify factors which influence dog ownership.

METHODS: A 12-page questionnaire comprising 48 questions was sent to two thousand people throughout New Zealand randomly selected from the electoral roll.

RESULTS: Seven hundred and twenty seven completed questionnaires were received, from a total of 1,750 successfully delivered, a response rate of 42%. Twenty-nine percent (211/727) of respondents currently owned dogs, and 32 % (233/727) had never owned a dog; the remaining 39% (283/727) had some history of dog ownership. There were regional differences in dog ownership. The level of dog ownership was influenced by the type of dwelling, region, age, marital status, presence and age of children, and owner personality.

CONCLUSIONS: Adult dog owners in New Zealand are mostly aged between 18 and 55 years, educated to secondary school level or above, live in a rural or suburban area, married or in a de-facto relationship with children over the age of one year, consider themselves to be of positive character, and do not consider a dog bite likely or to pose a significant health risk. Factors most predictive of dog ownership were considering themselves unlikely to be bitten, being young, living in a rural house, and considering themselves to have positive personalities

KEY WORDS: *Survey, dog owners, characteristics*

Introduction

In 2009 there were 477,727 registered dogs in New Zealand (Anonymous 2009), but there are few available data on the dog-owning public. The benefits of dog ownership are widely documented and include positive effects on physical and mental well-being (Fifield and Forsyth 1999; Vidovich et al., 1999; Cutt et al., 2008a), family structure (Power 2008) and child development (Daly and Morton 2006; Gee et al., 2007), but there is increasing publicity about dog attacks and the potential hazards of dogs in society. Legislative controls on dogs have recently become stricter. Problem behaviours such as barking and aggression are of social concern in New Zealand (Wake et al., 2006). Over a one-year period from 2007 to 2008, Auckland City Council received 2,091 complaints about barking (Anonymous 2008). There is a need to understand how these problems may arise, how they affect society and how to manage and control them. To do so, a better understanding of the characteristics of the dog-owning population must be gained. To date, there has been no published study of dog owners in New Zealand although Fifield and Forsyth (1999) examined demographic variables related to pet ownership by means of questionnaire surveys distributed via school children. The percentages of dog ownership and demographic variables relating to dog ownership differ between countries. One study in the United Kingdom (U.K.) reported 24% dog ownership (Westgarth et al., 2007) while in another in the United States of America it was 38% (Troutman 1988). A recently published study of cat and dog ownership in Teramo, Italy, placed dog ownership at 33% (Slater et al; 2008). Tanzania is an interesting comparison, with ownership placed at 14% (Knobel et al., 2008). Demographic variables quoted in overseas studies as influencing dog ownership include

gender, age (Slater et al., 2008), marital status (Slater et al., 2008), presence and age of children (Westgarth; 2007), the number of occupants in a household, educational level, residential area, income, and religious beliefs. The effects of gender varied with study; dog ownership increased in association with the presence of an adult female (Westgarth et al., 2007) or was positively associated with the presence of a male (Knobel et al., 2008) or there was no significant effect of gender (Slater et al., 2008). There were positive correlations with ownership and the presence of children (Fifield and Forsyth 1999; Slater 2008,) especially if they were between 6 and 19 years of age (Westgarth et al., 2007); ownership increased in association with increasing numbers of occupants in a household (Westgarth et al., 2007; Slater et al., 2008). Effects of age were noted, with a decrease in dog ownership seen in those aged >60years. The average age for dog ownership in one study was 43 years (Slater et al; 2008). Residential area was important in some studies (Fifield and Forsyth 1999; Knobel et al., 2008) and the type of dwelling was also significant (Knobel et al., 2008). Religion was significant in a study from Tanzania (Knobel et al., 2008), with Christian households being more likely to own dogs than Muslim households.

The aim of this study was to investigate the characteristics of dog owners in New Zealand and to identify factors which influence dog ownership.

Materials and methods

A 12 page questionnaire containing photographs and cartoons strategically placed to attract and maintain attention, was sent to 2,000 people who were randomly selected from the electoral roll. A covering letter explained the purpose of the questionnaire and

reassured participants that their privacy would be protected. Two mailings and a reminder were used to encourage a good response rate. A copy of the questionnaire is shown in Appendix 1. This project was approved by the Massey University Human Ethics Committee (MUHEC), Palmerston North, New Zealand.

Questions covered basic demographic data, including sex, age, and marital status, age of children, occupation, education, ethnicity, type of dwelling and region. The experience of dog ownership was evaluated, and also any history of exposure to aversive experiences associated with dogs, i.e. whether the respondents had been bitten or frightened by a dog, and whether they knew of or had heard of people having had such experiences. They were also asked to indicate how serious an injury a dog bite might be and how likely they thought it was that a dog might bite them or a member of their family.

Respondents were also asked to answer a personality self-assessment question.

Participants made a self-assessment of their personality by scoring the applicability of 20 words on a scale from 1 ("not at all") to 5 ("extremely"). This personality test is based on work by Watson and Clark (1988). Negative descriptors are Distressed, Upset, Guilty, Scared, Hostile, Irritable, Ashamed, Nervous, Jittery and Afraid. Positive descriptors are Interested, Excited, Strong, Enthusiastic, Proud, Alert Inspired, Determined, Attentive and Active.

Statistical analysis

Data were processed using SPSS statistical program versions 14 and 17 (SPSS Inc. Chicago, IL, U.S.A.). Cross tabulation was performed to evaluate effects and X^2 analysis used to determine significant associations. The 95% level of significance was used for all tests. Varimax rotated factor analysis was used to extract the first two component scores from the responses to the personality self-assessment question. These two scores captured 45 % of the variance from the self-assessment. The first score was associated with negative descriptors and the second with positive descriptors. Logistic regression analysis was used to identify factors associated with dog ownership and to control for any confounding effects. A step up model was used that included only terms at the 0.05 level of significance or better.

Results

Two hundred and fifty of the 2000 questionnaires were returned as undeliverable. Of the 1750 delivered questionnaires, 727 useful questionnaires were returned, a response rate of 42%. Not all respondents answered every question resulting in variable total values.

Forty percent (290/727) of survey respondents were male compared with a census figure of 47.9 %.

Demographics of Respondents

Respondents came from throughout New Zealand, with 31.6% (216/684) in the Auckland area and 14% (97/684) in Canterbury. Sixty-six percent (476/710) lived in suburban houses. The geographical distribution of respondents followed that of the New Zealand 2006 census quite closely which showed 32.4% of the population living in

Auckland (Anonymous 2006). Eighty one percent (569/700) of respondents were New Zealand Pakeha and 9.6% (67/700) were Maori. Maori appear to be underrepresented in the survey with 9.6% (67/700) Maori respondents compared with 12.5 % of census respondents. It is not possible to compare other ethnicities as numbers were too low. Ninety-six percent (669/700) considered English to be their first language. Forty percent (290/727) of respondents were males and 56 % (407/727) respondents were females. Ages ranged from 19 to 92 years with most in the 35 - 65 year bracket. There was a slight bias towards older members of society. Eighteen percent of respondents were >65 years of age compared with the census records of 15.5%. The median age for adult respondents in the census was 44 years while the median of this survey was 43.5 years.

The highest level of education for the majority of respondents was secondary school (65%; 445/686), with 24% (165/686) having a university degree and 9 % (59/686) having a post-graduate degree. Sixty-two percent (442/714) were married, compared with a census figure of 49.4%. Sixty-three percent (458/727) of the adults surveyed had children which paralleled the census figure of 60% and, 5.4% (39/727) had a child less than 1 year old in the house. Forty-eight percent (348/727) were at home most of the day during the week and 5.8% (42/727) worked night shift.

Dog ownership and demographic factors

Thirty-two percent of respondents (233/727) had never owned a dog. The others had some history of dog ownership with 29% (211/727) currently owning a dog.

The number of respondents currently owning a dog varied between regions (Table 1).

The type of dwelling had a significant effect on dog ownership ($\chi^2=60.4$, df=5, $p<0.001$)

(Table 2). Within the non-rural sector, dog owners tended to live in houses rather than flats.

Dog ownership and ethnicity

For most ethnic groups, dog ownership was about 28% (Table 3). There was no significant difference in the rate of ownership amongst the four ethnic groups with at least 20 respondents.

Dog ownership, age and gender

There was a marked decrease in dog ownership above the age of 55 years (Table 4, $\chi^2=18$, $df=6$, $p<0.05$). No one surveyed over the age of 75 owned a dog.

There was no significant effect of gender on dog ownership.

Dog ownership and level of education

Dog ownership was statistically independent of owner education, ($\chi^2=5.8$, $df=3$, $p=0.126$) (Table 5) and the average ownership across all levels of education was 29% (198/686).

Dog ownership and marital status

Individuals with a partner were more likely to own a dog than those widowed, divorced or single. There was no statistical difference in dog ownership between married and de-facto couples but amongst those widowed, divorced, or single, widows were less likely to own a dog ($\chi^2=7.9$; $df=2$; $p=0.019$) (Table 6). Those with children at home were very likely to be dog owners but only if the children were more than a year old.

Dog ownership and aversive experience with dogs

A higher percentage of non-dog owners than dog owners had been frightened by a dog (70.1% vs. 65.5%) and considered that if they were bitten a bite could pose a serious threat to their health. but there was no significant association between dog ownership and aversive experience (Table 7).

Dog ownership and perception of importance of dogs to society

Dog owners valued the role of dogs within society more than non-dog owners did ($\chi^2=54.3$, $df=4$, $p<0.001$) (Table 8). Significantly more dog owners than non-dog owners considered dogs to be very important as household pets, while both dog owners and non-dog owners considered guide, search-and-rescue, border-patrol, and police dogs important. Dog owners placed more importance on dogs assisting people with disabilities and pet-therapy dogs than non-dog owners. Gun dogs were not considered to be very important by either group.

Personality type and ownership

Respondents who currently owned a dog were more likely to have a high positive personality self-assessments (0.189 ± 0.073) than non-dog owners (-0.085 ± 0.053) Negative descriptor self-assessment was not a significant predictor of dog ownership ($p=0.14$)

Predicting dog ownership

Dog ownership can also be analysed as the product of several univariate factors operating at once. The people most likely to own a dog were those who felt they are unlikely to be bitten, were young, lived in a rural house, and made a high self-assessment of their positive personality traits (Table 9).

Discussion

The results of the survey presented here provide a reasonable snapshot of the New Zealand's dog-owning population although it does not differentiate between owners of working dogs such as farm dogs and owners of pet dogs. There may or may not be significant differences between owners in these categories. Maori appeared to be under represented in our survey but the fact that people could choose to identify with more than one ethnic group was an additional complication making ethnicity data difficult to interpret. Some respondents chose not to answer all the questions resulting in the possibility of some non-response bias in certain questions.

The fact that the majority of dog owners were aged between 18 and 55 years of age and 33% of married and de-facto couples owned dogs probably reflected the trend for New Zealanders to keep a family dog during the child-rearing phase of their lives which is consistent with the findings of Fifield and Forsyth(1999). It is a time when they are probably stable in their own home, and spend free time in family oriented outdoor pursuits in which they may be accompanied by a dog such as visiting beaches or parks or bike riding.

The lesser numbers of people aged 55-64 who kept a dog probably reflected the fact that families may have fragmented due to children moving out. Only 19% of those aged 65-74 owned dogs. These data are similar to data from the U.K. where those >60 years of age were significantly less likely to own dogs (Westgarth et al., 2007). This number is low considering that it is known that older people may benefit greatly from dog ownership (Antonacopoulos and Pychyl 2008). Dogs provide companionship and an incentive to exercise (Cutt et al., 2008a, b) and have been associated with health

benefits such as reduced blood pressure (Friedman et al., 2007; Knight and Edwards 2008). It may be that people in this age group find it difficult to afford the costs involved in keeping a dog or feel concerned that they may die before their pet. Others may find caring for a pet too much bother or may be traveling on a regular basis. Those in rural and suburban dwellings had the highest percentage of dog ownership. Of those dog owners living in non-rural areas, most lived in houses rather than flats. Those respondents living in suburban flats had a lower percent dog ownership than those in inner city flats. This probably reflects the trend to own property in the inner city whereas suburban flats are usually rented and many landlords do not accept pets. It is interesting that the study from the UK (Westgarth et al., 2007) found no correlation between type of dwelling and ownership, although this may have been due to the small sample size.

The largest percentage of dog owners was educated to secondary school level. Those educated to university degree level or beyond were slightly less likely to own dogs. This may be because they have a tendency to travel more or have different interests to those educated to a lower level. Data from the UK also showed a high level of dog ownership in middle-income groups (although there was also a strong positive correlation with the presence of unemployed, sick or disabled people or full-time students within the household) (Westgarth et al., 2007), and a similar pattern is seen with regard to middle-income groups in Italy (Slater et al., 2008).

In this survey, although more non-dog owners had been frightened by dogs than dog owners, potentially negative encounters with dogs or news of the negative encounters of others did not have a significant effect on ownership. The reason more non-dog owners

considered dog bites to be a potentially very serious risk to health than dog owners may reflect their lack of experience with dogs rather than why they did not own a dog.

It is understandable that dog owners consider dogs to be important to society and that they would place more importance on the role of dogs assisting people with disabilities and pet therapy dogs than non-dog owners as they are likely to be more aware of what a dog can actually achieve in these roles. The roles of police, guide and border-patrol dogs in society are widely publicised and so it is not surprising that non-dog owners recognized the importance of these roles.

There was a strong correlation between positive personality and dog ownership. This may be because people who are negative are in a financial or emotional position that is not conducive to dog ownership, or it may in fact be that owning a dog has a positive effect on a person's attitude to life (Knight and Edwards 2008; Dimitrijevic 2009).

Logistic regression analysis demonstrated that, overall, the people most likely to own a dog were those who felt they were unlikely to be bitten, were young, lived in a rural house, and made a high self-assessment of their positive personality traits (Table 9).

Other factors may also have been important, but they are likely to be correlated with the four included in the logistic regression model. Thus, these four factors are certainly good predictors of dog ownership, but the statistical model alone should not be construed as demonstrating they cause an individual to own or not own a dog.

In conclusion this is the first study that has investigated the demographics of the New Zealand dog owning population. Information gained may be helpful in targeting sectors of the population that would benefit from educational material about dog care and management. Data from the study may help indicate where amenities conducive to dog keeping need to be provided e.g. dog parks and suggest that further investigation should

be made to discover why older people are not keeping dogs in order to establish if there is a need to assist older people who wish to be dog owners.

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Table 1. Regional distribution of 684 New Zealanders who responded to a survey on dog ownership

Region *	Own a dog (%)		n
	Yes	No	
Northland	32	68	25
Auckland	21	79	216
Bay of Plenty	23	77	47
Waikato	70	29	47
Hawkes Bay	38	62	24
Taranaki	61	39	23
Manawatu	30	70	20
Wellington	21	79	63
Wairarapa	14	86	7
Nelson Bays	30	70	20
Marlborough	64	36	11
West Coast	25	75	8
Canterbury	30	70	97
Aorangi	50	50	8
Clutha/Central Otago	54	46	13
Otago: Coast & South	25	75	24
Southland	42	58	31

Table 2. Type of dwelling and current dog ownership for 710 New Zealanders who responded to a survey on dog ownership.

Dwelling	Own a dog (%)		n
	Yes	No	
Rural	56	44	129
Suburban house	24	76	476
Suburban flat	9	91	32
Inner city house	20	80	35
Inner city flat	14	86	14
Other	21	79	24

Table 3. Ethnicity and dog ownership of 700 New Zealander who responded to a survey. (Note responses exceed 700 as some identified with more than one ethnic group)

Ethnicity	Own a dog (%)		n
	Yes	No	
New Zealand Pakeha	29	71	569
Maori	25	75	67
Pacific Island	20	80	20
Australian	29	71	14
Chinese	25	75	16
Dutch	55	45	11
English	24	76	62

Table 4. Age relative to current dog ownership in 704 New Zealand respondents who answered a questionnaire on dog ownership.

Age	OWN A DOG (%)		n
	Yes	No	
18-24	36	64	39
25-34	29	71	89
35-44	36	64	129
45-54	37	63	140
55-64	26	74	127
65-74	19	81	169
>75	0	100	11

Table 5. The relationship of educational level to dog ownership for 686 New Zealand respondents to a questionnaire on dog ownership.

Education	Own a dog (%)		n
	Yes	No	
Primary	6	94	17
Secondary	31	69	445
University degree	26	74	165
Postgraduate degree	27	73	59

Table 6. Family status –effects on dog ownership of 714 New Zealanders who responded to a questionnaire about dog ownership.

Family Status	Own a dog (%)		n
	Yes	No	
Married	33	66	442
De facto	34	66	71
Divorced	16	84	37
Widowed	4	96	51
Single	21.2	79	113

Table 7. Association between aversive experience and current dog ownership of 722 New Zealand respondents to a questionnaire on dog ownership.

		Own a dog (%)		χ^2	Significance
Question		Yes	No		
Bitten by dog?	Yes	83	184	1.47	0.27
	No	122	332		
Frightened by dog?	Yes	135	359	1.44	0.23
	No	71	153		
Heard of anyone bitten?	Yes	202	495	3.42	0.064
	No	3	22		
Know of anyone bitten?	Yes	118	328	1.97	0.16
	No	84	184		

Table 8. Relationship of perception of importance of dogs to society and dog ownership in 621 New Zealand respondents to a questionnaire on dog ownership.

Response	Own a dog (%)		n
	Yes	No	
Vital to society	42	22	175
Play a moderately important role	47	39	257
Only important in specific roles	8	30	144
Important to minor sector	3	9	43
Not important at all	0	<1	2

Table 9 significant variables included in logistic regression model to predict dog ownership. Negative estimates for B indicate increasing likelihood of current ownership of a dog for people within the category or with a high score for the character.

Parameter	B	SE	WALD	df	Significance
Likely to be bitten	0.52	0.15	12.56	1	<0.001
Year born	-0.02	<0.01	4.63	1	0.031
Type of house					
Rural house	-1.53	0.28	29.64	1	<0.001
Suburban flat	2.32	1.05	4.92	1	0.027
Inner city house	0.20	0.51	0.15	1	0.703
Inner city flat	1.05	1.10	0.93	1	0.335
Other	-0.61	0.79	0.59	1	0.442
Positive assessment score	-0.28	0.12	5.27	1	0.022
Constant	3.52	0.67	27.63	1	<0.001

CHAPTER FOUR

Public Attitude to Barking Dogs in New Zealand.

The next step in this research was to assess public attitudes to barking dogs and to ascertain how bothersome barking was perceived to be by the general public and why. It was also necessary to find out how many people had actually received complaints about



their dogs barking, what the outcome had been and also what they would do if they received a complaint about their dogs barking. Information about what people who had been bothered by barking dogs or felt that they would be bothered by barking dogs had done or would do when faced with the problem and how much they understood about the possible reasons for barking was also required. These concerns were addressed in the same questionnaire used in the previous paper. The results are presented in the following chapter.

Public attitude to barking dogs in New Zealand.

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Abstract

AIM : To investigate public attitudes toward barking dogs in New Zealand in order to quantify the extent to which people perceive barking dogs to be a problem and the factors that influence this perception. To compare tolerance of barking with that of other common suburban noises, to assess the level of public understanding about the function of barking, to determine risk factors for intolerance of barking, and to assess public knowledge of possible strategies for the investigation and management of problem barking.

METHODS: A 12-page questionnaire comprising 48 questions was sent to 2,000 people throughout New Zealand randomly selected from the electoral roll.

RESULTS: There was a 42% response rate to the questionnaire. Forty -nine percent (356/727) of respondents indicated that frequent barking during the day would bother them while 75% (545/727) would be concerned by barking at night. Barking and howling were ranked above other suburban noises as a cause of annoyance. Risk factors for being bothered by daytime barking were; age (>35years), being home during the day, not owning a dog, and considering a dog bite to be a serious health risk. Risk factors for being bothered by night-time barking were; being divorced, considering dog bites to pose a serious health risk and having been frightened by a dog. Other factors that predisposed people to being bothered by daytime barking included; not living in an inner city flat, and considering English to be their first language. Other factors predisposing to night- time barking included; considering English to be their second language and not living in an inner city flat or rural house.

Action likely to be taken by those bothered by barking varied from investigating the cause, notifying and offering to help the owner, complaining to the owner and/or authorities, dealing with it themselves, and doing nothing. Dog owners' responses to barking complaints included seeking help from dog trainers or behaviourists, trying advertised anti-barking devices, and getting rid of the dog.

CONCLUSIONS: Barking is considered to be potentially disturbing by members of the New Zealand public. Attitudes towards barking are most influenced by age, dog ownership, past experience with dogs and attitude towards dog bites. Public understanding of the possible reasons for barking and appropriate methods of managing the behaviour when it becomes a problem could be improved.

KEY WORDS: *Barking, dogs, attitude, society*

Introduction

Barking is a form of communication used by domestic dogs (*Canis familiaris*) to communicate with conspecifics and with humans and other animals. It is a canine behaviour that is poorly tolerated by some people (Senn and Lewin 1975). Barking is frequently identified by owners as problem behaviour and is cited as a reason for the relinquishment of dogs to animal shelters (Wells et al; 2002). Dogs are commonly presented to veterinary behaviourists because of excessive or inappropriate barking (Beaver 1994; Verga and Palestrini 2002). Owners may find it difficult to tolerate their dog's barking or they may be concerned that their dog is distressed. Their primary concern may be that their dog could be bothering others.

