



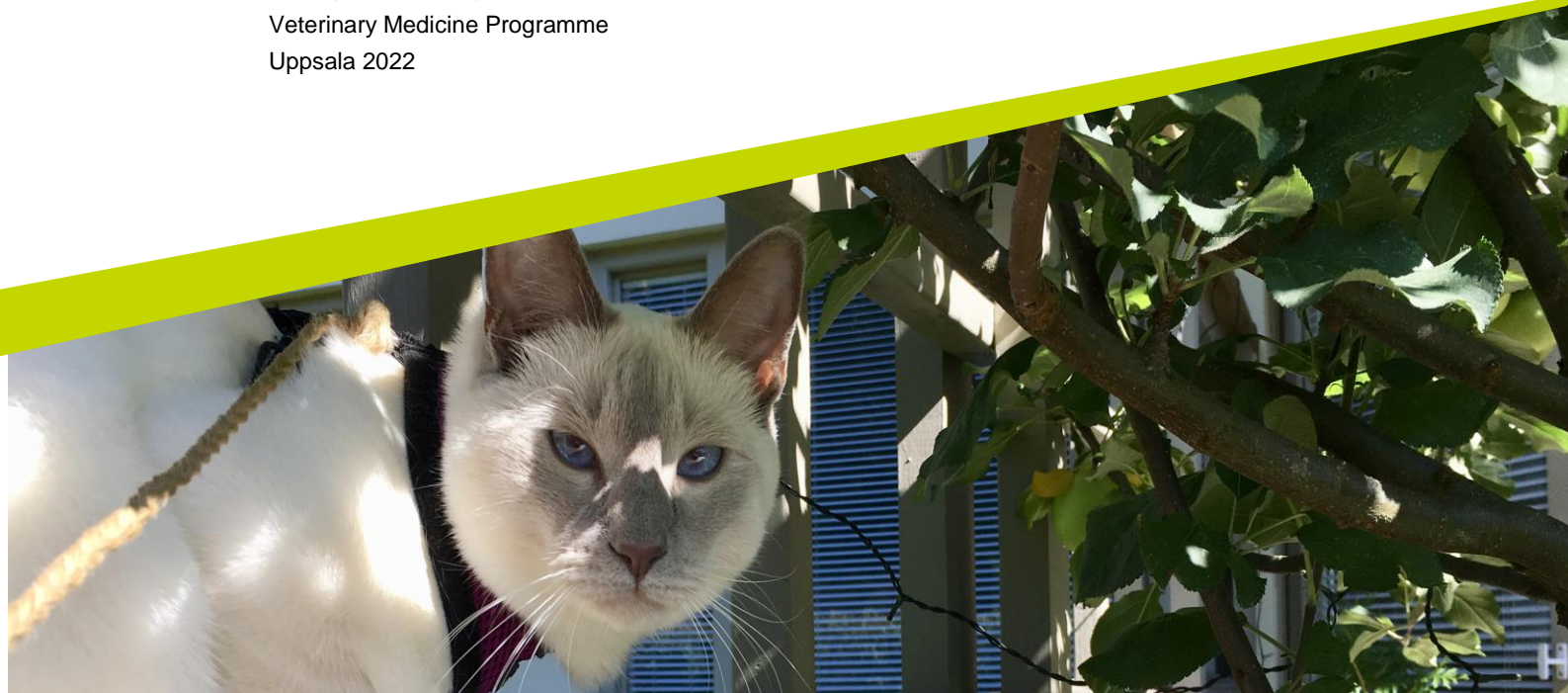
Human's Attitude toward Cats and their Behavior

– a survey study

Människans attityd gentemot katter och deras beteende – en enkätstudie

Aida Wolf

Degree project/Independent project • 30 credits
Swedish University of Agricultural Sciences, SLU
Faculty of Veterinary Medicine and Animal Science
Veterinary Medicine Programme
Uppsala 2022



Human's Attitude toward Cats and their Behavior – a survey study

Människans attityd gentemot katter och deras beteende – en enkätstudie

Aida Wolf

Supervisor: Maria Andersson, Swedish University of Agricultural Sciences, Department of Animal Environment and Health
Assistant supervisor: Elin Hirsch, Swedish University of Agricultural Sciences, Department of Animal Environment and Health
Examiner: Jenny Yngvesson, Swedish University of Agricultural Sciences, Department of Animal Environment and Health