Barking is a common cause for public complaint in New Zealand (N.Z.). Owners of barking dogs may be fined and in extreme cases dogs may be removed and euthanased. In one Auckland animal control centre an average of 204 barking complaints are received each month (Anonymous 2009). Overall 35.5% (2,452 /6,905) of annual complaints about dogs in Auckland are about barking.

Information about barking as a social problem is scarce. This study evaluates public attitudes towards dogs and quantifies the extent to which people in N.Z. perceive barking dogs to be a problem. It compares tolerance of barking dogs with that of other common suburban noises and investigates the level of public understanding about the function of barking. It establishes the course of action taken by people bothered by barking dogs and determines risk factors for intolerance of barking.

Materials and methods

Two thousand participants were sent a 12-page questionnaire and a covering letter explaining the purpose of the questionnaire and reassuring participants that their privacy would be protected (Appendix 1). The participants were randomly selected from the New Zealand electoral roll. Two mailings and a reminder were used to encourage a good response rate. This study was approved by The Massey University Human Ethics Committee, Palmerston North, New Zealand.

Questions covered basic demographic data, including sex, age, and marital status, age of children, occupation, education, ethnicity, dwelling type and region. The experience of ownership was evaluated and dog owners were asked if they had received complaints about their dogs barking. Respondents were asked to record any history of aversive experiences associated with dogs and to rate barking as an annoyance in comparison to other suburban noises. They were asked if they thought dogs should bark at all, why they thought dogs barked and to indicate what action they may take if exposed to frequent barking at night or during the day. They were asked to rate how they felt about dogs emotionally and whether they considered dogs to be a potential threat to themselves or their families. Their attitude to dog bites was evaluated.

Statistical analysis

Data were processed using SPSS v14 for Windows and v17 for Macintosh OS X (SPSS Inc., Chicago IL, USA). Cross tabulation was performed and Chi square analysis used to determine significance. Regression analysis was used to establish risk factors for intolerance to barking.

Results

Two hundred and fifty of the 2000 questionnaires were returned as undeliverable. Of the 1750 delivered, 727 useful questionnaires were returned, a response rate of 42%.

Not all respondents answered every question resulting in variable total values.

Demographics of respondents

Respondents came from throughout New Zealand, with 31.6% (216/684) in the Auckland area and 14% (97/684) in Canterbury. Sixty-six percent lived in suburban houses (476/710). The geographical distribution of respondents followed that of the New Zealand 2006 census quite closely which showed 32.4% of the population living in Auckland.

Ninety-six percent (669/700) considered English to be their first language. Maori appear to be underrepresented in our survey with 8.4% Maori respondents compared with 14.6% of census respondents. It was not possible to compare other ethnicities as numbers were too low. Some respondents identified with more than one ethnic group making any influence of ethnicity even more difficult to assess.

Forty-four percent of respondents were males (290/727) compared with a census figure of 47.9% and 56% of respondents were females. Ages ranged from 19 to 92 years with most in the 35 - 65 year bracket. There was a slight bias towards older members of society. Eighteen percent of respondents were 65 years of age or more, compared with the census records of 12%. The median age for the census was 35.9 years while the median of this survey was 43.5 years.

The highest level of education for most of the respondents was secondary school, 65% (445/686) of the sample, with 24% (165/686) having a university degree.

Sixty-two percent were married (442/714) compared with a census figure of 49.4%.

Sixty-three percent (458/727) of the adults surveyed had children, compared to a census figure of 60% and 6 % (39/727) had a child less than 1 year old in the house. Forty-eight percent (348/727) were at home most of the day during the week and 6% (42/727) worked night shift.

Respondent ownership history, exposure to complaints, and experience with dogs

Thirty two percent (233/727) of respondents had never owned a dog. The others had some history of dog ownership with 29% (211/727) currently owning a dog.

The level of official complaints reported by owners in this study was low, 4% (8/211) of dog owning respondents had received complaints from neighbours about their dogs' barking and 3% (7/211) had received complaints from the council.

Respondent attitude toward dogs

Forty percent of respondents (290/727) were very fond of dogs while 4% (29/727) disliked dogs. Seven percent (53/727) were afraid of dogs and 8% (57/727) were concerned that dogs may pose a threat to themselves or to family members. Fifty eight percent (406/700) felt that it was unlikely, but possible that, they or a family member could be bitten by a dog. Seventeen percent (119/700) thought it extremely unlikely, and 17% (118/700) considered it likely, with 8% (55/700) considering it to be very likely. Thirty eight percent (276/727) regarded dog bites as most likely to be moderately serious, 20 % (149/727) considered them likely to be slightly serious, and 17 % (125/727) not serious. Twenty- one percent (152/727) thought it was likely that a dog bite would be very serious.

Respondent attitude to barking

Ninety -five percent (690/727) of respondents accepted that dogs should bark at times. Forty- nine percent (356/727) said they would be bothered by a dog barking repeatedly during the day and 75% (545/727) said they would be bothered by a dog barking repeatedly at night. Dog barking or howling was rated as more annoying than any of the other common household noises given as comparisons (Figure1).

Daytime barking

Reasons for concern

Concerns about daytime barking listed by respondents were; distraction from work, sleep disturbance, the possibility that there may be a prowler and concern for the dog's welfare. Fewer dog owners (7.9%-16/202) felt they would be distracted by daytime barking than non-dog owners (16%-81/500) and more dog owners would be concerned for the dog in case it was hurt or was being maltreated in some way (39%-79/201) than non-dog owners (32%-161/500). Only a few dog owners (7.1% -15/211) and non-dog owners (6.0%-31/516) thought daytime barking may signify the presence of a prowler and there was little difference between dog owners (3.3%-7/211) and non dog owners (2.3%- 12/516) in the small numbers of respondents who considered sleep disturbance to be a potential problem.

Factors influencing concern

Those who had been frightened by a dog or knew of someone being bitten by a dog were more likely to be bothered a lot by (unable to ignore) daytime barking than those for whom this was not true (Table 1). The belief that a family member could get bitten by a dog (Table 2) also increased the likelihood that they would be bothered by daytime barking. Those believing that a bite could pose a serious health risk were slightly less

likely to be bothered (Table 3). Dog owners were somewhat less bothered by dogs barking during the day than non-dog owners (Table 4). People whose first language was English were more likely to be bothered by day time barking (51%-338/662) than those for whom English was a second language (31% - 16/51) ($\chi^2=15.60$; $df=3$ $p=0.002$). People living in suburban flats, inner city houses, suburban houses and rural dwellings were more likely to be bothered than those in inner city flats (Table 5). There was a trend for more people in the 45-64 year age group to be more bothered by daytime barking and for those above 35 years to be more bothered than those below. Those in age group 18-24 years were least bothered (Table 6).

Night-time barking

Concern about barking increased at night and the reasons for concern changed.

Reasons for concern

At night the emphasis of the respondents changed. Concern was predominantly in case there was a prowler, that the dog was alerting to and also because sleep was disrupted. Some were still concerned about the dog's welfare

Factors influencing concern

Both males and females were more likely to be bothered by night-time barking than daytime barking with 75.4% (242/321) males and 74.6% females (306/410) being bothered at night and 49.4% (155/315) males and 49.8% females (200/402) bothered during the day. Ownership had no significant effect on being be bothered by night time barking (Table 4). People were bothered more by night time barking if they had been frightened by a dog or if they knew someone who had been bitten by a dog (Table 1), if they considered that a dog could bite a family member (Table 2) and if they considered that a bite wound could pose a significant health risk (Table 3).

Those living in suburban houses, suburban flats and inner city flats were more likely to be bothered by night-time barking than those in inner city houses and rural houses (Table 5).

There was a trend for those below 25 years of age and those over 75 yrs. to be less bothered by night-time barking than those in other age groups (Table 6). Marital status had some influence with divorced respondents being most concerned (84% -31/37) and widowed being least concerned (57% - 28/49). People in de-facto relationships were next least concerned (62% - 44/70) with married (78% - 350/450) and single (76% - 86/113) showing similar levels ($X^2=22.03$; $df=12$ $p<0.01$).

Action likely to be taken in response to barking

Most people were prepared to investigate why a dog was barking repeatedly before complaining. If there was no apparent reason for the barking, 17.8% (119/666) of respondents would notify the owner and offer to help, 19.1% (127/666) would notify the owner to complain and 18.2% (121/666) would complain to the authorities. Of those that would not complain or contact the owner 26% (77/299) would be concerned that the owner would become angry with them, 25% (74/299) felt they had more important things to deal with, 15% (46/299) were afraid that the owner may hurt the dog and 10% (29/299) felt that nothing could be done so complaining was pointless.

Factors influencing action taken in response to barking.

Gender, age and dwelling type and the presence of a child under one year of age in the house had some influence on action taken in response to barking (Table 7). More males than females would complain to the owners and yell at the dog. Otherwise gender had little effect on the action likely to be taken (Table 7). Seventy five percent (98/130) of

55-64year olds and 75% (30/40) of 18-25year olds would investigate why a dog may be barking. Those over 65 years of age, were least likely to investigate (33% - 44/134).

Fewer young people (aged 18-24years) would complain to the owners or get further involved, although they were somewhat more likely to yell at the dog than the other age groups and most likely to complain to others. More people in the 55-74yr. age bracket would notify the owner and offer to help than in other age groups (Table 7).

Those living in rural houses were more likely to notify the owner and offer help than those in other dwellings ($\chi^2=20.3$; $df=5$ $p=0.001$), while those in inner city flats and houses were most likely to ignore it (Table 7).

Thirty-nine percent of respondents with a child younger than one year of age chose to do nothing.

Owner response to complaints

Reasons for owner concern about complaints

Owners indicated that if they received complaints about their dogs barking their concerns would include; that their dogs may be unhappy (57% -120/211), that their dogs may be taken away (56.8% - 119/211), that the barking may signify intruders (56.4% - 118/211), that their dog may be disturbing others (52.% -110/211), that they may receive a fine (40% - 85/211) and that their dog may be bored (44% - 92/211).

Owner action likely to be taken to decrease barking in their dogs

Twenty eight percent (59/211) of owners would call in a dog trainer for assistance if their dog was barking too much, while 26% (54/211) would call a behaviourist.

Citronella bark collars were considered a possible option by 14% (30/211) and electric anti-bark collars by 1.5% (3/211). Fourteen percent (30/211) would follow the

recommendations of a dog control officer. Some, 10% (20/211), would get rid of the dog and 7% (15/211) would consider debarking.

Factors influencing owner response to complaints

Gender and dwelling type had most influence on owner response to complaints. Female owners were more likely to seek help from a trainer (32%-41/127) than males (21% 17/80) ($\chi^2=13.58$;df =4 p=0.009). Males were more likely to trial citronella bark collars (21%-16/73) than females (19.3% 10/107) ($\chi^2=10.44$; df=4 p<0.005).Electric anti- bark collars were more likely to be used by males (23%-17/75) than females(5%-5/104 ($\chi^2=24.05$; df=4 p<0.001) and males were more likely to get rid of the dog (17%- 14/8100) than females (4%-4/107) ($\chi^2=14.85$; df=4 p<0.005).

Those in suburban houses were more likely to call in behaviourists (33% - 35/105) ($X^2=38.958$ df= 20 p=0.007) while those in rural houses were less likely to do this with 18% (11/62) likely to call a behaviourist.

Understanding the reasons for barking

Seventy three percent (510/694) of respondents believed that dogs barked predominantly to communicate. Having fun (60% - 417/694), because they were neglected (59% - 409/694), being unhappy (63% - 439/694), and not being properly trained (53% - 367/694) were selected as other possible reasons.

Factors most influencing attitude to barking

Logistic regression was used to explore the risk factors associated with whether or not respondents were bothered by daytime barking and night-time barking. Factors most influencing response to daytime barking were, age, whether respondents were at home

during the day, how serious a potential risk to health they regarded a dog bite to be, and whether or not they owned a dog (Table 8).

Factors most influencing response to night-time barking were: whether respondents were at home during the day, how serious a potential risk to health they considered a dog bite to be, whether they had been frightened by a dog, how likely they thought it was that they or a family member could get bitten by a dog and their marital status (Table 9).

Discussion

These results suggest that barking is a source of disturbance in New Zealand. Barking and howling were ranked well above other common noises for disturbance. It is unclear why these vocalizations were considered more disturbing than skill-saws and lawn mowers. It is possibly related to the type of noise and its direct effect on the brain since it has been suggested that barking triggers an orientating response (Kaiser et al;2002) making it impossible to ignore.

This study would suggest that conspecific noise, for example babies crying, although biologically relevant, is less disturbing than noise produced by other species (dogs and cats). This may well be situation specific (Riede et al;2001; Robbins 2003).

It may be that after years of living closely with dogs, humans, through natural selection and social conditioning, are particularly sensitive to barking and find it impossible to ignore.

In the early loose associations between dogs and humans, dogs were useful because they alerted humans to intruders and potential predators, being able to detect these threats well in advance of their human companions. Learning to recognize the change in

tone of vocalization between active tracking and subsequent bailing up of prey would have conveyed an obvious survival advantage to dog owners. Recognising a territorial bark indicating imminent danger would also have been useful (Ruusila and Pesonen 2004) while ignoring such a bark may well have been fatal.

People can differentiate between different barks (Yin and McCowan 2004; Pongracz *et al* 2005) and it is likely that a proportion of the ‘nuisance’ barking to which people are exposed on a regular basis is due to separation anxiety or territorial barking (Overall 1997, Palestrini *et al* 2010). Reasons for concern in this study varied between night and day with respondents, especially those who were divorced (and so perhaps feeling a lack of protection), more concerned about night-time barking not just because it could disturb sleep but because they thought it likely to indicate a potential threat. This lends weight to the theory that the degree of disturbance correlates to interpretation of the bark. While it is likely that night-time barking is mostly territorial guarding as opposed to separation anxiety because owners are more likely to be at home at night, it may also be that humans are socially conditioned or innately programmed to expect this. The relative frequency of different bark types occurring during the day and at night has not been documented.

In this study, repeated barking during the day was considered a problem because it was disturbing and because it could indicate that the dog was distressed. This suggests that the type of bark is influential in the response initiated because repeated barking during the day is quite likely to be caused by separation anxiety (Palestrini 2010).

Early experiences and associations with dogs appear to have some influence on the individual human tolerance of barking. In this study, those that had been frightened by dogs or believed that dog bites were likely to cause significant injury were more likely

to be disturbed by dogs. Not only may people be concerned that barking could constitute a warning of potential danger, such as the presence of a prowler, some may feel directly threatened by the animal itself, perhaps responding to the memory of a past frightening encounter.

Respondents who owned dogs were less likely to be bothered by daytime barking and more likely to approach owners of barking dogs to offer help than non-dog owners, possibly because they felt some amount of empathy.

Respondents aged 55-74 were more likely to notify owners and offer help than other age groups. This could be because they have more available time to become involved (some would be retired) or it may be that this age bracket represents a cohort with different social skills and values to those younger than 35yrs. Availability of time and different social values may also explain why those living in rural houses were more likely to contact owners of barking dogs and offer help than those in other dwellings and why those in inner city dwellings were most likely to ignore the barking.

During the day, those in inner city flats were least likely to be bothered by barking dogs. This may simply reflect the fact that these people are out most of the day. At night those in rural houses were least likely to be bothered by barking dogs and this may reflect the fact that rural dogs are more likely to bark during the night at non-threatening stimuli such as wildlife or farm animals moving about and consequently owners have become desensitized to some degree. Barking in inner city and suburban areas at night may be more likely to signify the presence of intruders.

Dog owners varied in their likely approach to dealing with a barking problem in their own dog depending on their past experience, sex and type of dwelling. Those that had received official complaints in the past were likely to punish the dog and to consider

quick-fix solutions possibly because they were afraid of potential fines. Respondents living in suburban flats were also likely to use some sort of punishment possibly because they were afraid of close neighbours complaining or landlords retaliating. Overall, males were more likely to choose quick fix solutions such as citronella or shock collars or getting rid of the dog. This may indicate a fundamental difference between the male and female psyche or simply a lack of time to give to modification programs.

Conclusions

Although the level of official complaints reported in this study was low, results indicate that barking is considered to be disturbing in New Zealand society. Barking was ranked higher in terms of annoyance than other common noises. Those most likely to be bothered by barking are aged between 35 and 55 years and living in suburban areas with a child less than one year of age in the house. Night-time barking was considered disturbing by more people than daytime barking because respondents felt it was more likely to indicate potential danger and also because it could disrupt sleep.

Respondents seemed to accept that barking dogs were to some extent a normal part of society and many had a reasonable understanding of the function of barking.

Nevertheless, some respondents thought that barking represented lack of training, and others thought nothing could be done about barking. Citronella and electric bark collars were considered as an option by some and some considered debarking to be acceptable, indicating further need for public education in this area.

The reluctance of some respondents to complain to dog owners about being disturbed by barking for fear of repercussions on themselves or their families indicates a need for

improved communication. Overall there is a willingness to address the problem of barking when it arises, but both complainants and dog owners probably need greater accessibility to assistance in this area. This may necessitate the development of time and cost efficient monitoring techniques that may be used by authorities to evaluate the extent of perceived problems and the provision of qualified advice on environmental management strategies and behaviour modification techniques for owners of problem barkers and dog owners in general. Pre- pet counselling offered in veterinary clinics could help to educate potential dog owners and puppy schools are a good forum for education of new owners on dog management.

Education via social media may help to increase public awareness of the function of and possible reasons for barking and inform people of appropriate actions to be taken if barking dogs bother them. Understanding the behaviour and knowing that there are solutions to problem barking may help to increase public tolerance of barking.

Further research into the aetiology of problem barking would be helpful.

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Figure 1: Disturbance rating of common suburban noises including barking as selected by 727 respondents who answered a questionnaire on barking dogs in New Zealand.

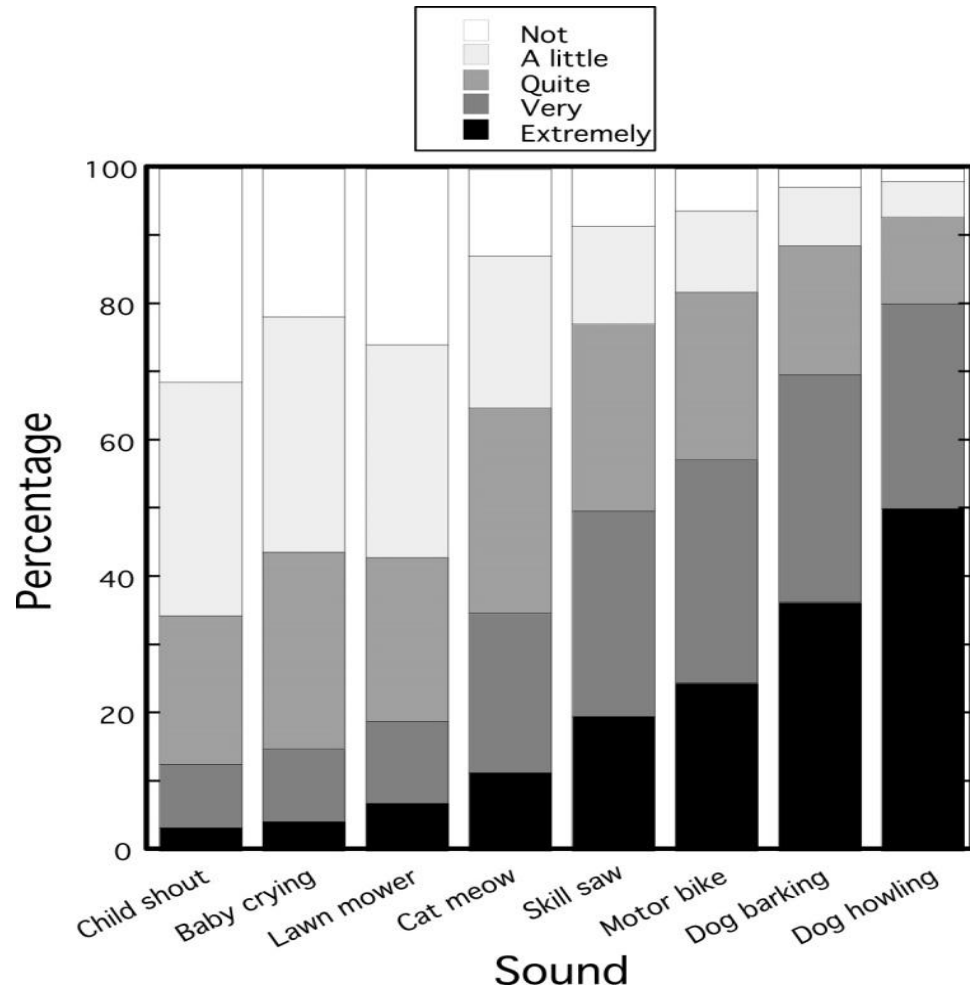


Table 1: The effects of having been frightened by a dog and knowing someone who has been bitten by a dog on attitude to day time barking in 694, and night- time barking in 709 New Zealand adults who responded to a questionnaire on barking in dogs.

Barking	Frightened by dog %	Not frightened %	n	Know a bite victim %	Don't know a victim %	n
Daytime						
Bother a lot	53.7 ^a	42.2	349	53.6 ^c	44.1	347
Bother a little	17.3	19.3	125	19.2	16.5	126
Volume dependent	27.6	33.5	205	25.6	35.6	204
No bother	1.5	5.0	18	1.6	3.8	17
n	479	218	697	433	261	694
Night-time						
Bother a lot	80.7 ^b	63.2	536	78.3 ^d	69.5	532
Bother a little	15.9	26.8	137	17.4	22.9	138
No bother	1.6	3.2	15	1.6	3.0	15
Don't know	1.8	6.8	24	2.7	4.5	24
n	492	220	712	433	266	709

^a $\chi^2=13.4$, $df=3$, $p=0.004$ (H_0 : Response to daytime barking is independent of whether the respondent has been frightened by a dog.)