Credits: 30 credits
Level: A2E
Course title: Independent project in Veterinary Medicine
Course code: EX0869
Program/education: Veterinary Medicine Program
Course coordinating dept: Department of Clinical Sciences

Place of publication: Uppsala
Year of publication: 2022
Cover picture: Aida Wolf

Keywords: cats, felines, behavioral problems, environmental needs, cat demographics, Sweden, attitude toward cats

Swedish University of Agricultural Sciences
Faculty of Veterinary Medicine and Animal Science
Department Animal Environment and Health

Publishing and archiving

Approved students' theses at SLU are published electronically. As a student, you have the copyright to your own work and need to approve the electronic publishing. If you check the box for **YES**, the full text (pdf file) and metadata will be visible and searchable online. If you check the box for **NO**, only the metadata and the abstract will be visible and searchable online. Nevertheless, when the document is uploaded it will still be archived as a digital file.

If you are more than one author you all need to agree on a decision. Read about SLU's publishing agreement here: <https://www.slu.se/en/subweb/library/publish-and-analyse/register-and-publish/agreement-for-publishing/>.

☒ YES, I/we hereby give permission to publish the present thesis in accordance with the SLU agreement regarding the transfer of the right to publish a work.

☐ NO, I/we do not give permission to publish the present work. The work will still be archived and its metadata and abstract will be visible and searchable.

Abstract

The domestic cat has many environmental needs that mirror those of their ancestor, the North African Wildcat. To ensure the wellbeing of domestic cats, these environmental needs should be met. If they are not met it can result in stress/fear/anxiety/frustration that can be expressed through behavioral problems. The owner's actions toward such problems can potentially lead to an even greater decrease in the quality of life for the cat.

Using an online survey, this study examined the frequency of certain behavioral problems in cats in Sweden and how the owners experience and choose to react to them. It also surveyed the general attitude of the respondents toward cats and examined if there was a correlation between coming from a cat shelter and expressing certain behavioral problems. Data was analyzed through descriptive statistics with a calculation of percentages. Some data were analyzed with chi-square test.

The specific behaviors investigated were presented through seven case studies and included: the cat urinating outside of the litterbox, biting and/or scratching the owner, meowing loudly and/or hiding in the cage during a veterinary visit, staying in the cage once home from the veterinarian, scratching the owner's furniture, stealing from the owner's plate of food and scratching a child after being provoked. The frequency of these behaviors was much higher compared to the literature, possibly due to differences in how survey questions are phrased. However, it might also indicate a large proportion of cats living in less-than-ideal environments in Sweden. The behaviors with the highest prevalence included biting and/or scratching the owner (82%) and scratching the owner's furniture (82%), followed by stealing from the owner's plate of food (67%). Respondents were split into two groups, those who had experienced the behavior previously and those who had not. The behavior that caused the most negative response among both groups of respondents was scratching the owner's furniture. By evaluating owner's emotional reaction and response to an initial and repeated behavior, it could be speculated that inappropriate urination, biting and/or scratching the owner and scratching the owner's furniture were most likely to cause a breakdown of the cat-owner bond.

The likelihood of seeking help from animal healthcare professionals increased in all case studies among both groups if the behavior was repeating itself. These behaviors and how they affect the cat-owner bond are important for a veterinarian to understand in order to educate owners on ways to enrich the cat's environment and thus improve such behavior. If objectionable behavior is properly addressed, there can be an improved quality of life for the companion cat, a strengthening of the cat-human bond, an increased utilization of veterinary services and a decreased number of relinquishments and euthanasia.

Keywords: cats, felines, behavioral problems, environmental needs, cat demographics, Sweden, attitude toward cats

Table of contents

List of tables	9
List of figures.....	12
1. Introduction.....	13
1.1. Purpose	14
1.2. Research questions:.....	14
2. Literature review	15
2.1. The environmental needs of a cat	15
2.2. Behavioral problems.....	16
2.3. The importance of the pet-owner bond to a cat's welfare	17
2.4. The role of the veterinarian.....	18
3. Material and methods.....	20
3.1. Survey creation, distribution and design	20
3.2. Data analysis	22
4. Results.....	23
4.1. Demographic results.....	23
4.1.1. Human demographics.....	23
4.1.2. Cat demographics.....	23
4.2. Respondents' attitudes toward cats	26
4.2.1. Respondents' opinions to statements about cats	26
4.2.2. Respondents' current relationship with cats	26
4.3. Case studies	27
4.3.1. Case study 1: Urinating outside of the litterbox	27
4.3.2. Case study 2: Biting and/or scratching the owner	30
4.3.3. Case study 3: Meowing loudly and/or hiding in the cage during veterinary visit	33
4.3.4. Case study 4: Staying in the cage once home from the veterinarian	36
4.3.5. Case study 5: Scratching on the owner's furniture	39
4.3.6. Case Study 6: Stealing from the owner's plate of food.....	42
4.3.7. Case Study 7: Scratching a child after being provoked	45
5. Discussion.....	49

6. Conclusions	55
References	56
Acknowledgements.....	59
Popular science summary.....	60

List of tables

Table 1. In the table, there is a description of the survey questions including the specific respondent group for each question.	21
Table 2. The table includes respondent demographics and the proportion of respondents. The number of respondents per question, n, varied due to incomplete surveys and are therefore shown for each demographic category in the table.	24
Table 3. The table includes cat demographics as reported by the respondents and the proportion of the sample (n=390).	25
Table 4. The chosen mode of action for case study 1, the cat urinating outside of the litterbox. The results were split into two groups, the percent of respondents who had experienced it and those who had not. Multiple answers could be chosen. E = respondents who had experienced the case study. NE = respondents who had not experienced the case study.	29
Table 5. The chosen mode of action for case study 1, the cat urinating outside of the litterbox, if the behavior were to repeat itself. The results were split into two groups, the percent of respondents who had experienced it and those who had not. Multiple answers could be chosen. E = respondents who had experienced the case study. NE = respondents who had not experienced the case study.	30
Table 6. The chosen mode of action for case study 2, being bitten and/or scratched by the cat. The results were split into two groups, the percent of respondents who had experienced it and those who had not. Multiple answers could be chosen. E = respondents who had experienced the case study. NE = respondents who had not experienced the case study.	32
Table 7. The chosen mode of action for case study 2, being bitten and/or scratched by the cat, if the behavior were to repeat itself. The results were split into two groups, the percent of respondents who had experienced it and those who had not. Multiple answers could be chosen. E = respondents who had experienced the case study. NE = respondents who had not experienced the case study.	33
Table 8. The chosen mode of action for case study 3, the cat meowing loudly and/or hiding in the cage during a veterinary visit. The results were split into two groups, the percent of respondents who had experienced it and those who	

had not. Multiple answers could be chosen. E = respondents who had experienced the case study. NE = respondents who had not experienced the case study.....	35
Table 9. The chosen mode of action for case study 3, the cat meowing loudly and/or hiding in the cage during a veterinary visit, if the behavior were to repeat itself. The results were split into two groups, the percent of respondents who had experienced it and those who had not. Multiple answers could be chosen. E = respondents who had experienced the case study. NE = respondents who had not experienced the case study.....	36
Table 10. The chosen mode of action for case study 4, the cat staying in the cage once home from the veterinarian. The results were split into two groups, the percent of respondents who had experienced it and those who had not. Multiple answers could be chosen. E = respondents who had experienced the case study. NE = respondents who had not experienced the case study.	38
Table 11. The chosen mode of action for case study 4, the cat staying in the cage once home from the veterinarian, if the behavior were to repeat itself. The results were split into two groups, the percent of respondents who had experienced it and those who had not. Multiple answers could be chosen. E = respondents who had experienced the case study. NE = respondents who had not experienced the case study.....	39
Table 12. The chosen mode of action for case study 5, the cat scratching on the owner's furniture. The results were split into two groups, the percent of respondents who had experienced it and those who had not. Multiple answers could be chosen. E = respondents who had experienced the case study. NE = respondents who had not experienced the case study.	41
Table 13. The chosen mode of action for case study 5, the cat scratching on the owner's furniture, if the behavior were to repeat itself. The results were split into two groups, the percent of respondents who had experienced it and those who had not. Multiple answers could be chosen. E = respondents who had experienced the case study. NE = respondents who had not experienced the case study.....	42
Table 14. The chosen mode of action for case study 6, the cat stealing from the owner's plate of food. The results were split into two groups, the percent of respondents who had experienced it and those who had not. Multiple answers could be chosen. E = respondents who had experienced the case study. NE = respondents who had not experienced the case study.	43
Table 15. The chosen mode of action for case study 6, the cat stealing from the owner's plate of food, if the behavior were to repeat itself. The results were split into two groups, the percent of respondents who had experienced it and those who had not. Multiple answers could be chosen. E = respondents who	

had experienced the case study. NE = respondents who had not experienced the case study.....	45
Table 16. The chosen mode of action for case study 7, the cat scratching a child after being provoked. The results were split into two groups, the percent of respondents who had experienced it and those who had not. Multiple answers could be chosen. E = respondents who had experienced the case study. NE = respondents who had not experienced the case study.	47
Table 17. The chosen mode of action for case study 7, the cat scratching a child after being provoked. The results were split into two groups, the percent of respondents who had experienced it and those who had not. Multiple answers could be chosen. E = respondents who had experienced the case study. NE = respondents who had not experienced the case study.	48