^b $\chi^2=28.66$, $df=3$, $p<0.001$ (H_0 : Response to night-time barking is independent of whether the respondent has been frightened by a dog.)

^c $\chi^2=12.399$, $df=3$, $p<0.001$ (H_0 : Response to daytime barking is independent of whether the respondent knows someone who has been bitten by a dog.)

^d $\chi^2=7.535$, $df=3$, $p<0.05$ (H_0 : Response to night- time barking is independent of whether the respondent knows someone who has been bitten by a dog.)

Table 2: The effects of belief in the likelihood of themselves or a family member being bitten by a dog in daily life on attitude to daytime barking in 700 and night-time barking in 713 New Zealand adults who responded to a questionnaire on barking in dogs.

Barking	Extremely likely %	Very likely %	Unlikely / possible %	Extremely unlikely %	n
Daytime					
Bother a lot ^a	66.1	58.5	45.5	47.9	348
Bother a little	10.7	17.8	18.2	23.5	129
Volume dependent	23.2	22.0	33.4	24.4	204
No bother	0	1.7	2.9	4.2	19
n	56	118	407	119	700
Night-time					
Bother a lot ^b	91.4	83.5	73.5	63.9	535
Bother a little	8.6	11.6	21.4	26.9	140
No bother	0	1.7	2.2	4.2	22
Don't know	0	3.3	2.9	5.0	16
n	58	121	415	119	713

a $\chi^2=19.152$, df=9, p=0.020 (H_0 : Response to daytime barking is independent of the respondents' belief that they or their family may get bitten by a dog).

b $\chi^2=23.66$, df=9, p<0.005 (H_0 : Response to night time barking is independent of the respondents' belief that they or their family may get bitten by a dog).

Table 3: The effects of believing that a dog bite might be a serious health risk on attitude to day-time barking in 689 and night-time barking in 701 New Zealand adults who answered a questionnaire on barking in dogs.

Barking	Very serious (%)	Serious (%)	Moderately serious (%)	Not serious (%)	n
Daytime					
Bother a lot ^a	55.9	53.1	41.5	63.9	343
Bother a little	13.0	17.1	24.6	26.9	127
Volume dependent	28.0	28.3	31.0	4.2	200
No bother	3.1	1.6	2.8	5.0	19
n	161	258	142	128	689
Night-time					
Bother a lot ^b	85.4	75.0	73.5	65.6	525
Bother a little	10.4	20.1	21.4	27.2	127
No bother	3.0	1.5	2.2	4.0	16
Don't know	1.2	3.4	2.9	3.2	22
n	164	121	144	125	701

^a $\chi^2=14.178$, $df=9$, $p<0.100$ (H_0 : Believing that a dog bite could constitute a serious health risk has no effect on respondent attitude to day-time barking.)

^b $\chi^2=22.3$, $df=9$, $p=0.008$ (H_0 : Believing that a dog bite could constitute a serious health risk has no effect on respondent attitude to night-time barking.)

Table 4: Effects of ownership on attitude to day-time barking in 702 and night-time barking in 719 New Zealand adults who responded to a questionnaire on barking in dogs.

	Current dog owner		
How much bother barking?	Yes (%)	No (%)	n
Daytime			
A lot ^a	41.1	53.4	350
A little	26.2	14.8	127
Vol. dependent	27.2	30.0	206
No bother	5.0	1.8	19
n	202	500	702
Night-time			
	Yes (%)	No (%)	n
A lot ^b	69.8	77.0	539
A little	23.4	17.9	140
No bother	2.0	2.3	16
Don't know	4.9	2.7	24
n	205	514	719

^a $\chi^2 = 20.308$, $df=3$, $p=0.00$ (H_0 : That dog ownership is independent of the barking bother category for daytime barking.)

^b $\chi^2 = 5.462$, $df=3$, $p<0.1$ (H_0 : That dog ownership is independent of the barking bother category for night-time barking.)

Table 5: Effects of dwelling type on daytime barking in 699 and night-time barking in 715 New Zealand adults who responded to a questionnaire on barking in dogs.

How much bother from a dog barking frequently close by.	Type of dwelling						n
	Rural house	Suburban house	Suburban flat	Inner city house	Inner city flat	Other	
Daytime							
Bother a lot ^a	49.6%	50.6%	43.4%	47.1%	14.3%	54.2%	345
Bother a little	18.6%	19.0%	13.3%	20.6%	7.1%	16.7%	129
Volume dependent	26.4%	28.0%	43.3%	29.4%	78.6%	29.2%	206
Wouldn't bother	5.4%	2.4%	.0%	2.9%	.0%	.0%	19
n	129	468	30	34	14	24	699
Night-time							
Bother a lot ^b	68.2%	77.8%	75.0%	62.9%	76.9%	80%	538
Bother a little	25.8%	17.4%	21.9%	25.7%	23.1%	16.0%	140
Don't know	4.5%	2.7%	0%	5.7%	0%	4.0%	22
Wouldn't bother	1.5%	2.1%	3.1%	5.7%	0%	0%	15
n	132	478	32	35	13	25	715

^a $\chi^2 = 25.371$, $df=15$, $p=0.04$ (H_0 : Dwelling type has no effect on respondent attitude to daytime barking.)

^b $\chi^2 = 13.589$, $df=15$, $p<0.50$ (H_0 : Dwelling type has no effect on respondent attitude to night-time barking.)

Table 6: The effects of age on attitude to daytime barking in 641 and night-time barking in 656 New Zealand adults who responded to a questionnaire on barking in dogs.

How much bother from a dog barking frequently close by.	Respondent age interval (years)							n
	18-24	25-34	35-44	45-54	55-64	65-74	>75	
Daytime ¹								
Bother a lot	35. %	41.6%	50.4%	55.4%	51.2%	51.8%	33.3%	317
Bother a little	12.5%	24.7%	19.5%	20.1%	19.7%	12.3%	22.2%	120
Volume dependent	47.5%	29.2%	29.3%	22.3%	26.8%	33.3%	44.1%	188
Wouldn't bother	5.0%	4.50%	0.8%	2.2%	2.4%	2.0%	0%	16
n	40	89	123	139	127	114	9	641
Night-time ²								
Bother a lot	64.1%	76.4%	80.5%	80.4%	74.8%	74.4%	55.6%	501
Bother a little	25.6%	16.9%	16.4%	15.4%	18.1%	22.3%	22.2%	120
Don't know	5.1%	2.2%	2.3%	3.5%	4.7%	0.5%	0%	23
Wouldn't bother	5.1%	4.5%	0.8%	0.7%	2.4%	2.5%	22.2%	12
n	39	89	128	143	127	121	9	656

¹ $\chi^2=22.45$, df=18, p=0.20 (H₀: Age of respondent had no effect on attitude to barking during the day)

² $\chi^2=24.9$, df=18, p<0.10(H₀: Age of respondent had no effect on attitude to barking at night)

Table 7: Effects of age, sex, dwelling type, marital status, and presence of children on action taken in response to barking by New Zealand adults who responded to a questionnaire on barking in dogs. (Note that respondents could select more than one action.)

Demo-graphic	Yell at dog %	Do nothing %	Offer to help %	Complain to owner %	Notify authorities %	Complain to others %	Anon. letter %	Feed dog %	n
Age									
18-24	25	45	30	30	15	27.5	5.0	2.5	40
25-34	8.9	20	31.1	35.6	33.3	17.8	5.6	1.1	90
35-44	17.1	17.1	29.5	39.5	35.7	13.2	4.7	2.3	129
45-54	15.4	15.4	29.4	36.4	36.4	7.0	3.5	4.2	143
55-64	11.5	13.8	39.2	31.5	34.6	5.4	3.1	3.1	130
65-74	9.8	7.3	37.4	35.0	34.1	3.3	2.4	1.6	123
> 75	0	9.1	0	45.5	36.4	9.9	9.1	0	11
Gender									
Male	16	17.2	31.1	40.6	32.3	7.4	2.8	3.1	325
Female	10.5	14.8	34.4	29.9	33.7	11.0	4.3	3.1	418
Dwelling									
Rural house	14.7	14	48.5	32.4	24.3	5.9	1.5	2.2	136
Suburban house	12.8	17	29.8	33.7	35.2	9.7	3.5	3.1	483
Suburban flat	12.5	15.6	28.1	43.8	25.0	21.9	6.3	0	32
Inner city house	11.4	11.4	20.0	45.7	37.1	11.4	2.9	2.9	35
Inner city flat	7.1	21.4	28.6	35.7	28.6	14.3	7.1	14.3	14
Marital status*									
1	13	14.7	34.5	33.6	36.7	8.1	3.3	2.9	455
2	11.3	18.3	36.6	33.8	28.2	12.7	1.4	1.4	71
3	5.4	10.8	35.1	32.4	35.1	8.1	2.7	2.7	37
4	9.8	11.8	25.5	31.4	21.6	3.9	0	3.9	51
5	17.4	24.3	27.0	40.9	25.2	16.5	7.8	5.2	115
Child<1yr									
Yes	18.2	39.4	24.2	21.2	18.2	21.2	0	0	33
No	11.8	14.8	33.7	34.6	34.3	8.6	3.7	3	569

- Marital status: 1=married, 2= De facto, 3= Divorced, 4= Widowed, 5= Single

Table 8. Factors that best predict the likelihood of members of the New Zealand public being bothered by daytime barking. The model is from a backwards stepwise logistic regression. A smaller or more negative coefficient (**B**) indicates a lower probability of being bothered by daytime barking.

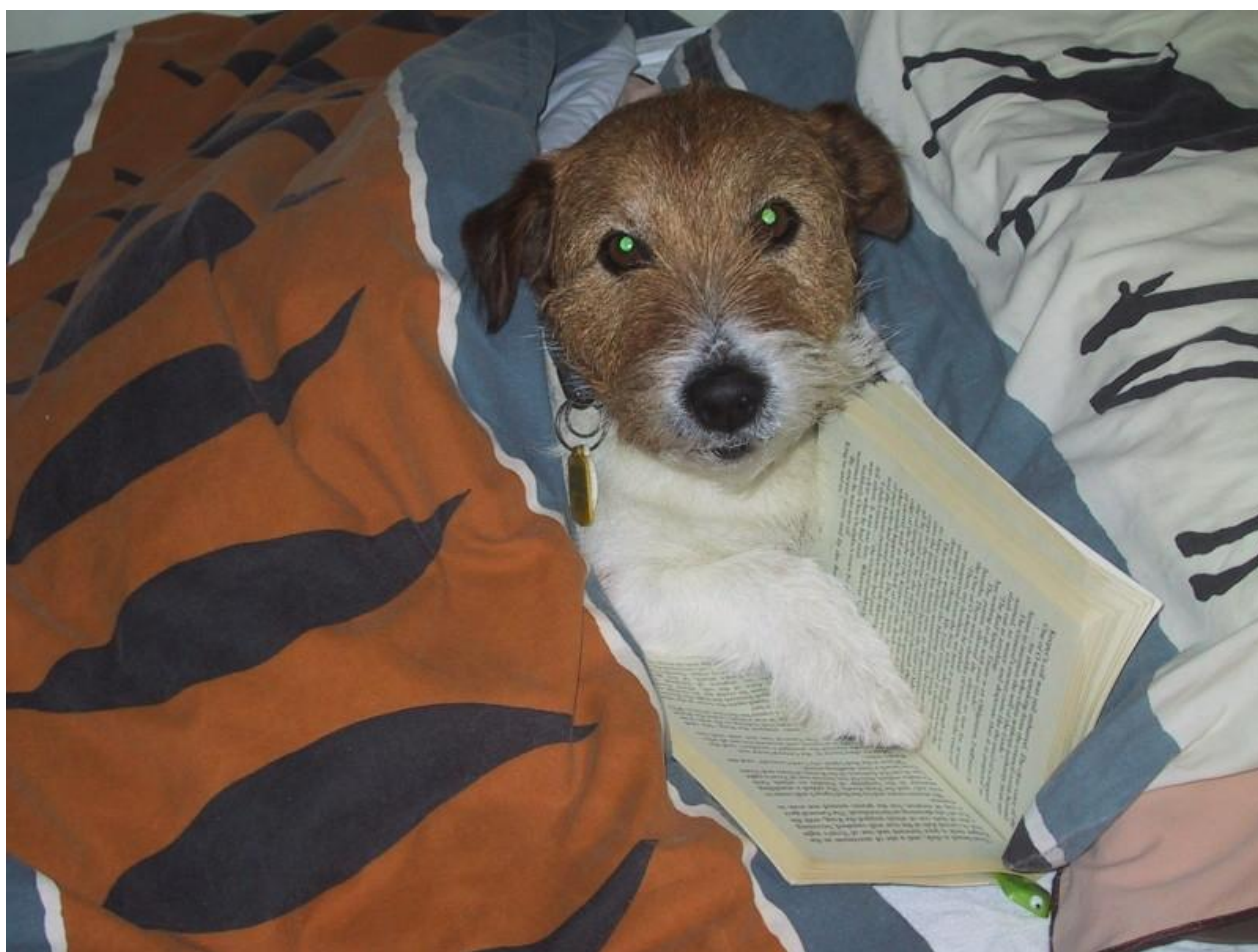
	n	B	SE	Wald	df	P<
Current dog owner	383			9.272	1	0.002
Yes	114	-.756	0.248	9.272	1	0.002
No	269					
At home during day	383			5.076	1	0.024
Yes	164	-.570	0.253	5.076	1	0.024
No	219					
How serious dog bite?	383			9.853	3	0.020
Not serious	82	-.552	0.372	2.200	1	0.138
Slightly serious	80	-.954	0.366	6.772	1	0.009
Moderately serious	143	-.118	0.346	0.116	1	0.734
Very serious	78					
Age (years)	383	-.017	0.008	4.661	1	0.031
Constant	383	2.722	0.586	21.548	1	0.001

Table 9. Variables that best predict the likelihood of members of the New Zealand public being bothered by night-time barking. The model is from a backwards stepwise logistic regression. A negative or smaller coefficient (B) indicates a lower probability of being bothered by night-time barking.

	n	B	SE	Wald	df	P<
At home during day?	495			7.533	1	0.006
Yes	219	-.655	0.239	7.533	1	0.006
No	276					
Ever frightened by a dog?	495			3.958	1	0.047
Yes	349	.498	0.251	3.958	1	0.047
No	146					
How likely to be bitten?	495			8.976	3	0.030
Very likely	39	1.210	0.607	3.977	1	0.46
Moderately likely	78	1.037	0.422	6.032	1	0.014
Bite possible	298	.683	0.287	5.650	1	0.017
Extremely unlikely	80					
How serious dog bite?	495			10.932	3	0.012
Not serious	99	-1.169	0.386	9.180	1	0.002
Slightly serious	109	-.736	0.392	3.531	1	0.060
Moderately serious	185	-.437	0.369	1.406	1	0.236
Very serious	102					
Marital Status	495			9.454	4	0.051
Married	313	.302	0.322	0.878	1	0.349
De-facto	54	-.492	0.417	1.392	1	0.238
Divorced	21	1.060	0.823	1.659	1	0.198
Widowed	26	-.565	0.239	7.533	1	0.006
Single	81					
Constant	495	20.732	27522	.000	1	0.001

CHAPTER FIVE

Husbandry Practices and Owner and Dog Characteristics as Risk Factors for Problem Barking in Suburban Dogs in New Zealand



Having ascertained that barking is a problem in New Zealand, it was important to identify possible causes or predisposing risk factors for problem barking. This was investigated by an analysis of cases of problem barking presented to the Animals with Attitude Behaviour Clinic in Auckland, New Zealand as described in the following chapter.

Husbandry practices and owner and dog characteristics as risk factors for problem barking in suburban dogs in New Zealand

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ABSTRACT

There is little information available on factors predisposing to excessive or ‘problem’ barking in dogs (*Canis familiaris*) or on the type of barking most commonly complained about. In New Zealand authorities commonly receive complaints about barking dogs. Complaints may result in owners being fined and dogs being removed or subjected to quick-fix strategies, such as anti-bark collars, to control the behaviour. To minimise the potential for problem barking it is important to understand what provokes and influences the behaviour. The present study investigates factors predisposing to problem barking in dogs. It establishes the relative frequency of separation anxiety barking and territorial barking in cases presented to an animal behaviour clinic in Auckland, New Zealand and evaluates what percentage of these result in official complaints. It evaluates husbandry practices and owner and animal characteristics as risk factors for the problem barking behaviour. In a retrospective analysis, husbandry activities and owner and dog characteristics were collected from 97 of 107 problem barking dogs presented to an Auckland animal behaviour clinic over a two- year period. These parameters were compared with data from eighty “control dogs” i.e. dogs that had no history of barking problems presented to a veterinary practice for medical consultation or vaccination. Of the 107 dogs that were presented with problem barking, 40% were diagnosed with separation anxiety, 51% were guarding territory and 10% were barking for other reasons. Factors that predisposed to problem barking behaviour included; belonging to a single, inexperienced owner; not having access to indoors and outdoors; being left alone for more than four hours; insufficient walking exercise especially in the morning; the absence of daily training sessions and lack of access to bones and toys. Multinomial regression analysis identified the most significant risk

factors for problem barking as lack of access to toys and not being walked in the morning.

Keywords: Barking, dogs, problem, risk factors

1. Introduction

Barking dogs are a common reason for public complaint to authorities in New Zealand. Owners of barking dogs may be fined and in extreme cases dogs may be removed and euthanased. One Auckland animal control centre received an average of 204 barking complaints each month (Anonymous 2009). Overall, on an annual basis, 35.5% (2,452 /6,905) of complaints about dogs in Auckland are due to barking. Barking and howling have been ranked above other common suburban noises including skill saws, motor bikes, lawn mowers and crying babies as a cause of disturbance (Flint et al., 2011 in press) .

Excessive barking is recognized as a problem by behaviourists in many countries (Beaver, 1994; Fielding, 2008; Hassan et al., 2009; Verga and Palestini, 2002; Wells et al., 2002) but with the exception of two studies, (Cross et al., 2009; Khoshnegah et al., 2011), there has been little investigation into the type of barking that provokes complaint and factors that may influence this behaviour. Quick-fix attempts to control unwanted or problem barking (barking that causes distress) are controversial and include surgical devocalization (Franklin et al., 2011), anti-barking collars (Juarbé-Díaz, 1997; Wells, 2001) and anti-barking muzzles (Cronin et al., 2003). Strategies to minimise the potential for problem barking are needed.

The factors that influence problem barking (barking that causes distress) may vary between countries depending on lifestyle, and breed popularity. In Brisbane the greatest risk for problem barking occurred with young herding type dogs that had access to the house and lived in multi-dog households (Cross et al., 2009). In Iran, Khoshnegah et al. (2011) suggested that being female and kept mainly outdoors were risk factors for problem barking in dogs.

This paper uses data from 107 cases of problem barking presented to an Auckland animal behaviour clinic. The relative proportions of territorial and anxiety based barking are determined. It also investigates how the owners were made aware of the problem barking. The data from these clinical behaviour cases of dogs diagnosed with separation anxiety or territorial barking cases are compared to data from 80 dogs with no history of problem barking. Risk factors for problem barking in pet dogs kept in suburban society are identified.

2. Materials and Methods

2.1. Data collection

Data were sourced from clinical cases presented to the Animals with Attitude Behaviour Clinic based in Auckland, New Zealand over a two year period. The owners of the dogs presenting to the clinic were from the greater Auckland area. Details of how the dogs were managed, ownership factors, source of complaint and dog characteristics were gathered as part of the consultation process, by questioning the owners of the 107 dogs presented for problem barking. Problem barking was diagnosed from the behavioural history (gained during a house call consultation) in conjunction with analysis of video studies (Palestrini et al. 2010) using a Panasonic SDR-H85 video

camera and tape recordings using Sony ICD-BX112 recorders. Where the behavioural history indicated that separation anxiety was likely (e.g. owner reported that the dog showed concern when unable to see them momentarily when at home, noticed signs of anxiety in the dog when they were preparing to go out or reported hearing whimpering or howling upon leaving) dogs were filmed for one hour during which time the owner and the consultant left the property using the owner's vehicle at a time consistent with the owner's daily routine. Diagnosis was made from analysis of filmed behaviour and recorded barking. Where the results were inconclusive, the equipment was left with the owners and the dogs were filmed over eight hours. Where separation anxiety was confirmed, treatment was instigated and monitoring continued during the treatment program. Where the history indicated the barking was unlikely to be separation related barking, dogs were filmed and recorded for eight hours initially and where results were inconsistent with separation anxiety, recording continued over five days and results were analysed.

Behaviour indicative of separation anxiety included trembling, pacing, running yawning, lip licking, panting, scratching at doors or furnishings, digging and biting at fences and in some ,standing staring at the door with tail down(Overall,1997 : Palestrini, 2010).Barking accompanying these behaviours was high pitched, repetitive and typically interspersed with howling or whining. Some presented a continuous monotone (Yin&McGowan 2004).

Behaviour indicative of territorial guarding included walking with ears and tail erect, hair raised on neck and shoulders and sometimes also the rump. Sudden changes from resting to rushing toward the door or fence , ears up and tail up, leaning forward and

barking, or approaching the boundary tail down hair up and barking and backing off. Barking accompanying this behaviour was typically low pitched and performed in bursts or runs (Yin & McGowan 2004).