List of figures

Figure 1. Statements about cats answered according to Likert scale by respondents. The data are displayed in percentages. The sample size (n) differed among statements and is displayed in the figure after each statement.	26
Figure 2. The top 5 emotions for case study 1 (urinating outside of the litterbox) for both those who had experienced it and those who had not experienced it. The specific percent value for each emotion is displayed in the graph following the bar.....	28
Figure 3. The top 5 emotions for case study 2 (biting and/or scratching the owner) for both those who had experienced it and those who had not experienced it. The specific percent value for each emotion is displayed in the graph following the bar.....	31
Figure 4. The top 5 emotions for case study 3 (meowing loudly and/or hiding in the cage during veterinary visit) for both those who had experienced it and those who had not experienced it. The specific percent value for each emotion is displayed in the graph following the bar.	34
Figure 5. The top 5 emotions for case study 4 (staying in the cage once home from the veterinarian) for both those who had experienced it and those who had not experienced it. The specific percent value for each emotion is displayed in the graph following the bar.....	37
Figure 6. The top 5 emotions for case study 5 (scratching on the owner's favorite furniture) for both those who had experienced it and those who had not experienced it. The specific percent value for each emotion is displayed in the graph following the bar.....	40
Figure 7. The top 5 emotions for case study 6 (stealing from the owner's plate of food) for both those who had experienced it and those who had not experienced it. The specific percent value for each emotion is displayed in the graph following the bar.....	43
Figure 8. The top 5 emotions for case study 7 (scratching a child after being provoked) for both those who had experienced it and those who had not experienced it. The specific percent value for each emotion is displayed in the graph following the bar.....	46

1. Introduction

The domestic cat, *Felis silvestris catus*, is one of the most popular pets in today's society. They provide us with companionship and improve the mental and physical health of their owners (O'Haire 2010). A survey conducted by Agria in the Scandinavian countries and the UK (2021), looking at the human-cat relationship during the Covid-19 pandemic, concluded that cats increase owners' happiness and decrease the feeling of loneliness.

Even though cats are a common pet, they are much less domesticated than what one might expect. The domestic cat descended from the North African Wildcat, *Felis silvestris lybica* (Faure & Kitchener 2009). This ancestor was both a solitary territorial predator and prey for larger carnivores (Bradshaw *et al.* 2012). Exactly when and where the domestication process occurred is disputed. A review article by Faure & Kitchener (2009) suggests that it occurred in different times in different areas, dating as early as 10,000 years ago. Despite various opinions on when and where it occurred, most studies agree on how it occurred. The domestication process occurred through a mutually beneficial relationship between humans and wild cats (Bradshaw *et al.* 2012). The cat kept the human's grain supply free of rodents, resulting in a reduction in the loss of grain and limiting the spread of zoonoses (Faure & Kitchener 2009). The cat in turn received food, shelter and protection (Bradshaw *et al.* 2012). It is possible that the humans also helped fulfill the cat's psychological needs by playing and through displays of affection. Nowadays, cats are more often kept for companionship than for their predation. The domestic cat has multiple environmental needs that mirror those of their wild ancestor. However, their natural instincts remain intact even though they live in a domestic household (Bradshaw 2018).

Cats perceive their surrounding differently from humans due to their heightened senses. They hear higher and lower frequency sound than humans. As with many other species, cats have evolved the ability to see in low levels of light (Bradshaw 2018). Additionally, cats, along with other animals, have an organ that humans lack, the vomeronasal organ. This organ enhances the cat's sense of smell allowing them to communicate with other cats and collect olfactory information from their environment. Cats leave scent marks in their environment, by using scent glands

throughout their body. Scent glands between the toes (interdigital glands) may leave a scent when the cat scratches with its claws. Cats also use urine and feces as a way of adjusting their olfactory environment (Bradshaw 2018).