Behaviour indicative of play, included, a relaxed wagging tail, a bouncing gait, jumping, throwing toys about, pawing at objects and the play bow. Barking accompanying this behaviour was intermittent and medium to high pitched (Yin&McGowan 2004).

Barking was confirmed as territorial guarding (n = 54), separation anxiety (n =43) or miscellaneous causes (n = 10).

Data from those diagnosed with separation anxiety or problem territorial barking were compared with data from 80 dogs that had no history of problem barking, presented for medical consultation (including annual health check/vaccinations) to a veterinary practice between 1/08/2011 and 1/09/2011. Dogs were excluded from the study if they suffered from any longstanding medical problem or degenerative condition that may affect their behaviour or were critically or terminally ill. In the remainder of this paper, members of this group are referred to as ‘control’ dogs.

2.2. Questionnaire

Owners were asked to fill out a four-page questionnaire (32 questions) about their dog and its daily routine while they waited for their appointment (Appendix 2). The questionnaire took on about 5 minutes to complete and client participation was entirely voluntary. The questionnaire was used to obtain information about the age, sex and breed, from where and at what age the dog was sourced, training received, amount and

time of daily walking exercise, housing, time left alone, level of environmental enrichment provided and the owner's assessment of the dog's attitude towards people and other dogs. Basic information about the family structure and dwelling type was also obtained. This information was also gained as baseline data in cases of problem barking.

Dogs were classified by type according to the New Zealand Kennel Club (NZKC website, 2012). Two extra categories, bull terrier cross and poodle were added to investigate whether these two types were over-represented in dogs presented for problem barking associated with separation anxiety.

2.3. Data analysis

Two sets of analyses were carried out. The first compared normal dogs with those identified as separation anxiety barkers. The second set of analyses compared normal dogs with territorial barkers. Details from dogs in the miscellaneous barking category ($n = 10$) were not used for further analysis because the group size was too small to include as a category in a regression analysis.

Bivariate screening analyses were conducted to test the association between each of the putative risk factors (explanatory variables) derived from the questionnaires and barking status using the chi-square test for categorical variables and the t test for continuous variables. A fixed-effects logistic regression model was developed to select the set of explanatory variables that best explained the probability of being a territorial or separation anxiety barker. All variables associated with bark status at a level of <0.2 at the bivariate level were entered in the model (Dohoo et al., 1997). The significance of each explanatory variable was determined using the Wald test.

Variables that were not statistically significant were removed from the model one at a time, beginning with the least significant, until the estimated regression coefficients for all retained variables were significant at a level of <0.05 . The final models are reported in terms of the estimated coefficients and adjusted odds ratio (OR) for each explanatory variable. An adjusted OR (and its 95 per cent confidence interval CI) of greater than 1 indicates that, after adjusting for other variables in the model, exposure to the explanatory variable increased the risk of a dog being a territorial or separation anxiety barker. An adjusted OR (and its 95 per cent CI) of less than 1 indicates that exposure to the explanatory variable was protective, and an odds ratio of 1 indicates that the variable had no influence on barking status.

A Receiver Operating Characteristic (ROC) curve was constructed on the basis of barking status predicted by the model. The area under the ROC curve, which ranges from zero to one, provided a measure of the model's ability to discriminate between normal and territorial or separation anxiety barkers. The greater the area under the ROC curves the better the model's discriminatory power. The curve confirmed a high level of discriminatory power. Data were analysed using SPSS data analysis program (PASW 18).

3. Results

Most problem barking cases were presented because neighbours had complained directly to the owners about the barking, or a dog control officer had approached the owners after receiving complaints from the public. Some were presented because the owners had difficulty coping with their dog's barking.

In 64% (68/107) of barking cases neighbours complained to the owner. Neighbours complained in 69% (29/43) of separation anxiety based barking cases, 64% (35/54) of territorial barking and 33% (3/10) of other barking cases. Dog control officers had approached the owners in 22% (12/54) of cases of territorial barking, in 50% (21/43) of separation anxiety barking and in 30% (3/10) of other barking. Overall, dog control officers were involved in 33% (36 /107) of problem barking cases.

Forty percent (43/107) of problem barking dogs were diagnosed with separation anxiety and 51% (54/107) with territorial guarding. The remainder, 9% (10/107), barked for other reasons including excitement during play, attention seeking, barking at cats or birds, interaction with owners, or canine cognitive dysfunction.

3.1. Ownership Factors

First- time owners were more likely than experienced owners to present their dogs at the behaviour clinic for a barking problem related to separation anxiety (Table 1). 44% (29/66) of first time owners had dogs presenting with separation anxiety compared to 13% (14/111) of experienced owners.

3.12. Owner gender and marital status

Owner gender and marital status had some effects on the incidence of barking problems (Table 1). Single people (especially females) were more likely to own dogs with separation anxiety ($\chi^2=70.584$ df=8 p=0.000). 50% (14/28) of single females had dogs with separation anxiety, as did 33% (2/6) of single males. 49% percent of married couples without a family (42/85), and 43% (3/7) of retired couples had dogs with problem territorial barking.

3.2. Management Factors

Management protocols, including daily exercise, training, the provision of toys and bones and the way the dogs were housed, correlated with barking problems (Table 2) as described below.

3.21. Walking exercise

In this study dogs that were walked daily for at least 30 min were less likely to have barking problems ($\chi^2=18.732$ df =2 p=0.000). The time of day that the walking occurred was significant ($\chi^2=46.9$ df =2 p=0.00). 34% (34/99) of dogs that were not walked in the morning showed separation anxiety barking and 43% (43/99) showed problem territorial barking (Table 2). Of those that were walked in the morning, 12% (9/77) showed separation anxiety barking and 14% (11/77) showed problem territorial barking.

3.22. Training

Daily training, defined as reinforcement of basic commands by the owners, significantly decreased the likelihood that dogs would show problem territorial barking ($\chi^2=35.407$ df =2 p=0.000). 48% of dogs (48/98) not trained daily showed problem territorial barking whereas only 8.9% (7/79) of those who were trained daily were problem territorial barkers (Table 2). Daily training did not significantly decrease the likelihood of dogs suffering separation anxiety; in fact slightly more dogs that received training suffered separation anxiety (Table 2).

3.23. Toys

Of dogs that were not provided with toys 33.8% (26/77) had separation anxiety and 40.8% (31/77) were problem territorial barkers (Table 2). Where dogs did have toys, only 17% (17/100) had separation anxiety and 23% (23/100) showed problem territorial barking. This indicates that the provision of toys may help to decrease the likelihood of dogs barking from separation anxiety and territorial guarding ($\chi^2=20.425$ df =2 p=0.000).

3.24. Bones

Fewer dogs that were provided with bones showed separation anxiety (18.2% -12/66) than those that did not have bones (27.9%-31/111). 26% of those with bones (17/66) showed problem territorial barking compared to 33.6 % (37/111) of those without bones (Table 2.). Bones do appear to be of some value in decreasing the likelihood of problem barking caused by separation anxiety and territorial barking ($\chi^2=5.145$ df=2 p=0.154).

3.25. Housing

35% (11/32) of dogs kept mainly inside had separation anxiety and 6.3% (2/32) showed problem territorial barking (Table 2). Of dogs kept outside only 33.3% (11/33) had separation anxiety and 57.6% (19/33) were problem territorial barkers. Where dogs had free indoor/outdoor access 18.8% (21/112) had separation anxiety, and 29.5% (33/112) were problem territorial barkers, suggesting that keeping dogs with indoor out door access reduces the incidence of separation anxiety and problem territorial barking ($\chi^2=29.673$ df=4 p<0.000) and that dogs kept inside only are much less likely to show problem territorial aggression but are more likely to show separation anxiety.

3.26. Time alone

Of those dogs that were alone for 4 to 8h each day 29.8% (25/84) had separation anxiety and 38% (32/84) were problem territorial barkers (Table 2). Of those left alone for less than 4 h only 6.8% (5/73) suffered separation anxiety and 30% (22/73) were problem territorial barkers, indicating that time left alone significantly affects the incidence of problem barking particularly barking due to separation anxiety. Dogs left alone for less than 4 h were much less likely to show separation anxiety ($\chi^2 = 24.927$ df=2 $P < 0.000$).

3.3. Dog Factors

3.31. Age

Problem barkers tended to be young. The overall average age for dogs presented with barking problems was 4.4 years. Territorial barkers averaged 3.3 years while those suffering from separation anxiety averaged 5.6 years. ‘Normal’ dogs averaged 7.7 years of age. The range in age for problem barkers was 9 months to 14 years. Range for normal dogs was 1 to 16 years (Table 3).

3.32. Sex

There was no significant difference between males and females, with respect to territorial barking or separation anxiety.

3.33. Number of dogs in the household

There were fewer cases of separation anxiety in multi-dog households (8.8%, 3/34) compared with single dog households (28.2%, 40/142). Conversely territorial problem

barking occurred in 35% (3/34) of multi-dog households and 29.6% (42/142) of single dog households.

3.34. Type of dog

Due to the large variety of breeds in the study population (44 different breeds) it was impossible to evaluate breed effects. Some trends were seen with type of dog (Table 4). 83% (10/12) of hounds and 84 % (16/19) of Staffordshire bull terrier cross dogs were problem barkers. Fifty seven percent (13/23) of working/farm dogs, 67% of utility dogs (12/18) and 61% of toy dogs (14/23) were problem barkers. The sample sizes were too small to be statistically significant.

3.35. Aggression

More dogs that tended to be aggressive towards strangers, 45.7% (16/35) ($\chi^2=7.53$, $df=4$ $p=0.011$) and dogs 52% (13/25) ($\chi^2=8.953$ $df=4$ $p=0.062$) showed problem territorial barking (Table 5).

Only 11.4% (4/35) of dogs that were aggressive towards strangers and 13% (2/25) of dogs that were aggressive towards other dogs suffered separation anxiety (Table 5).

3.36. Adult adoption

There was a tendency for dogs adopted as adults from rescue kennels to show separation anxiety (41.2%, 7/17). 18% (3/17) of dogs adopted as adults from kennels were problem territorial barkers.

4. Dog control officer involvement

Dogs with toys available were slightly less likely to have had dog control officers involved than dog without toys ($\chi^2=3.71$ $df=2$ $p=0.156$). There was a trend for

territorial barking dogs kept outdoors only to have dog control officers involved. There was no difference in dog control officer involvement when there was more than one dog in the house.

5. Risk factors for barking problems

Multinomial regression analysis showed that the factors which predisposed most to problem territorial barking included; lack of daily training, not being walked in the morning and lack of access to toys. Factors predisposing most to separation anxiety were lack of owner experience with keeping a pet dog, being alone for more than four hours not receiving a morning walk, and lack of access to toys and bones. Other important influences were whether they were kept inside, outside or with access to both areas, and owner marital status (Tables 6 &7).

6. Discussion

This study has identified that problem barking in New Zealand is predominantly caused by separation anxiety and territorial guarding. Barking due to separation anxiety was more likely to result in official complaints than barking associated with territorial guarding, suggesting that it is a more disturbing type of bark.

6.1. Owner characteristics predisposing to problem barking

First time owners, and single owners, were more likely to own problem barkers than experienced owners and owners that were not single. In particular, inexperienced and single owners were more likely to own dogs with separation anxiety. This may reflect a lack of experience in dog management in first time owners and the fact that single

owners are more likely to leave their pets alone for long periods while they are at work. Single owners may also spend a lot of time with their dog and thus develop a particularly strong relationship between dog and owner and thereby increase the risk of separation anxiety.

6.2. Management effects on the incidence of problem barking

There was an increase in problem barking related to separation anxiety as time alone increased. This is in accordance with the findings of Rehn and Keeling (2011) who documented a time related increase in anxiety-based behaviours in home alone dogs. Problem barking in dogs that were only kept outside or had inside outside access was predominantly territorial guarding, although separation anxiety was also diagnosed in some of these situations. Problem barking in dogs kept only inside was predominantly due to separation anxiety with very few diagnosed as territorial guarding. This makes sense as dogs kept inside are less likely to be exposed to visual stimuli that may provoke guarding and auditory stimulation may also be decreased. 80% of the problem barking dogs that were kept inside were diagnosed with separation anxiety. This may reflect the fact that dogs kept inside spend more time in their owner's company when the owner is at home and so become more owner dependent than those that spend time outside. Dogs that did not have toys were much more likely to be problem barkers. This supports the findings of studies investigating environmental enrichment strategies in group housed dogs (Schipper et al., 2008; Wells and Hepper, 2000). Dogs provided with bones were also less likely to be problem barkers. A walk in the morning significantly reduced the likelihood of problem barking. Dogs that are exercised before being left alone may be less reactive to environmental stimuli (Adams and Johnson,

1994). Dogs getting daily training sessions were less likely to be problem territorial barkers. They may be more likely to stop barking when told to than dogs not being trained, or it could be that they had more owner interaction and mental activity and so were less reactive to environmental stimuli. Training had no effect on separation anxiety barking.

6.3. Dog characteristics correlated with problem barking

In this study problem barkers were predominantly young dogs. Problem territorial barkers were more likely to be young (<5years), to be terriers or toy breeds and they were more likely to show aggression toward strangers or other dogs. Young dogs are likely to be more active and are less complacent about environmental stimuli.

Moreover, aggressive dogs can be expected to show a significant amount of guarding activity. More dogs over 5 years of age were diagnosed with separation anxiety than those under 5 years. The reason for this is unclear.

7. Conclusions

Despite the fact that we are not able to demonstrate causality there are significant and useful correlations shown in this study. Multinomial logistic regression, identified age, not being walked in the morning, not being provided with toys, not receiving daily training, belonging to inexperienced owners, and being left alone for more than four hours as significant factors predisposing to problem barking.

Recommendations that could be made to owners to help minimise the potential for problem barking in their pets on the basis of this study include: Avoid leaving a dog

alone for more than 4- h daily. Provide a dog with toys and bones, ensure it has a morning walk and incorporate a training session into its daily routine.

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Table 1:

Effects of owner category on problem barking in a study population of 177 pet dogs in New Zealand.

Bark Type %	Owner Type					n	Experienced owners	First time owners	n
	Married Couple	Married Couple with children	Single male	Single female	Retired Couple				
Separation Anxiety	27.1	5.9	33.3	50.0	14.3	43	12.6	43.9	43
Territorial	49.4	5.9	0.0	21.4	42.9	54	25.5	38.4	54
Normal	23.5	88.2	66.7	28.6	42.9	80	62.2	16.7	80
n=	85.	51	6	28	7	177	111	66.0	177

1 Ho That owner marital status has no effect on problem barking $X^2 = 70.584$ $df = 6$ $p = 0.000$

2 Ho That previous experience of dog ownership has no effect on problem barking $X^2 = 38.398$ $df = 2$ $p = 0.000$

Table 2.

Effects of management on the incidence of problem barking in 177 pet dogs in New Zealand

	Alone	Alone	>1dog	>1dog	Training	Training	Toys	Toys	Bones	Bones	In	Out	In/	*Walk am	Walk am	
Bark Type%	<4hrs ^a	4-8hr	Yes ^b	No	Yes ^c	No	Yes ^d	No	Yes ^e	No	Only	Only	Out	Yes ^f	No	N
Separation Anxiety	6.8	29.8	8.8	28.2	25.3	23.5	17.0	33.8	18.2	27.9	34.4	33.3	18.8	11.5	34.3	43
Problem Territorial	30.1	38.1	35.3	29.6	8.9	48.5	23.0	40.8	25.8	33.3	6.3	57.6	29.5	14.1	43.4	54
normal	63.0	32.1	55.9	42.3	65.8	28.6	60.0	26.0	56.1	38.7	59.4	9.1	51.8	74.4	22.2	80
n=	103	84	34	142	79	98	100	77	66	111	32	33	112	78	99	177

 H_0 = That management is independent of bark type..^a $\chi^2=24.97$ df=2p=0.000^b $\chi^2=6.88$ df=4p=0.143

*walk 30mins minimum

^c $\chi^2=35.40$ df=4p=0.000^d $\chi^2= 20.42$ df=4 p=0.000^e $\chi^2=5.14$ df=4p=0.154^f $\chi^2=46.98$ df=2 p=0.000

Table 3:

Effects of age on problem barking in a study population of 177 pet dogs in New Zealand

Bark Type %	Age of dog				n
	Age up to 5yrs	Age 6-10yrs	Age 11-15yrs	Age >15yrs	
Separation Anxiety	23.5	28.6	20.8	100.0	43
Territorial	46.6 ^a	12.2	0	0	54
Normal	30.1	59.2	79.2	0	80
n=	103	49.0	24	1	177

Ho = That age has no relationship to problem barking

^a $\chi^2=36.609$ $df= 5$ $p=0.000$

Table 4.

Effects of type of dog on problem barking in 177 New Zealand dogs.

Bark Type %	Dog Type										N
	Staffordshire bull terrier cross	cross other	terrier	hound	toy	retriever/gun	working/farm	guard	poodle	utility	
Separation Anxiety	50.0	16.7	26.9	41.7	8.7	13.0	27.3	1.0	57.1	6.7	43
Territorial	31.3	20.0	23.1	41.7	47.8	34.8	27.3	4.0	0.0	53.3	54
Normal	18.8	63.3	50.0	16.7	43.5	52.2	45.5	11.0	42.9	40.0	80
n=	16	30	26	12	23	23	22	16	7	15	177

Table 5

Influence of dog factors on problem barking in 177 pet dogs in New Zealand

Bark Type %	Aggressive to people		Aggressive to dogs		Adopted from Kennels		n=
	Yes	No	Yes	No	Yes	No	
Territorial	46	27	52	27	17	46	54
Separation anxiety	11	28	8	27	41	22	43
Normal	43	46	40	46	41	46	80
n	35	142	25	152	17	160	177

Table 6

Multinomial regression results for factors significantly affecting Separation Anxiety barking

Variable	B	SE	Wald	p	OR(ExpB)	95% CI
No Toys	1.527	0.634	5.793	<0.016	4.604	1.328-15.962
No walk am	1.695	0.727	5.438	<0.020	5.447	1.310-22.641
Alone>4hr	2.496	1.022	5.967	<0.015	12.133	1.638-89.884
No bones	1.292	0.706	3.347	<0.067	3.64	0.912-14.553
Only dog	2.46	0.915	7.225	<0.007	11.702	1.947-70.340
Single female owner	2.357	1.402	2.828	<0.093	10.559	0.677-164.7
Experienced Owner	-3.110	0.610	26.012	<0.000	0.45	0.014-0.147

Table 7

Multinomial regression results for factors significantly affecting Territorial barking

Variable	B	SE	Wald	p	OR(ExpB)	95% CI
No Toys	1.302	0.624	4.349	<0.037	3.676	1.081-12496
No Training	2.489	0.701	12.593	<0.000	12.052	3.348-47.661
No Walk am	1.646	0.683	5.803	<0.016	5.186	1.359-19788
Alone > 4 hrs	-18.279	0.679	724.782	<0.000	1.152	3.044-94358
Only dog	1.24	0.747	2.757	<0.097	3.455	0.800-14.97
Experienced Owner	-2.02	0.563	26.855	<0.000	0.133	0.044-0.400

CHAPTER SIX

Human Ability to Recognize the Aetiology of Different Dog Barks-Effects on Reaction to Barking.



Knowing that most problem barking was due to either separation anxiety or excessive territorial barking, it was of interest to ascertain how readily human listeners could identify the type of bark and which type of bark caused most disturbance. This was done by playing recordings of barking due to separation anxiety and territorial barking to volunteers and asking them to identify the type of bark and to rate how irritating or disturbing they found it, as described in the following chapter:

Human ability to recognize the etiology of different dog barks-effects on reaction to barking

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Abstract

Barking dogs have been ranked as more disturbing than many other common suburban noises. It is as yet unclear whether the cause of barking has any direct relevance to the degree of disturbance it may cause to people. .

This study investigated the ability of people to recognize the etiology (cause) of barks produced by dogs in two different situations namely, guarding territory, and when separated from their owners and sought to determine how disturbing these people found the barks. The effects of gender and dog ownership on response to different barks were evaluated. Six barks were recorded (three expressing separation anxiety and three guarding territory). The sounds were played to 79 students in a lecture theatre. Each recorded bark was played for 30 seconds with a 10 second interval between them. Using a short questionnaire, students were asked to categorize the barks. They were also asked to rank the barks according to how irritating they found them and to state whether or not each of the recordings evoked sympathy. Seventy -five percent of the students correctly classified all the barks. Territorial barking was misclassified more than separation anxiety barking. There was no statistical difference in average irritation rankings between territorial and separation anxiety barking. Overall, females, were least irritated by barking and were more likely than males to feel sorry for the dog.

Keywords: Bark, recognition, etiology, anxiety, guarding

Introduction

Barking is a form of communication used by domestic dogs (*Canis familiaris*) to communicate with conspecifics and with humans and other animals. Dogs are commonly presented to veterinary behaviorists for excessive or inappropriate barking (Beaver, 1994; Juarb -Diaz, 1997; Verga and Palestini, 2002). In fact, barking has been ranked as more disturbing than many other common suburban noises (Flint et al., in press). The reason for this is unclear. It is possibly a legacy from early loose associations between dogs and humans, when recognizing a territorial bark indicating imminent danger would have been useful (Ruusila and Pesonen, 2004) while ignoring such a bark may well have been fatal.

If this is true, then most people are probably able to recognize the meaning of different barks and should find territorial barking more disturbing and difficult to ignore than other bark types. It has been demonstrated that dog barks have specific acoustic parameters depending on context (Yin, 2002; Yin and McCowan, 2004). The acoustic parameters that have been investigated include frequency, noisiness, and tonality (Pongracz et al., 2006).

It has been shown that people can differentiate between different barks in their own dogs (Yin and McCowan, 2004; Pongracz et al., 2005) and recognize their context. Other studies have shown that humans are able to determine meaning from canine vocalizations made by unfamiliar dogs of the same breed even if they have had no previous association with dogs and so have not had the opportunity to observe the associated body language (Molnar et al., 2009). It is as yet unclear whether the meaning of barking has any direct relevance to the degree of disturbance it may cause.

The aim of this study was to ascertain if listeners could correctly identify the etiology of a bark, to determine if the etiology of the bark had any effect on the listener's response to it, and to determine if previous dog ownership and gender had any influence on human response to barking.

Materials and Methods

Recordings

Three dogs were recorded barking as a result of anxiety created by separation from their owners (left alone at home) and again when guarding territory (reaction to the arrival of a stranger at their home). The dogs were all neutered males, ranging in age between 6 and 12 years. The first was a 30 -kg border collie cross, the second a 35- kg Staffordshire bull terrier Labrador cross and the third an 8- kg miniature schnauzer. The recordings were made with a Panasonic (SDR-H85) video camera and the volume was standardized for playback.

Subjects

Seventy- nine veterinary students volunteers (19 males and 60 females) ranging in age from 19 to 48 years, were asked to listen to six recorded barks and to identify the type of bark by selecting between separation anxiety and territorial guarding (Appendix 3). They were also asked to indicate if the bark made them feel sorry for the dog and to rate each bark on an irritation scale of 1 to 10 (1 being least irritating). The barks from each dog were juxtaposed, but the order was changed for each dog. The students were exposed to thirty seconds of barking for each of the six examples with a 10-second interval between to allow time for them to record their responses on the table provided (Appendix 3). They also were asked to state their sex, age, and history of dog ownership. The students were seated in a lecture theatre and spaced so that they could

not view each other's responses. They were not allowed to communicate in any way during the experiment. The students had not received lectures or information on canine behaviour problems at this stage of their studies.

Statistics:

A logistic regression was done to confirm the most important influences on student response. An independent sample t-test was used to compare means. A paired sample t test was used to compare individual irritation scores for the two bark types.

Results.

Ownership history

Thirty- four (43%) of the students currently owned dogs and 66 (83%) had been exposed to a family dog when at home. Ten (13%) had had no close exposure to dogs at home.

Classification

Fifty- nine of 79 participants (75%) classified all the barks correctly. Of the 20 (25%) that did not, 6 were male and 14 were female. Bark number 1 (territorial), was misclassified ten times, bark number 3 (separation anxiety) twice, bark number 4 (territorial) four times, bark number 5 (territorial) twice, bark number 6 (separation anxiety) nine times. Bark number 2 (separation anxiety) was not misclassified (Table1). Overall, territorial barking was misclassified more than separation anxiety. Of 474 responses (6x79), 11 misclassifications were separation anxiety (2.1%) and 16 were territorial barking (3.5%). So 93% of responses to examples of territorial barking were correct and 95% of responses to examples of separation anxiety barking were correct.

Irritation Levels

Type of bark

Bark number 5 (territorial) had the highest individual average irritation score at 8.0 and bark number 1 (territorial) had the lowest at 5.6 (Table 2). However, there was no statistically significant difference in the average overall irritation scores for territorial and separation anxiety barking when an independent sample t test (PASW 18) was applied ($t=0.85$, $df=472$, $p=0.40$). A paired sample t test showed no significant difference between irritation scores for territorial and separation anxiety in individual respondents ($t= -1.004$, $df=78$, $p=0.319$).

Dog effects

Although it is not possible to draw significant conclusions with a sample size of only three dogs, it is interesting to note that barks 5 and 6 (produced by the miniature schnauzer) had the highest median irritation levels.

Dog ownership

An independent sample t- test was used to identify differences in irritation scores for those with and without a family dog. Differences in irritation scores were not significant at the alpha level of 0.05 ($t=0.709$, $df=77$, $P=0.48$). The test was also used to test for the influence of dog ownership on irritation scores. Differences were not significant ($t=1.268$, $df=77$, $P= 0.20$). There was no significant difference between those with no home exposure to dogs at all and those with a family dog or that were current dog owners ($t=0.40$, $df=77$, $P=0.69$).

Gender

Based on overall average irritation scores, assessed with an independent sample t-test, females were less irritated by barking than males ($t= 2.5$, $df=77$, $P=0.020$).

Emotionality

Barking provoked by anxiety clearly engendered the most sympathy. Sixty eight percent (54/79) felt sorry for the dog in bark number 2, 62 % (49/79) for bark number 3 and 53% (42/79) for bark number 6 (all barks expressing separation anxiety) while only 2/79 (2.5%) felt sorry for the dog in bark number 1 and 1/79 (1.2%) felt sorry for the dogs in barks 4 and 5 (both territorial guarding).

Gender

Females were more sympathetic to the dogs than males ($t= 2.60$, $df=77$, $p=0.011$).

Logistic regression confirmed that gender had the most influence on how sympathetic subjects might be towards barking especially towards barking due to separation anxiety (Table 3).

Ownership history

Having had a family dog had no effect on the ability to detect emotionality ($t= 0.553$, $df=77$, $P=0.6$) and nor did dog ownership ($t= 0.32$, $df=77$, $P=0.74$). Those who had no family dog and were not current dog owners and so had no close exposure to dogs at home did not return a significantly different overall sorry score ($t=-0.17$, $df=77$, $p=0.87$).

.Discussion/Conclusions

In this study, students were equally irritated or disturbed, by the two most common types of problem barking i.e. territorial guarding and expression of separation anxiety. Studies have shown that humans are physiologically affected by the noise component of barking (Reide et al., 2001; Kaiser et al., 2002) and that they are able to identify meaning in barks (Yin and McGowan, 2004). This suggests that being disturbed by anxious barking may reflect human compassion or simply reflect the effect of the noise

itself on the human brain. Similarly, disturbance from territorial based barking may simply relate to sound structure or the understanding that the bark is a warning. Results from the present study suggest that it is quite likely that both the physiological effects of the noise on the brain and the psychological and emotional effects of understanding the meaning of the bark combine to cause a response but that the noise effects may be most significant overall. Students found both types of barking difficult to ignore but felt sorry for the dogs barking to express separation anxiety. Since they were in a secure environment territorial barking was unlikely to provoke feelings of fear or concern but the students overall found it just as disturbing as barking expressing separation anxiety. The students were able to differentiate between the types of bark quite accurately which demonstrates their ability to comprehend the meaning of, or at least the most likely trigger for, a given bark and supports the findings of Yin and McGowan (2004). They were also able to detect emotionality in canine barking /vocalization. Where sympathy was evoked it was mainly in response to barking expressing separation anxiety. This study suggests a gender difference in human sensitivity to canine vocalizations, with females more sympathetic towards barking dogs than males which is intuitively what we may expect.

The fact that dog ownership and exposure to a family dog did not influence irritation and sympathy scores supports the findings of Molnar et al (2009) and Pongracz et al (2005). It is possible, however, that this may be a reflection of the fact that the subjects were all veterinary students. Presumably they were interested in dogs and probably associated with them via friends and during their training. For this reason, and given the limited range in age of the subjects, the study population cannot be considered representative of the general population. Thus we must be cautious in extrapolating our

findings to the population as a whole. It would be interesting to repeat the study with a group of students from other faculties and with a greater age range of subjects.

Age may prove significant in a larger sample with a greater range of ages. The majority of volunteers in this study were under thirty years of age.

The fact that barking produced by the smallest dog achieved the highest median irritation level for both bark types, suggests that the degree of irritation or disturbance caused by barking may relate to the size of the dog. It would be interesting to explore this with a larger sample size.

Acknowledgements:

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Table1: Identification of the reason for barking in six different recorded barks by 79 students. Dog1, is a border collie cross (barks1 & 2) Dog 2, a Labrador cross (barks 3 & 4), Dog3 a miniature schnauzer (barks5 & 6).T (territorial) and A (anxious) refer to the actual bark type.

Bark Classification	1 T	2 A	3 A	4 T	5 T	6 A
Anxious	10	79	77	4	2	70
Territorial	69	0	2	75	77	9
% correct	87	100	97	94	97	92

Table 2: Irritation scores assigned to six recorded examples of barking by 79 veterinary students Dog 1, is a border collie cross (barks1 & 2) Dog 2 a Labrador cross (barks3 &4), Dog 3 a miniature schnauzer (barks 5 & 6). T (territorial) and A (anxious). Median irritation levels in bold.

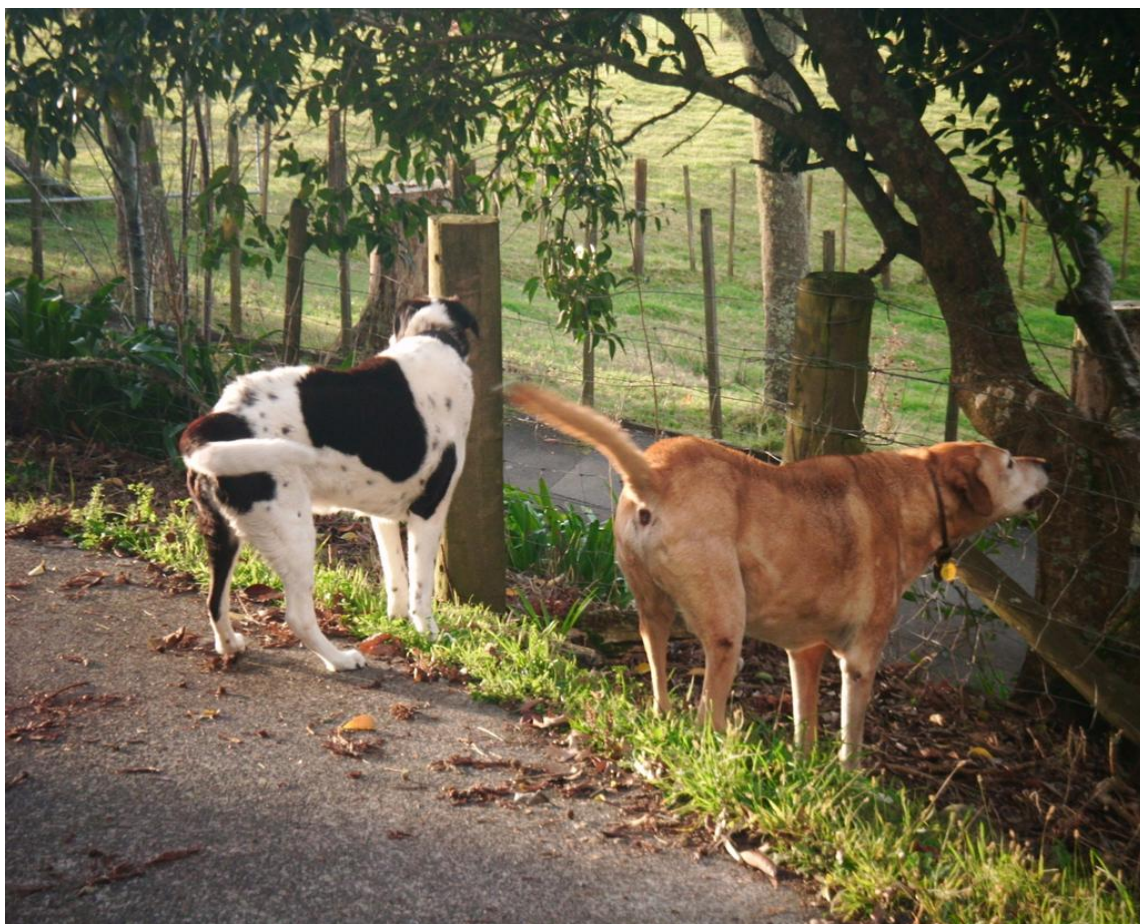
<i>Irritation Level</i>	1 Territorial	2 Anxiety	3 Anxiety	4 Territorial	5 Territorial	6 Anxiety
0	0	0	0	0	0	0
1	2	3	0	0	0	0
2	3	1	1	2	0	0
3	7	5	4	6	2	3
4	12	11	9	8	0	4
5	12	12	9	16	6	6
6	14	17	10	19	5	10
7	15	14	14	14	10	9
8	12	12	21	8	23	20
9	0	1	10	3	20	18
10	2	3	1	3	13	10
N=	79	79	79	79	79	79

Table 3 Logistic regression showing the effects of age and gender on response to separation anxiety barking.

<i>Variable</i>	<i>B</i>	<i>S.E</i>	<i>Wald</i>	<i>df</i>	<i>P<</i>	<i>Exp B</i>
Bark 2						
age	.149	.078	3.678	1	0.055	1.160
female	1.443	.592	5.943	1	0.015	4.232
constant	-3.680	1.915	3.691	1	0.055	0.025
Bark 3						
age	.197	.079	6.184	1	0.013	0.217
female	1.109	.593	3.499	1	0.061	3.032
constant	-4.821	1.944	6.152	1	0.013	0.008
Bark 6						
age	.031	.052	.356	1	0.551	1.031
female	1.211	.562	4.607	1	0.032	3.357
constant	-1.519	1.349	1.268	1	0.260	0.219
.						

CHAPTER SEVEN

Barking in Home Alone Suburban Dogs (*Canis familiaris*) in New Zealand



The research thus far had provided information about the type of barking causing social disturbance and factors that predisposed to its occurrence and were relevant to its control, management and prevention. Before a behaviour problem can be controlled or managed, however, it must be identified. It was important to have some baseline against which barking complaints or concerns might be compared. Expected ‘normal’ parameters for barking in home alone dogs were assessed.

Barking in home alone suburban dogs (*Canis familiaris*) in New Zealand

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ABSTRACT

AIM: To establish expected average parameters for barking in “normal” (dogs with no history of nuisance barking), suburban dogs in New Zealand that are left alone for eight hours during the day, with indoor /outdoor access and that are walked daily. Parameters evaluated in the study population over an eight hour period were the average number of barking episodes, the average length of each episode and the average total amount of barking. The effects of age and sex on these parameters were assessed.

MATERIALS & METHODS: Clients from two different Auckland veterinary practices were offered the opportunity to participate in the study. Participants (n=60) were provided with a voice operated tape recorder (VOR) and a written instruction sheet. They recorded their dogs daily over eight hours for five days. Data were then recorded onto a spread sheet and analysed using the SPAWS 18 statistical analysis system. Box plots were constructed to evaluate variation between and within dogs.

RESULTS: On average, dogs barked between four and five times over 8 hours. The average length of each episode was 30 seconds and the average total amount of barking in eight hours was 129 seconds. Young dogs (<5years) tended to bark more frequently than older dogs.

CONCLUSIONS: These parameters provide a baseline against which barking complaints may be measured.

Keywords: Barking; dogs; suburban; average

Introduction

Barking is recognized world-wide as a behavior problem being a common cause for animals to be presented to behavior clinics (Uchida, 1996; Overall, 1997; Cross et al., 2009; Hassan et al., 2009; Rafie et al., 2011). It is a behavior that is not well tolerated by some people and is a common reason for complaints to authorities (Anonymous, 2009). Barking complaints often result in fines being issued to owners, and in extreme cases dogs may be removed and destroyed. Despite a recent increase in research within this area there is no universally accepted parameter for normal levels of barking that may be used as a standard. In New Zealand, problem or 'nuisance' barking is defined subjectively, as loud, persistent barking (Anonymous, 1996) and there may be a tendency for the response of the authorities to reflect the intensity of the complainant rather than the true severity of the problem.

Humans vary considerably in their response to noise and this may reflect their state of mental or physical health at the time of exposure (Mesquita et al., 2011) their perception of relative benefits or potential threats posed by the source of the noise (Jansen et al., 2011) and the environment in which they live (Nang et al., 2012). Kaiser et al.,(2002) showed that barking triggers an involuntary physiological reaction in people causing them to orient toward the sound. It is likely that this varies in individuals, thereby affecting tolerance. A recent New Zealand survey (Flint et al., in press) revealed that the degree of concern and disturbance felt by people in response to barking could be influenced by their

perception of how potentially harmful dogs may be to themselves or their families.

Without some sort of accepted level of barking against which barking complaints may be measured, owners and dogs may be unfairly penalized. This study evaluates barking in suburban dogs in New Zealand. It establishes average values for total amount of barking, the average number of sessions and the average length of each session, over an eight-hour period in forty suburban dogs while at home alone. It also evaluates the effects of age and sex on the measured parameters.

Materials and Methods

Two small animal veterinary practices in Auckland New-Zealand were asked to assist in this study. One was based on the North Shore and the other in Howick, East Auckland. The attending veterinarian offered clients the opportunity to participate in the study when they presented their dogs for consultation. The selection criteria were that the dogs must receive at least thirty minutes off property exercise daily and have indoor/outdoor access. The properties on which the dogs were kept were suburban houses with gardens. In the areas from which the study population was derived, the average garden area was 169 m² (range 131 to 205). Properties next to public rights of way (beach or park access ways) were excluded from the study. Properties in both study areas were subject to light to moderate traffic flow and were not on any regular flight paths. Dogs were excluded from the study if they had a history of nuisance barking defined as owners having received complaints from neighbors or authorities about their

dog's barking, or were suffering from any medical or age related degenerative condition that may have affected their normal behavior. Participating owners were provided with a voice operated tape recorder (V.O.R, Sony microcassette recorder M200mc) and a written instruction sheet (Appendix 4). They were requested to record their dogs barking daily over eight hours for five days. They were asked to speak into the recorder before leaving home, stating the time of day and day of the week. Upon return they were to state the time before turning off the recorder. Data were then recorded by hand and transferred as daily totals onto a spread sheet by the investigator.

Data from forty of sixty dogs initially involved with the study were sufficiently complete to use in the analysis. Data were discarded as unsuitable where owners did not record over sufficient time or forgot to annotate the recordings. In some cases tapes were damaged, and in others tape recorders were lost, or destroyed. Some owners initially agreed to participate but found it too hard, or too intrusive and so withdrew.

SPASW statistical analysis system (18) was used to look for measures of association, using cross tabulations and Chi square analysis. Bar graphs were constructed to demonstrate trends visually and box plots were constructed to explore variability within and between dogs.

Results

Dogs ranged in age from 1 year to 14 years. There were twenty-three males and seventeen females. Seven dogs were entire (3 females and 4 males). Twenty

different breeds were represented, so analysis of breed differences was not possible as the sample size was too small.

Across all dogs there was 25858.5 seconds of barking recorded during 200 8-hour sessions for an average barking duration of 129 seconds per 8 hours (25858.5/200, range 0-1200. The average number of bark bouts over eight hours was 4.3 (862/200, range 0-28). The average length of each bout was 30 seconds (25,858.5/862).

In many dogs, daily results were extremely variable and there was considerable variation between dogs both in total bark time and number of bark episodes (Figures 1 and 2). Young dogs, barked more frequently on average than older dogs. All of those that averaged between 21-30 bark episodes in eight hours were younger than five years of age (Figure3). Older dogs had the longest bark sessions. Average total bark time in eight hours was greater for females than males (77.8% of those whose average daily bark time was 201-300 seconds were female) (χ^2 3.259 df=1 p=0.071) and outliers with the longest average bark time in eight hours were female, however this did not achieve statistical significance. There was no significant relationship between number of bark episodes and sex. The analyses were repeated using only the thirty- three neutered animals and there was no appreciable difference in the results compared to those gained using the data set including entire dogs.

Discussion

This study provides some baseline parameters against which barking complaints may be compared. Results suggest that overall most home- alone dogs do not

bark frequently or for very long at any one time on a regular basis. There are however, days when they do bark for longer and more frequently than usual. This is probably because in most cases the environment changes from day to day and there may be days when something unusual occurs in or around a property which triggers more barking. Because of this environmental variation, assessment of a dog that is subject to a barking complaint should be made over more than one observational period. Ideally, an assessment should be made on data gathered over several days.

The fact that some age and sex related trends were seen, but were not statistically significant probably reflects the small sample size. This may also explain why there was no appreciable difference in parameters between entire and neutered animals.

It would be useful to continue this study, expanding the sample size in order to re-evaluate the effects of reproductive status and sex and to evaluate possible breed and regional differences. Areas that are partly industrial, close to sports grounds or schools, or have a particularly high dog density may return higher average values and this may need to be taken into account when setting “acceptable” or normal levels of barking.

Authorities could use strategically placed VOR recorders or similar digital voice recorders to evaluate complaints. Recorders are now available that offer continuous recording for more than 500 hours. The data processing and collating in this study was extremely time consuming and it would not be economically viable for authorities to work in this way. However with recent technological improvements to recorders it should be possible for the recordings to be

downloaded into a computer program devised to automatically note the barking parameters, particularly the number of bouts and length of each bout.

Conclusions

This study has provided data that may be useful when barking complaints must be investigated to decide if a dog is in fact barking excessively or if the perception of neighbours or owners with respect to the barking is incorrect.

Although there may well be regional variability due to environmental triggers it is useful to have some idea of how often, on average, home alone dogs that have not been the subject of barking complaints, are not suffering separation anxiety, are exercised daily and are not subject to extreme or unusual environmental stimuli bark during the day, bark for.

The amount of barking done by a dog that is the subject of a barking complaint can be compared to these average figures and a decision made as to whether further investigation is warranted.

Having identified a dog that is barking excessively, steps must be taken to establish why this is occurring and to implement appropriate management plans and /or behavioural therapy to achieve resolution (Overall 1997; Juarbé-Díaz 1997). Where complaints are unfounded, authorities can show complainants that the level of barking about which they are concerned is within normal boundaries and encourage social tolerance.

Acknowledgements:

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Figure 1. Box and whisker plot showing the distribution of number of bark events per dog, recorded over eight hours on each of five days for forty suburban dogs in Auckland, New Zealand. Each dog provides five data points. The median value is the white box shown within the solid dark second and third quartiles. The maximum and minimum values are represented by the ends of the dashed lines.

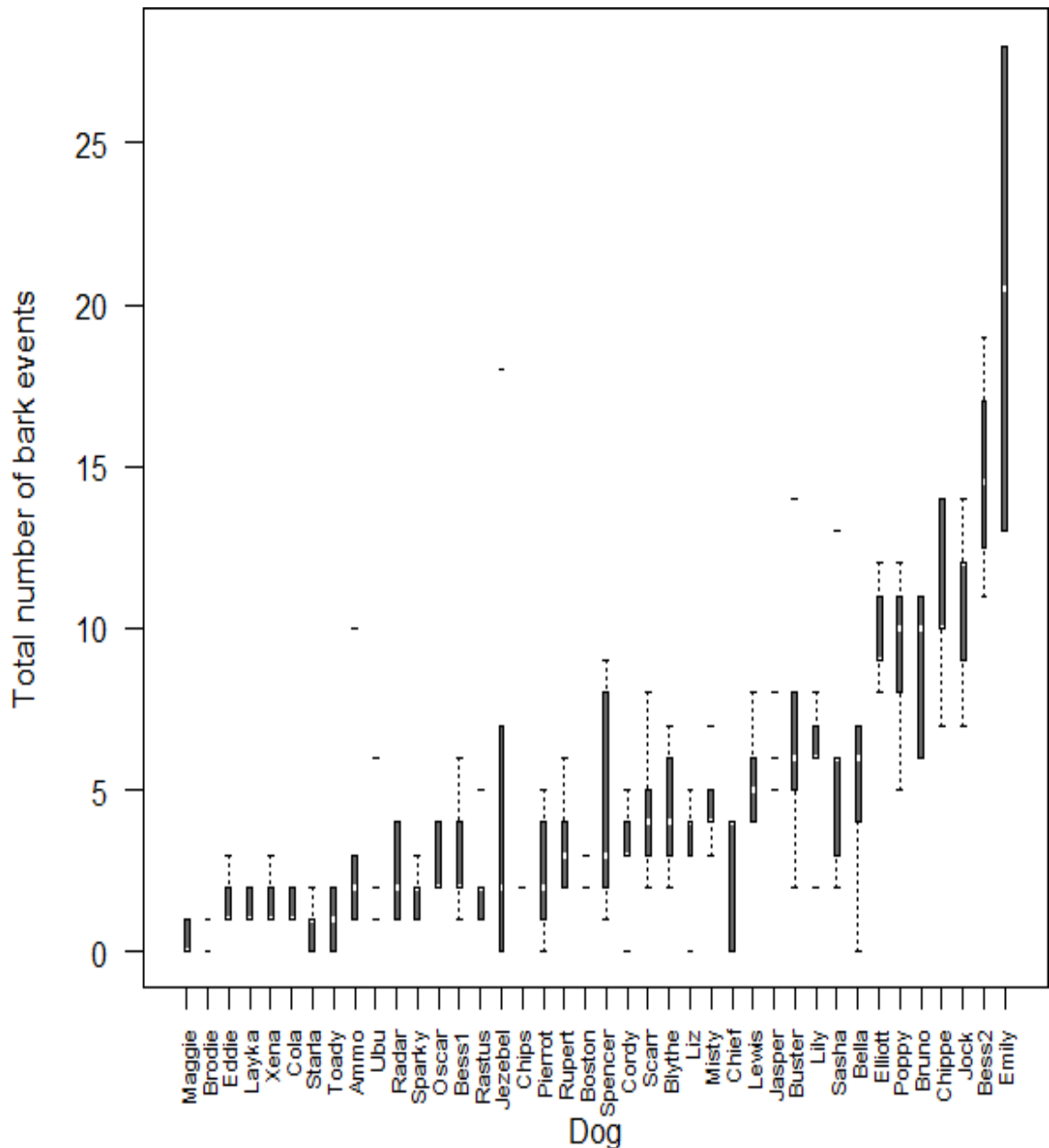


Figure 2. Box and whisker plot showing the distribution of total amount of barking per dog in eight hours (measured over five days) for forty suburban dogs in Auckland New Zealand. Each dog provides five data points.

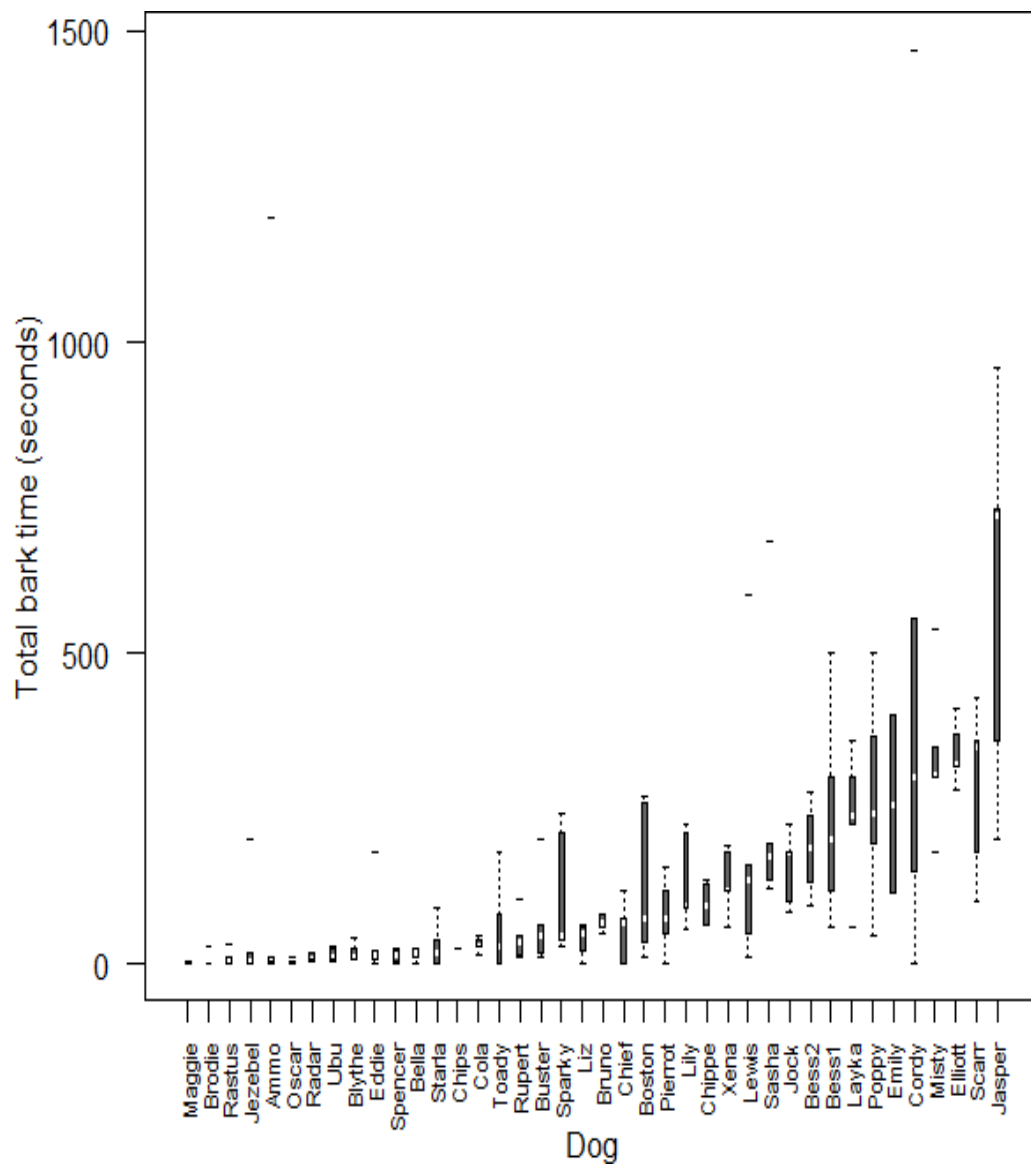
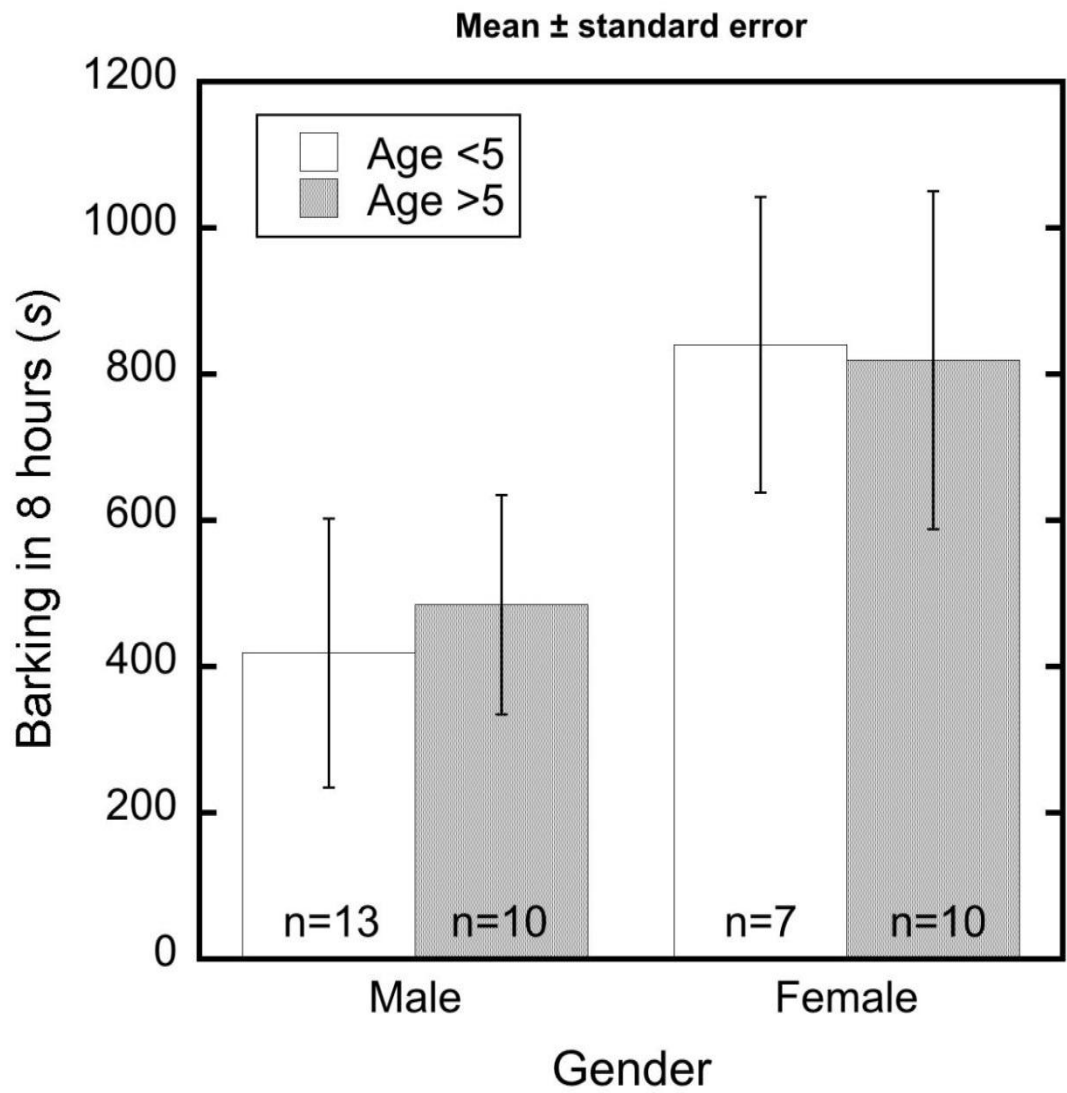


Figure 3. Effects of age and sex on amount of daily barking (seconds) for forty suburban dogs in New Zealand.



CHAPTER EIGHT

Triggers for Barking in Suburban Dogs in New Zealand



To formulate management and prevention plans for nuisance barking it is important to identify the common triggers for barking in suburban dogs. This information was gained from volunteer owners who noted on a daily basis what their dogs barked at and how often as described in the following chapter.

Triggers for barking in suburban dogs in Auckland New Zealand.

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(This chapter will be submitted to Journal of Veterinary Behaviour)

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Abstract

Excessive barking by the domestic dog (*Canis familiaris*) is a problem in modern suburban society. A significant proportion of barking that provokes complaints is territorial barking. To modify this behaviour it is necessary to implement strategies which include desensitization to environmental triggers. Identifying the common triggers for barking in normal suburban dogs may help implement preventative management programs to decrease the problem barking in suburban dogs.

Aims: To identify the most common triggers for barking in suburban dogs in New Zealand.

Materials and Methods: The owners of 29 dogs noted how often their dogs barked each day, how long they barked for and what triggered the barking. This was done for seven days. Data were recorded onto a spread sheet and relative frequencies of environmental triggers were established. The average length of each bark episode and the average total bark time was also evaluated

Results: Triggers for barking were identified for 696 barking episodes. The most common triggers for barking were events occurring off property involving movement and noise by people (40%, n=279) and direct interaction with the dog's owner on the property (22%, n=151). Other triggers included vehicles and machinery, other animals, household noises, play and sirens.

Conclusions: Results suggest that desensitization to the presence of strangers near the property and noises related to common human activities could help to prevent problem barking.

Introduction

Dogs may bark for many reasons including guarding territory, to communicate with their owners, other dogs or other species, in play, to express excitement, in anticipation of a walk or a ride in the car and to express anxiety or discomfort (Yin, 2002; Kaminski, 2011). Problem barking is usually due to territorial guarding or separation anxiety (Flint et al 2012 in press). In one animal behaviour clinic based in Auckland, New Zealand 51% (54/107) of cases initially presented for problem barking were due to territorial guarding.

In order to modify territorial barking, it is useful to identify the triggers that provoke the behaviour. This can be done by utilising owner observations or by making video recordings of the dogs when barking. Once the triggers are identified, a desensitization and counter-conditioning protocol may be instituted to decrease the dog's reactivity (Juarbé –Diaz 1997; Overall 1997). In some cases, screening off visual triggers may be useful.

In order to advise people on the prevention of excessive territorial barking it is necessary to know what the most common triggers for territorial barking are. No studies to date have attempted to quantify the relative frequency of specific environmental triggers as precipitating factors for territorial barking.

This study identifies common triggers for territorial barking in suburban dogs in Auckland, New Zealand.

Materials and Methods

Dog owning clients of two companion animal veterinary practices were offered the opportunity to participate in the study when they visited the clinic. To participate in the

study the dogs had to have at least 30 minutes exercise daily and have indoor/ outdoor access. Dogs were excluded from the study if they had a history of nuisance barking or were suffering from any medical or age related degenerative condition that may have affected their normal behaviour.

Participating owners were provided with a record sheet (Appendix 5) on which they were requested to fill out the name, sex age and breed of the dog. On a daily basis they were asked to fill out the date, and to note every episode of barking that occurred, the duration of each barking session (seconds) and what the trigger was. They were requested to do this for a total of seven days. Data were transferred onto a Microsoft word XL spread sheet by the investigator and relative percentages were evaluated.

Results

Of the 50 clients that volunteered to be involved 31 provided useful complete questionnaires.

The dogs barked on average 4.9 times in each 24 hour period (range 0-9 each with an average duration of 39 seconds (range 1.42-599sec). The average total bark time over all dogs in 24hrs was 3.2 minutes.

Barking occurred in response to passers-by (seen and heard), visitors, noises in the house and cars. Dogs also barked in response to other dogs barking, in response to thunder and at other animals, at the lawn mower and when their owners were interacting with them or when another family member arrived home.

The stimuli which provoked the most barking were noises from people, visitors (15%, 101/696), neighbours (12%, 86/696) or people passing by the house (13%, 92/696) and response to or interaction with owners (22%, 151/696). The remaining 38% of barking

sessions were mainly attributable to other dogs (9%, 64/696), other animals (8%, 54/696), thunder vehicles or machinery (12%, 85/696), non -human directed play (2%, 11/696) and noises within the house (2%, 11/696). Triggers could not be identified for only 3% (24/696) of barking episodes.

Table 1: Summary of the relative significance of stimuli identified as triggers for barking in suburban dogs in New Zealand.

Triggers	Percentage	Number
Humans	63	441
Neighbours	12	86
Passers-by visual	9	65
Passers-by auditory	4	27
Owner interaction	22	151
Household noise	2	11
Visitors	15	101
Machinery	14	95
Motorbike	1	10
Cars	7	47
Trucks	4	25
Other	2	13
Dogs	10	75
Visual	6	41
Auditory	3	23
Play	2	11
Other animals	8	54
Visual	6	42
Auditory	2	12
Thunder	1	7
Unknown	3	24

Discussion

Results show that dogs at home with human company bark at specific stimuli and when interacting with their owners. The most significant triggers were of human origin, both visual and auditory.

The environments in this study were not standardized beyond being suburban properties. Some of the dogs within the study may have lived in quiet cul-de-sacs and others on main roads, next door to noisy neighbours or quiet people. Some may have belonged to owners who had lots of visitors, others to owners who rarely had visitors. The owners' previous reactions to the stimuli and to the dogs' responses may also have had some effect on individual dogs.

There are many variables that can affect the response of individual dogs to various stimuli including physiological state, management strategies (Juarbé –Diaz 1997; Flint et al 2012 in press) and frequency of exposure (Wells et al;2002) so we cannot extrapolate from this study to the extent of saying that all dogs will respond to all of the identified stimuli. However we can conclude that the stimuli identified have the potential to precipitate barking in suburban dogs and that some are more likely than others to act as triggers.

Triggers were not identified in only 3% of barking episodes which supports current theories that dogs bark at specific stimuli and for specific reasons (Yin 2004; Kaminski 2011). Information gained from this study could be helpful in the formulation of preventative management strategies for problem territorial barking.

It would be interesting to test the stimuli identified in a standardized environment with specific exposure times to establish any consistent differences in the intensity of response.

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CHAPTER NINE

General Discussion

Dogs are popular as pets in New Zealand, particularly with people who are aged between 18 and 55 years of age, are married or living in de-facto relationships, have children over one year of age, and live in rural areas, suburban houses, or in inner city houses. The former is consistent with previous studies on pet ownership (Fifield and Forsyth, 1999) and is intuitively what we might expect since people in this phase of life tend to spend time on family orientated activities in which a dog may be included. In addition, it is consistent with current philosophy that pet keeping is good for children (Gee et al., 2007; Dimitrijevic, 2009). Married and de-facto couples without children also commonly own dogs. This is thought to reflect the trend for couples to have children later in life and to keep pets to satisfy their need to nurture (Power, 2008). There is a marked decrease in dog ownership amongst those over 55 years of age. In the survey (Chapter Three) only 19% of those aged 65-74 years owned a dog. The reason for this is unclear. It may simply be that older people no longer want the bother or responsibility of owning a dog or it may reflect a large percentage of people for whom illness or lack of finance precludes dog ownership. It is concerning that older people may not be able to afford to keep a dog since studies show significant health benefits for older people keeping pets (Friedmann et al., 2007). It is interesting that there was a strong correlation between positive personality traits and dog ownership. This may be because dog owning has a positive effect on a person's attitude to life or it may be that only positive people feel capable of and willing to care for a dog. It may simply reflect that the phase of life during which most people keep dogs is a time during which their

outlook on life is positive. The profile of a non-dog owner derived from this study was a person who is over 65 years of age, educated to university level or above, living in a suburban flat without a permanent partner, does not consider pet dogs vital to society, considers that a dog bite could present a serious health risk and has a negative personality score.

Public attitude towards dogs is generally positive with 40% of respondents in our study being very fond of dogs (Chapter Four). Both dog owners and non-dog owners acknowledged the importance of working dogs to society, especially guide dogs, search and rescue dogs and police dogs (Chapter Three). Dog owners, however, valued dogs more as household pets than non-dog owners. There was some evidence of fearfulness with 7% of respondents being afraid of dogs and 8% considering that a dog may pose a threat to themselves or their family.

Despite the high level of dog ownership and the apparent overall positive attitude towards dogs in New Zealand society, barking is considered to be disturbing. Barking and howling were ranked as significantly more disturbing than any of the common suburban noises, both animate and inanimate, used as comparisons in the survey (Chapter Four). As expected, people were concerned about disturbance of work, activities and relaxation during the day and disturbance of sleep at night. This could apply to any persistent noise. With barking, however, they were also concerned that a dog barking persistently during the day might be suffering in some way or that the dog may be alerting to a problem with its owner, and that persistent barking at night might indicate the presence of danger in the form of intruders. This suggests an ability to detect meaning and emotionality in barking consistent with the work of Yin (2006) and Pongracz (2009) and could also lend support to the theory that humans are innately

programmed to pay attention to barking (Lord 2009). Fear of night-time barking could also reflect social conditioning. Books and films often set the scene for a night-time attack or home invasion by depicting barking dogs and in this study people were more concerned by night-time barking if they had been frightened by a dog or knew of someone who had been bitten by a dog. Some felt threatened by the dog itself.

Dog owners were less likely to be bothered by barking probably because they are more habituated to barking than non-dog owners. Non-dog owners are more likely to have noticed extreme territorial or separation anxiety barking (refer Chapter Five) and less likely to have experienced other types of barking in daily life. When asked about barking in a questionnaire, respondents were likely to relate the question to something that they had experienced.

Young people, less than 25 years of age, and elderly people, older than 74 years of age, were least bothered by barking. This perhaps reflects the fact that people in the middle years spend more time at home and so have greater exposure to barking than young people, while much older people may suffer hearing loss and be less bothered as a result. Divorced people were more concerned about night-time barking which suggests they interpreted it as signifying potential danger and felt vulnerable without the support of a partner.

Respondents varied in their understanding of the potential reasons for barking. Fifty three percent of respondents considered that nuisance barking may signify lack of training, but in general they understood that barking occurred for a reason with 75% recognising it as a form of communication or self-expression.

The survey demonstrated a willingness amongst respondents to investigate why a dog was barking before complaining. Many people (41%) said they would be reluctant to

complain about a barking dog. Concerns included fear of repercussions on themselves or their families by the dog owners, or fear that the dog may be harmed as a result of their complaint. This may explain the surprisingly small number of complaints reported in the survey by current and previous dog owners (only 4% of dog owners had received official complaints). Some respondents felt that complaining would be of no use at all as nothing could be done. These results suggest that people may be more proactive in dealing with problem barking if they understand that there are solutions in most cases and know where to find help that will not result in the dog being hurt or the owners being penalised. People who were most likely to approach the owners of a barking dog and offer to help in some way were those in the 55 to 74 year age group. This may be because they have time to provide assistance or simply that they belong to a generation which values social supportiveness.

Dog owners were likely to be concerned if their own dogs were barking excessively. The reasons given were, that the dog may be upset, the dog might be taken away, the barking might signify intruders, or may disturb other people and they might receive a fine. They were prepared to consult dog trainers and behaviourists. If they had received a fine in the past they were more likely to use anti-bark collars or rehome the dog. These responses indicate that the threat of fines is a strong incentive to resolve the problem but may result in the implementation of inappropriate strategies.

Analysis of clinical data to determine the aetiology of problem barking showed that problem barking is usually either territorial guarding or an expression of separation anxiety (Chapter Five). When students were exposed to barking in a controlled environment (Chapter Six) they were equally disturbed by both types of barking. This could support the theory that barking has a physical effect on the brain which makes it

impossible to ignore (Kaiser et al; 2002). In the same study however students accurately differentiated between barking expressing separation anxiety and territorial guarding, and felt most sympathy for the barks expressing separation anxiety. That result suggests an ability to detect emotionality and to understand the meaning of the bark or at least the likely trigger for it. Thus barking is difficult to ignore not only because of the physical properties of the sound but also because of its meaning. Contrary to the findings in Chapter Three, past and current dog ownership had no effect on student response to barking, however this could have been because the student subjects were all either veterinary students or studying in a related field and presumably had regular interactions with and an interest in dogs as a result.

Problem barking was strongly correlated with dog management (Chapter Five). Risk factors for problem barking included; leaving the dog alone for longer than four hours, failure to provide toys, lack of daily training and lack of morning walks. The provision of toys and bones decreased both types of problem barking which is consistent with the findings of studies investigating the effects of environmental enrichment strategies on group housed dogs (Schipper et al; 2008; Wells and Hepper, 2000). Daily training reduced problem territorial barking but had no effect on the expression of separation anxiety. Allowing dogs indoor /outdoor access when left alone reduced the likelihood of both problem territorial guarding and separation anxiety. Dogs with separation anxiety often improve if allowed access to the house, probably because they feel more secure as a result, conversely, some suffer barrier frustration and panic if shut inside (Overall 1997) so, although there is individual variation, overall, indoor/ outdoor access may be the most appropriate management strategy in dogs prone to separation anxiety if they must be left alone. The results from this study suggest that implementing such a housing

management strategy is probably helpful in preventing the manifestation of separation anxiety. Dogs that guard excessively may well choose to rest inside the house and, as a result, be less exposed to environmental stimuli that may trigger guarding.

Being walked in the morning significantly reduced the likelihood of problem barking. That makes intuitive sense as a dog that has been exercised is likely to be tired and less reactive. This has always been assumed to be true by animal behaviourists but has not previously been quantified in the field.

Dogs belonging to single females were at increased risk of separation anxiety. Single owners are more likely to leave dogs alone for long periods while at work and probably spend more time interacting with their dog when they are at home than people with families and partners do. Thus they develop a more intense bond with the dog which may predispose to separation anxiety (Zasloff, R.L; Kidd A.H, 1994). It is unclear why dogs belonging to a single female were more at risk for separation anxiety than those belonging to single males. It may be that single males are more likely to be employed in trades that allow them to take their dog to work such as building or landscaping.

The identification of management factors that predispose to problem barking enables us to be proactive with respect to problem barking by educating owners to care for their pets in a way that minimises the potential for problems. Pre-pet counselling in veterinary clinics would be extremely useful in identifying people who are not in a position to provide appropriate care for a dog and to advise them to take on a more suitable pet. Puppy schools may be an excellent forum for the education of new owners on husbandry techniques and informing them about problem barking.

Authorities in New Zealand have not had any previous information identifying average barking parameters in New Zealand dogs to use as guidelines when assessing barking

complaints. As a result the response to complaints has tended to be driven by the intensity of the complainants rather than the true severity of the problem. In order to establish a baseline against which barking complaints could be measured average levels of barking for 'normal suburban' dogs were established (Chapter Seven). This should help prevent dogs being punished for normal barking. It will assist in the identification of problem barkers which can then receive the necessary modification and treatment. This study demonstrates the enormous variability in daily barking and shows that monitoring of dogs that are the subjects of barking complaints should be done over several days. In fact on average these 'normal' dogs barked 4.3 times in eight hours with an average bout length of 30 seconds when home alone and 4.9 times with an average bout length of 39 seconds when owners were home with them. On any given day, however, they may bark more frequently and for longer depending on the presence of triggers.

Triggers for barking in suburban dogs are many and varied. In this study, however, most were related to human activity (Chapter Eight). In theory this should make it easier to modify excessive territorial barking by desensitisation with the cooperation of the people involved in the activities that act as triggers or by restructuring the activities so that they are less likely to act as triggers. There is likely to be significant regional variation with respect to triggers for barking.

Limitations

The survey in this study provided valuable information on dog owners and public attitude toward dogs. However, the data must be interpreted with caution. It is possible that those who completed the survey, even if not current or previous dog owners were

interested in dogs in some way which may bias the results. There was no incentive to fill out the survey given by way of reward and many people would consider themselves too busy to bother or just never get around to it if something about it had not stimulated interest or concern. Ethnicity data were hard to interpret as respondents could identify with more than one ethnic group.

Much of the other work within this thesis is based on clinical data or relies on client participation. As a result, the potential for bias and confounding was quite high. In the study on predisposing factors (Chapter Five) the problem barkers and the controls were not derived from exactly the same population. The problem barkers were derived from all over Auckland, while the controls were derived from one clinical practice on the North Shore which potentially increased the risk of a confounding result. The potential confounding of clinical data is corrected for by using ROC curves and logistic regression analysis.

The clients presenting animals to the animal behaviour clinic paid for the service so they were either very committed to the welfare of their animal or had a reasonable level of discretionary income. There may well be variation in the aetiology of problem barking related to different socio-economic groups.

Data used in establishing normal levels of barking was heavily reliant on client participation. Their compliance in adhering to the required recording time was important and in some cases may not have been exact. I do however believe that those participants who completed the task were sufficiently motivated and committed to comply with requirements. The averages derived from this study are useful as a baseline but there may well be some regional variation.

CONCLUSIONS

It is apparent from this study that despite a high level of dog ownership and a generally positive attitude toward dogs, barking is a cause of public disturbance within New Zealand society. The study has returned some interesting and useful information that may be helpful in the establishment of humane and effective prevention and management strategies for problem barking in dogs that address both the needs of the public for canine companionship and the welfare of the dogs kept as pets.

More is now known about how dog owners are distributed, the risk factors for being bothered by barking, and for the occurrence of problem barking. Some baseline barking parameters have been established to which barking complaints can be compared. This information will be useful in developing public education programs and in the identification, treatment and management of cases of problem barking.

The study shows that dogs do not bark randomly and for no reason and that problem barking is strongly correlated with husbandry practices. Therefore, if dogs are properly cared for and managed, problem barking should be successfully prevented or resolved without the need to resort to an 'off switch' in the form of electric collars.

Future research.

There is still much to be done in this area. I think it is important to investigate regional and socioeconomic differences in the aetiology of problem barking. Identification of hot spots for problem barking would enable relevant environmental and husbandry factors from these areas to be compared to those from areas with relatively few problems providing further insight into possible solutions. Data on problem areas are available via

request using the Public Information Act but data on specific cases are not retained in any detail by the council. The names of those with repeatedly problematic dogs are logged but access may be precluded by the privacy laws. Such a study would involve the researcher accompanying officers to individual cases and getting owner permission to evaluate the situation.

There is a need to develop better methods of monitoring barking in barking complaints including computer systems that can automatically record and evaluate data and classify bark type using sonographic analysis.

It would be useful to quantify the numbers of barking complaints that result in fines being issued or dogs being removed, the numbers that are advised about and implement management strategies and the numbers that are issued with electric anti-bark collars. A comparison of outcomes would be most enlightening. It would be interesting to look at how many of those owners who are offered electric collars as a solution accept them willingly or because they think they have no option or because it seems an easy solution. This would require access to council records, or a separate survey, targeting dog owners who had received complaints about their dogs barking.

The present survey did include questions about complaints and results suggested that very few dog owners responding to the survey had received official complaints about their dogs barking. This could indicate a reluctance to admit having received a complaint or that the people who were prepared to answer the survey were excellent at managing their dogs. It is important to remember also that 32% of respondents had never owned a dog. Directly targeting dog owners across multiple areas may yield very different results.

It is evident from discussion with clients of the Animals with Attitude animal behaviour clinic who presented their dogs to the clinic due to concerns about problem barking, that electric anti-bark collars continue to be recommended by authorities as a first option to control problem barking. A field study is needed to monitor the response of each of these animals to the implementation of collars using video studies, behavioural assessments and possibly saliva cortisol assays.

It is important that we monitor the effectiveness of treatment and management protocols in clinical cases of excessive barking and establish reasons for treatment failures.

Due to a relatively small sample size containing multiple breeds this study was not able to evaluate breed differences in problem barking. There may be a definitive relationship between problem barking and breed that transcends husbandry. If so, breeds less prone to problem barking could be recommended for those living in suburban situations.

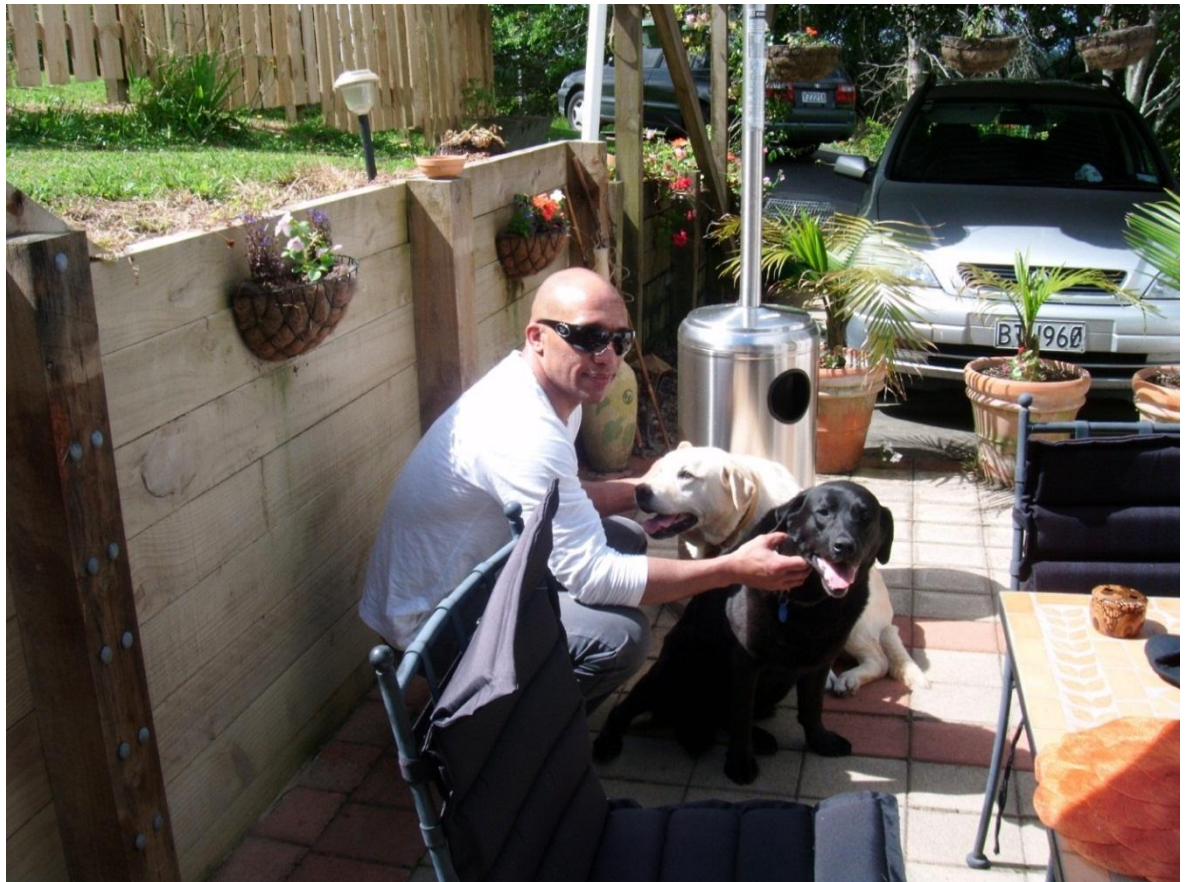
It would be helpful to produce better educational material for use in veterinary practices so that new puppy owners can be advised on preventing problem barking. Evaluating the effectiveness of this dissemination would be worthwhile.

It is evident from this study that there is a need to devise methods of educating the non-dog owning and currently dog owning public about barking in dogs via social media or publications and to offer feasible methods of prevention and management and to emphasise that some suburban environments and lifestyles are simply not conducive to dog ownership.

It would be useful to investigate why older members of society are not owning dogs and to explore the feasibility of establishing a day care system for home-alone dogs involving elderly people who do not have their own dog, due to a lack of perceived

ability to provide adequate care or due to limited finances, but would enjoy the company of someone else's on a daily basis.

It is important that the problem of unwanted barking is addressed now as with increasing population pressure in the suburbs and diminishing garden sizes, living areas for pet dogs are likely to become increasingly restricted in area and dogs are likely to be subjected to an increased level of environmental stimuli from neighbour activity that might trigger territorial barking. Strategies to enable cohabitation of dogs and humans in a way that addresses the emotional and physical needs of both are essential.



The bond between owner and dogs is unique and rewarding for both in the right circumstances. Appropriate husbandry techniques significantly decrease the likelihood of problem barking.

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APPENDICES

Appendix 1

1.1 Information sheet

PUBLIC INFORMATION SHEET- BARKING *DOGS*

Researcher:

Dr Elsa Flint MSc BVSc MACVS
E mail: e.flint@xtra.co.nz

Supervisors:

Professor K Stafford
Dr E Minot
Dr P Perry

Dear Householder

My name is Elsa Flint. I am a veterinarian with a special interest in animal behaviour.

During the course of my work I have become very aware of the increasing problems associated with dogs barking in suburban areas and the lack of knowledge about reasons for barking and possible solutions to barking problems. As a result I have started a PhD at Massey University to study this in the hope of obtaining some answers that will restore harmony to the lives of dogs and people in suburban New Zealand!

Please help me by taking some time to fill out the attached questionnaire. It is a very important part of the study.

If you choose to participate, no material which could personally identify you will be used in any reports on this study. The questionnaire is completely anonymous and the researcher and supervisors will not be able to link questionnaires to the individual participants.

Data obtained during this study will be stored in a secure location at Massey University.

Only the researcher and supervisors will have access to the data

Your participation is entirely voluntary. You do not have to take part in the study however I would be very grateful for your help. If you feel uncomfortable about a particular question then simply do not answer it. If you have any questions about this project, or would like a summary of the results, please feel free to contact us.

1.2 Barking dog survey



Massey University
COLLEGE OF SCIENCES

Barking Dog Survey



Institute of Veterinary Animal and Biomedical Sciences
Massey University
Private Bag 11-222
Palmerston North

ID:

Please answer the following questions by marking the appropriate box or writing in the space provided.

Remember, you may skip any question you wish not to answer.

1. How annoying do you find the following sounds when they are close by?

	1 = not annoying			5 = extremely annoying			
A lawn mower	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>		1
Children shouting.....	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>		2
Baby	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>		3
Motorbike revving	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>		4
Skill saw	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>		5
A cat meowing repeatedly	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>		6
A dog barking repeatedly.....	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>		7
A dog howling repeatedly	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>		8

2. How often do you hear dogs barking when you are at home? *(Please tick)*

I hear dogs barking:

Everyday	<input type="checkbox"/> 1	
Once or twice a week	<input type="checkbox"/> 2	9
Once or twice a month	<input type="checkbox"/> 3	
Never	<input type="checkbox"/> 4	

3. Do you own a dog at the moment?..... Yes ☐ 1 10
No ☐ 2

4. Which of the following statements is/are true of your experience of dog ownership?
(Tick any/all where appropriate)

I have:

A. Always owned a dog	<input type="checkbox"/>	11
B. Owned a dog in the past.....	<input type="checkbox"/>	12
C. Never owned a dog but would like to.....	<input type="checkbox"/>	13
D. Never owned a dog and don't want to	<input type="checkbox"/>	14

IF YOU SELECTED C or D ABOVE PLEASE GO TO QUESTION 7



5. If you currently own a dog /dogs, what breeds do you own?
 15

6. If you have owned a dog(s) in the past, what breeds have you owned? (list all)
 16

7. Which of the following statements describe how you feel about dogs?
 (Please tick all that apply to you)
- | | | |
|--------------------------------------|--------------------------|----|
| I could not live without a dog | <input type="checkbox"/> | 17 |
| I am very fond of dogs | <input type="checkbox"/> | 18 |
| I quite like dogs..... | <input type="checkbox"/> | 19 |
| I dislike dogs..... | <input type="checkbox"/> | 20 |
| I am afraid of dogs..... | <input type="checkbox"/> | 21 |
| I am terrified of dogs..... | <input type="checkbox"/> | 22 |
| I hate dogs..... | <input type="checkbox"/> | 23 |
| I don't really think about dogs..... | <input type="checkbox"/> | 24 |
8. Have you ever been frightened by a dog?..... Yes ☐ 1 25
 No ☐ 2
9. Have you ever been bitten by a dog? Yes ☐ 1 26
 No ☐ 2
10. Do you know anyone (other than yourself) who has been bitten
 by a dog?..... Yes ☐ 1 27
 No ☐ 2

11. Have you heard of anyone being bitten by a dog? Yes ☐ 1 28
No ☐ 2
12. If "Yes" to Question 11, where or from whom did you hear about it?
(Please tick all that apply)
- Radio ☐ 29
Newspaper ☐ 30
Magazine ☐ 31
Television ☐ 32
Internet ☐ 33
Talking to others ☐ 34
13. How likely do you think it is that you or a member of your family could get bitten by a dog in the course of every day life?
- It is very likely ☐ 1
It is likely ☐ 2
It is unlikely but possible ☐ 3 35
It is extremely unlikely ☐ 4
14. How serious a risk to your health do you think most dog bites are likely to be?
- Not very serious ☐ 1
Slightly serious ☐ 2 36
Moderately serious ☐ 3
Very serious ☐ 4
15. When you see people out walking dogs how do you feel?
(Please tick all/any that are appropriate)
- Happy to see owners taking good care of their animals ☐ 37
Happy to see dogs enjoying themselves ☐ 38
Disgusted because the dogs are likely to foul the environment ☐ 39
Concerned because the dog may be a threat to people ☐ 40
I think it is ridiculous to walk dogs in this way ☐ 41
I don't really think about it ☐ 42

16. Which of the following best describes your view of the importance of dogs to society?

- They play a vital role..... ☐ 1
 They play a moderately important role ☐ 2
 They are only important in specific roles such as guide dogs,
 police dogs, or search and rescue dogs..... ☐ 3 43
 They are only important to a minor sector of society ☐ 4
 They are not important at all..... ☐ 5

17. Using the scale below as a reference, please answer the following questions by ticking the appropriate box .

How important do you consider each of the following roles that a dog might play in society?

	1 = not important			5= most important			
Guide dog	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>		44
Border/customs patrol	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>		45
Search and rescue dog	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>		46
Assistance dog for the disabled.....	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>		47
Pet therapy (eg. hospital visits)	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>		48
Gun / hunting dog	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>		49
As a household pet.....	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>		50
Police dog.....	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>		51

18. In general, why do you think that dogs bark?

..... 52

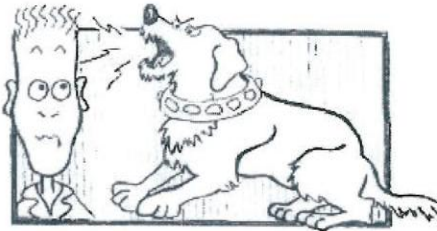
19. How do you feel about the following statements?

	1 = strongly disagree			5= strongly agree			
Dogs bark to communicate.....	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>		53
Dogs bark because they are unhappy.....	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>		54
Dogs bark because they have not been trained properly.....	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>		55
Dogs bark because they are not being properly cared for	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>		56
Dogs bark when they are having fun.....	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>		57

20. If you heard a dog barking frequently close by during the day, how much would it bother you? (please tick one box)

- A. It would bother me a lot ☐ 1
 B. It would bother me a little..... ☐ 2 58
 C. It depends on how loudly the dog was barking..... ☐ 3
 D. It wouldn't bother me at all..... ☐ 4

IF YOU SELECTED D PLEASE GO STRAIGHT TO QUESTION NUMBER 22



21. Why would hearing a dog bark frequently during the day bother you?
 (List reasons in order of importance)

..... 59

22. If you heard a dog barking frequently throughout the day, what would you do?
 (Tick any/all that apply)

- Notify the owner and offer to help ☐ 60
 Notify the owner to complain ☐ 61
 Notify the authorities ☐ 62
 Complain to everyone else ☐ 63
 Put anonymous letters of complaint in the owner's letter box ☐ 64
 Ignore it ☐ 65
 Feed the dog ☐ 66
 Yell at the dog ☐ 67
 Do nothing ☐ 68
 Other (please specify) ☐ 69

23. If you would decide to take no action, which one of the following choices would be the most likely reason?

I would be afraid that the owner may hurt the dog	<input type="checkbox"/> 1	
I would be afraid that the owner may be angry because I complained	<input type="checkbox"/> 2	
I don't see what anyone could do about it	<input type="checkbox"/> 3	70
There are more important things to worry about	<input type="checkbox"/> 4	
It's none of my business	<input type="checkbox"/> 5	
Other (please state)	6	
.....		

24. If you heard a dog barking frequently during the night, how much would it bother you?

It would bother me a lot	<input type="checkbox"/> 1	
It would bother me a little	<input type="checkbox"/> 2	71
It wouldn't bother me at all	<input type="checkbox"/> 3	
Don't know	<input type="checkbox"/> 4	

25. Why would hearing a dog bark frequently during the night bother you?

.....	72
.....	

IF YOU DO NOT OWN A DOG, PLEASE GO TO QUESTION 34

26. How often have you had neighbours complain to you about your dog barking?
(Please tick one of the following)

Almost everyday	<input type="checkbox"/> 1	
Once or twice a week	<input type="checkbox"/> 2	
Once or twice a month	<input type="checkbox"/> 3	73
Occasionally	<input type="checkbox"/> 4	
At no time	<input type="checkbox"/> 5	

27. Have you received notification from the council about your dog's barking in the last 5 years?

..... Yes ☐ 1 74
 No ☐ 2

If "Yes", how many times? 75

28. If you have received complaints about your dog's barking, what did you do about it?
 (Please tick all/any that apply)

Ignored the complaint ☐ 76
 Attempted to talk to all the neighbours to see who complained and why ☐ 77
 Asked a neighbour who is home during the day to note how often the
 the dog barked ☐ 78
 Left a tape recorder going when I was out ☐ 79
 Started taking the dog to work ☐ 80
 Started leaving the dog with a sitter during the day ☐ 81
 Followed the recommendations of Dog Control ☐ 82
 Other..... ☐ 83

29. If a dog control officer made recommendations, what were those recommendations?

..... 84

30. If you were to receive a complaint about your dog barking, what would you do? (tick any/all that are appropriate)

Investigate by asking the neighbours if they had heard your dog barking ☐ 85
 Try to find out why your dog barked during the day while you were out ☐ 86
 Take immediate steps, without investigating, to ensure the dog did not bark .. ☐ 87
 Call in a dog trainer for assistance ☐ 88
 Call in a dog behaviourist for assistance ☐ 89
 Other ☐ 90

31. Should dogs be allowed to bark at all?Yes ☐ 91
No ☐

32. If you discovered that your dog was barking a lot while you were out, how concerned would you be about the following possibilities?

1 = not at all concerned 5 = very concerned

My dog may be barking because it is unhappy	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/> 5 <input type="checkbox"/>	92
My dog may be bored	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/> 5 <input type="checkbox"/>	93
My dog may be barking at intruders	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/> 5 <input type="checkbox"/>	94
My dog may be disturb other people	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/> 5 <input type="checkbox"/>	95
My dog may be taken by dog control	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/> 5 <input type="checkbox"/>	96
I might receive a fine	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/> 5 <input type="checkbox"/>	97

33. If you had a dog that barked too often, what would you do?

1 = most likely 5 = least likely

Punish the dog for barking when I was at home	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/> 5 <input type="checkbox"/>	98
Call in a dog trainer to help me	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/> 5 <input type="checkbox"/>	99
Call in a behaviourist to help me	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/> 5 <input type="checkbox"/>	100
Lock the dog inside to see if that helped	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/> 5 <input type="checkbox"/>	101
Purchase a citronella anti-bark collar (squirts the dog with citronella spray when it barks)	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/> 5 <input type="checkbox"/>	102
Purchase an electric anti- bark collar (delivers an electric shock to the dog when it barks)	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/> 5 <input type="checkbox"/>	103
Have the dog surgically debarked (vocal cords cut)	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/> 5 <input type="checkbox"/>	104
Get rid of the dog	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/> 5 <input type="checkbox"/>	105

34. In what year were you born? 106, 107

36. Is English your first language? Yes ☐ No ☐ 109

New Zealand Pakeha	<input type="checkbox"/>	110
New Zealand Maori	<input type="checkbox"/>	111
Pacific Island	<input type="checkbox"/>	112
American	<input type="checkbox"/>	113
Australian	<input type="checkbox"/>	114
Chinese	<input type="checkbox"/>	115
Dutch	<input type="checkbox"/>	116
English	<input type="checkbox"/>	117
Indian	<input type="checkbox"/>	118
Irish	<input type="checkbox"/>	119
Korean	<input type="checkbox"/>	120
Eastern European	<input type="checkbox"/>	121
South African	<input type="checkbox"/>	122
Other (please specify)	<input type="checkbox"/>	123

38. In which area do you live?

- | | | |
|--|--|----------|
| Northland <input type="checkbox"/> 01 | Horowhenua <input type="checkbox"/> 12 | |
| Auckland <input type="checkbox"/> 02 | Wellington <input type="checkbox"/> 13 | |
| Thames Valley <input type="checkbox"/> 03 | Wairarapa <input type="checkbox"/> 14 | |
| Bay of Plenty <input type="checkbox"/> 04 | Nelson Bays <input type="checkbox"/> 15 | |
| Waikato <input type="checkbox"/> 05 | Marlborough <input type="checkbox"/> 16 | |
| Tongariro <input type="checkbox"/> 06 | West Coast <input type="checkbox"/> 17 | 124, 125 |
| East Cape <input type="checkbox"/> 07 | Canterbury <input type="checkbox"/> 18 | |
| Hawkes Bay <input type="checkbox"/> 08 | Aorangi <input type="checkbox"/> 19 | |
| Taranaki <input type="checkbox"/> 09 | Clutha-Central Otago <input type="checkbox"/> 20 | |
| Wanganui <input type="checkbox"/> 10 | Coastal-North Otago <input type="checkbox"/> 21 | |
| Manawatu-Rangitiki <input type="checkbox"/> 11 | Southland <input type="checkbox"/> 22 | |

39. What is your occupation? 126

40. What is your highest level of education? (Please tick one of the following)

- | | | |
|----------------------------|----------------------------|-----|
| Primary school | <input type="checkbox"/> 1 | |
| Secondary school..... | <input type="checkbox"/> 2 | 127 |
| University degree..... | <input type="checkbox"/> 3 | |
| Post graduate degree | <input type="checkbox"/> 4 | |

41. What is your marital status? (Please tick one of the following)

- | | | |
|----------------|----------------------------|-----|
| Married | <input type="checkbox"/> 1 | |
| De facto | <input type="checkbox"/> 2 | 128 |
| Divorced | <input type="checkbox"/> 3 | |
| Widowed | <input type="checkbox"/> 4 | |
| Single..... | <input type="checkbox"/> 5 | |

42. In what type of house do you live? (Please tick one of the following)

- | | | |
|------------------------|----------------------------|-----|
| Rural house | <input type="checkbox"/> 1 | |
| Suburban house | <input type="checkbox"/> 2 | |
| Suburban flat | <input type="checkbox"/> 3 | 129 |
| Inner city house | <input type="checkbox"/> 4 | |
| Inner city flat | <input type="checkbox"/> 5 | |
| Other | <input type="checkbox"/> 6 | |

43. Do you work a night shift? Yes ☐ 1 130
 No ☐ 2

44. During the week, are you at home most of the day? Yes ☐ 1 131
 No ☐ 2

45. Do you sleep well in general? Yes ☐ 1 132
 No ☐ 2



46. Do you have children? Yes ☐ 1 133
 No ☐ 2

If yes how many? 134

47. Is there a child younger than one year of age in the household? Yes ☐ 1 135
 No ☐ 2

48. How would you describe your personality? This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you generally feel this way, that is, how you feel on the average. Use the following scale to record your answers.

	1 = very slightly or not at all	2 = a little	3 = moderately	4 = quite a bit	5 = extremely	
Interested	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	136
Distressed	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	137
Excited	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	138
Upset	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	139
Strong	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	140
Guilty	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	141
Scared	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	142
Hostile	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	143
Enthusiastic	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	144
Proud	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	145
Irritable	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	146
Alert	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	147
Ashamed	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	148
Inspired	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	149
Nervous	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	150
Determined	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	151
Attentive	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	152
Jittery	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	153
Active	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	154
Afraid	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	155

THANK YOU VERY MUCH FOR YOUR TIME!

Completion and return of the questionnaire implies your consent.

Please return the questionnaire in the addressed reply paid envelope provided, to:

Professor Kevin Stafford
Barking Dog Survey
Institute of Veterinary Animal and Biomedical Sciences
Massey University
Private Bag 11-222
Palmerston North

Appendix 2

Questionnaire dog daily routine.

A QUESTIONNAIRE ABOUT YOUR DOG AND ITS DAILY ROUTINE

Dear Client,

This questionnaire is designed to gain information about dogs in society. It will be used as part of a PhD thesis that I am working on. Your participation is completely voluntary, but I would be most grateful for your assistance. All the information you supply is confidential.

Sincerely,
Elsa

About your dog:

1. What is the Breed of your dog? _____
2. How old is your dog? _____ (years)
3. What is the Sex of your dog? _____
4. Has your dog been neutered? Yes [☐] No [☐]
5. Did you get your dog as a puppy? Yes [☐] No [☐]
6. How do you keep your dog? (*Please select only one option*)
 - a. Mainly indoors (*out for walks /toilet*) [☐]
 - b. Indoor /outdoor (*free access*) [☐]
 - c. Outdoor /indoor (*lives outside but comes inside sometimes*) [☐]
 - d. Outdoor only [☐]
7. Do you walk your dog daily? Yes [☐] No [☐]

8. If yes when do you usually walk your dog?

Morning	Yes []	No []
Evening	Yes []	No []
Morning and Evening	Yes []	No []

9. If you do not walk your dog daily, *how often do* you walk your dog?
(please write how often)

10. Did your dog receive any formal training? Yes [] No []

11. If yes, please select which type

Puppy school	Yes []	No []
Dog obedience school	Yes []	No []
Dog agility	Yes []	No []
Canine good citizen	Yes []	No []

12. Do you train your dog daily (practice basic commands sit stay, down?)
Yes [] No []

13. How often is your dog left alone during the day on average (working week?)

Not at all	[]
4hrs or less	[]
More than 4 hours	[]

14. Does your dog have toys? Yes [] No []
]

15. Does your dog have bones? Yes [] No []
]

16. Does your dog have a Kong when left alone? Yes [] No []
17. Is there another dog at home? Yes [] No []
18. Is there another pet (not a dog) at home with whom the dog plays ?
Yes [] No []
19. Do you live next door to a public access way?
(i.e. a narrow path leading to a park or beach
or house) Yes [] No []
20. Is your dog friendly to strangers? Yes [] No []
21. Is your dog friendly to other dogs Yes [] No []
22. What does your dog normally bark at when at home (e.g. cats, visitors, other
dogs barking) ? _____

ABOUT YOU & YOUR FAMILY

23. Is this your first dog? Yes [] No []
24. Are there children in the house ? Yes [] No []
25. How many people in the household? _____
26. What is your gender? M [] F []
27. Do you go to work every day Yes [] No []
28. Do you work from home? Yes [] No []
29. Are you retired? Yes [] No []
30. Has anyone ever complained about your dog barking? Yes [] No []
31. What sort of dwelling do you have? (house [],townhouse [] flat [] other -----
-
32. Is there anything about your dog's behaviour that concerns you at present?

Thank-you very much for completing this questionnaire!

Appendix 3

Form for student bark identification experiment



BARKING PERCEPTIONS

Introduction:

This is a research exercise designed to see how people perceive and interpret the different kinds of barks that a dog might make. It is part of a larger thesis project concerned with barking dogs being undertaken by Elsa Flint for a PhD in Veterinary Science at Massey University.

For the purposes of Human Ethics, this part of the thesis has been judged to be of “low risk”. No names or identifying information is being recorded. All information will be treated as strictly confidential by all researchers involved in the project.

Instructions:

We will ask you to listen to 6 different recordings of individual dogs barking, one at a time.

For each recording we will ask you to do three things:

(1) Indicate what **type of barking** you think this is.

Choose only one of the following three choices

- (a) Is it a dog that is **anxious or in distress**?
- (b) Is it a dog that is **guarding its territory**?

Indicate how **irritating** you found each bark. Rate each bark with a number from 1 (not irritating at all) to a possible 10 (extremely irritating).

(2) Indicate whether you **feel sympathy** for the barking dog. Please answer **yes** or **no**

First, About Yourself

1. Are you: Male ☐ Female ☐
2. What is your age? _____
3. Do you currently own a dog? Yes ☐ No ☐
4. Did your family ever own a dog when you were growing up? Yes ☐ No ☐

Six Barking Dogs

Please listen to each of the 6 recorded barkings, one at a time. For each one indicate (1) which type of barking you think it is, and (2) how irritating it is.

(1) What type of bark is this? (Please tick *one* type for each numbered bark.)

Bark number	1	2	3	4	5	6
Anxious / Distressed						
Territorial guarding						

(2) How irritating is each bark? Use a scale of 1 (*not irritating*) to 10 (*extremely irritating*).

Bark number	1	2	3	4	5	6
Irritation						

(3) Do you feel sorry for the dog barking? Please write Y for yes or N for no.

Bark number	1	2	3	4	5	6
Feel Sorry?						

Thank you very much for helping us with this study.

Appendix 4

Instructions for taped barking

Dear Participant

This study entails the collection of data on the amount of barking that dogs do daily. The data will be used as part of a PhD thesis in Animal behaviour. Please record your dog over five days.

INSTRUCTIONS

- You have been provided with a tape recorder. Please turn this on and leave it in an area where it will pick up your dog's barking.
- Please leave it on during the day and turn it off when you return.
- Please speak into the tape recorder stating the day, and time each morning when you leave and the time when you return.

PLEASE ANSWER THE FOLLOWING QUESTIONS ABOUT YOUR DOG

1. How old is your dog (years) _____
2. What breed is your dog? _____
3. What sex is your dog? _____
4. Is your dog de-sexed? _____
5. How is your dog housed when you are home? (please select **ONE** of the following)

Indoor /outdoor (free access to inside and outside)	[]
Indoor only (confined inside with occasional access to outside)	[]
Outdoor only (never allowed inside)	[]
Outdoor/indoor (usually outside but occasionally inside)	[]

Thank you very much for participating in this study!

Elsa Flint

Contact details if required: e.flint@xtra.co.nz

Appendix 5

Instructions for barking triggers data collection

Triggers for Barking

Dear Participant

This study entails the collection of data on the amount of barking that dogs do daily and what triggers this barking. The data will be used as part of a PhD thesis in Animal behaviour. Please note how long your dog barks for and what he or she barks at. Please do this over five days

INSTRUCTIONS

Please choose days when you are at home all day.

Please note the time your dog starts to bark and when the barking stops.

Please record what your dog was barking at during each session or state that this was not clear.

Please do not interfere with the barking, allow your dog to stop naturally.

PLEASE ANSWER THE FOLLOWING QUESTIONS ABOUT YOUR DOG

1. How old is your dog (years) _____
2. What breed is your dog? _____
3. What sex is your dog? _____
4. Is your dog de sexed? _____
5. How is your dog housed when you are home? (please select **ONE** of the following)
 - Indoor /outdoor (free access to inside and outside) []
 - Indoor only (confined inside with occasional access to outside) []
 - Outdoor only (never allowed inside) []
 - Outdoor/indoor (usually outside but occasionally inside) []

Thank you very much for participating in this study!

Elsa Flint: Contact details if required: e.flint@xtra.co.nz

Appendix 6

Contribution forms

DRC 16 GRS Version 3– 16 September 2011

STATEMENT OF CONTRIBUTION TO DOCTORAL THESIS CONTAINING PUBLICATIONS

(To appear at the end of each thesis chapter/section/appendix submitted as an article/paper or collected as an appendix at the end of the thesis)

We, the candidate and the candidate's Principal Supervisor, certify that all co-authors have consented to their work being included in the thesis and they have accepted the candidate's contribution as indicated below in the *Statement of Originality*.

Name of Candidate: Elsa Louise Flint

Name/Title Professor Kevin Stafford

Name of Published Research Output and full reference:

Elsa. L. Flint. The function, social implications and management of barking in dogs, CAB Reviews 2012 7, No.039 (issn1749-8848).

In which Chapter is the Published Work:

Chapter Two

Please indicate either:

- The percentage of the Published Work that was contributed by the candidate:

95%

and / or

- Describe the contribution that the candidate has made to the Published Work:

Candidate's Signature Date

Principal Supervisor's signature Date

STATEMENT OF CONTRIBUTION TO DOCTORAL THESIS CONTAINING PUBLICATIONS

(To appear at the end of each thesis chapter/section/appendix submitted as an article/paper or collected as an appendix at the end of the thesis)

We, the candidate and the candidate's Principal Supervisor, certify that all co-authors have consented to their work being included in the thesis and they have accepted the candidate's contribution as indicated below in the *Statement of Originality*.

Name of Candidate: Elsa Louise Flint

Name/Title of Principal Supervisor: Professor Kevin Stafford

Name of Published Research Output and full reference:

EL Flint, EO Minot, PE Perry, KJ Stafford. Characteristics of adult dog owners in New Zealand, NZVJ 58, 69-73, 2010

In which Chapter is the Published Work:

Chapter Three

Please indicate either:

- The percentage of the Published Work that was contributed by the candidate:

85%

and / or

- Describe the contribution that the candidate has made to the Published Work:

Candidate's Signature Date

Principal Supervisor's signature Date

STATEMENT OF CONTRIBUTION TO DOCTORAL THESIS CONTAINING PUBLICATIONS

(To appear at the end of each thesis chapter/section/appendix submitted as an article/paper or collected as an appendix at the end of the thesis)

We, the candidate and the candidate's Principal Supervisor, certify that all co-authors have consented to their work being included in the thesis and they have accepted the candidate's contribution as indicated below in the *Statement of Originality*.

Name of Candidate: Elsa Louise Flint

Name/Title of Principal Supervisor: Professor Kevin Stafford

Name of Published Research Output and full reference:

EL Flint, EO Minot, PE Perry and KJ Stafford. Public attitude to barking dogs in New Zealand. (In Press NZVJ.)

In which Chapter is the Published Work:

Chapter Four

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Name of Candidate: Elsa Louise Flint

Name/Title of Principal Supervisor: Professor Kevin Stafford

Name of Published Research Output and full reference:

Elsa L. Flint, Mark Stevenson, Edward O. Minot, Paul E. Perry, Kevin J. Stafford.

Husbandry practices and owner and dog characteristics as risk factors for problem barking in suburban dogs in New Zealand. (In Press Journal of Veterinary Behaviour)

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Name of Candidate: Elsa Louise Flint

Name/Title of Principal Supervisor: Professor Kevin Stafford

Name of Published Research Output and full reference:

Elsa.L. Flint, Edward.O. Minot, Kevin.J. Stafford, Paul.E.Perry, Mark Stevenson.
Human ability to recognize the etiology of different dog barks-effects on reaction to barking.

In which Chapter is the Published Work:

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Name of Candidate: Elsa Louise Flint

Name/Title of Principal Supervisor: Professor Kevin Stafford

Name of Published Research Output and full reference:

Elsa.L. Flint, Edward.O. Minot, Mark Stevenson, Paul.E.Perry, Kevin.J. Stafford.
Barking in home alone suburban dogs (*Canis familiaris*) in New Zealand. (Journal of Veterinary Behavior Clinical Applications and Research)

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Chapter Seven

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Name of Candidate: Elsa Louise Flint

Name/Title of Principal Supervisor: Professor Kevin Stafford

Name of Published Research Output and full reference:

EL Flint, EO Minot, PE Perry and KJ Stafford. Triggers for barking in suburban dogs in Auckland, New Zealand. (This paper will be submitted to Journal of Veterinary Behaviour)

In which Chapter is the Published Work:

Chapter Eight

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