Domestic cats have environmental and behavioral needs that when provided by the owner can ensure the pet cat's welfare. When these needs are not met, it can result in anxiety and frustration for the cat, and thus a decrease in its quality of life (Ellis *et al.* 2013). A cat's anxiety and frustration can be expressed through certain behaviors that may be problematic for owners. These behaviors include, but are not limited to, inappropriate elimination, scratching on furniture and aggression toward humans or other animals (Heidenberger 1997; Salman *et al.* 2000). Problem behavior can cause a breakdown of the cat-owner bond and result in relinquishment or euthanasia (Bradshaw *et al.* 2012). The owner establishes the cat's environment; they are the most important factor in maintaining their cat's wellbeing (Heidenberger 1997).

1.1. Purpose

The purpose of this study was to explore human attitudes toward domestic cats and toward their behavior, including potentially undesirable behavior. Further, this study aimed to provide an understanding of how cat owners emotionally and physically react to various undesirable behaviors.

1.2. Research questions:

- What is the overall attitude of the respondents toward cats?
- How prevalent are certain behaviors in pet cats?
- How do survey respondents react to behavioral problems in cats? What is their initial response, initial mode of action and mode of action if the behavior is repeated?
- Is there a difference between respondents' desire to seek professional help when faced with a behavioral problem versus actually obtaining the help?
- Is there a correlation between how the cat was obtained and behavioral problems?

2. Literature review

2.1. The environmental needs of a cat

A cat has multiple environmental requirements that need to be met in order to ensure a good welfare. According to the American Veterinary Medical Association (AVMA), animal welfare is described as the ability of the animal to cope with the conditions in which it lives (AVMA 2021). There are many different opinions on what constitutes a good animal welfare (Carenzi & Verga 2009). Essentially, it means that the animal is free from hunger, thirst, fear, pain and illness and that the animal is able to express its natural behavior. This natural behavior is the basis for the cat's environmental needs. Providing a "natural environment" can be difficult without the proper knowledge and prerequisites, especially when cats are limited to indoor-only housing (Grigg & Kogan 2019).

Domestic cats have changed very little in their behavior compared to their wild ancestor, the North African Wildcat. Their environmental needs mirror those of their ancestors. These needs include competition-free access to resources such as food, water, an elimination area, a sleeping area, and a scratching area (Ellis *et al.* 2013). According to chapter 2, 6§ in the Swedish Board of Agriculture's regulations and general advice (SJVFS 2020:8) on keeping dogs and cats, case number L102, cats should have a safe place where they can hide, they should be able to express play and hunting behavior and they should have the opportunity to scratch and sharpen their claws every day. Cats are solitary opportunistic hunters that use sight, hearing and smell, to maintain awareness in their environment and alert them to danger (Herron & Buffington 2010; Bradshaw *et al.* 2012). In order to avoid stressful situations and threats to their safety, cats require a feeling of familiarity with both their physical and social environment. They like familiarity, routine and predictability. Humans can directly provide these conditions, since they control the environment in which domestic cats live (Heidenberger 1997). Changes in a cat's environment or moving to new territory, can cause cats to become stressed. They may cope by hiding and avoidance (Ellis *et al.* 2013). It is important that the cat's environment provides them with the ability to do so. Cats also tend to hide illness

or pain to avoid appearing weak to potential predators. This may make it difficult for humans to detect when their cat is not doing well; unfortunately it has also led people to believe that cats do not need regular medical care (Lue *et al.* 2008; Ellis *et al.* 2013).

Cats can both live alone and in groups as long as there are adequate resources (Macdonald *et al.* 2000). It is important in multi-cat households to provide the proper number of resources, available in different locations, so that the cats can avoid competition (Ellis *et al.* 2013). Cats have well developed senses being skillful predators, allowing them to communicate with other cats and ensuring a sense of security in their environment. It is important that a cat's sense of smell is respected in order for the cat to feel safe (Ellis *et al.* 2013). The cat's olfactory signals should not be interrupted by humans. It is recommended that strongly scented cleaning products, including scented litter, be avoided in the cat's area. Synthetic pheromones (e.g., Feliway) can be used to create a sense of calmness. Scratching areas should also be provided for the cat to leave its scent. The cat's bedding should be washed on a rotating schedule so that there is always an area that has the cat's scent on it (Ellis *et al.* 2013; SJVFS 2020:8).

Establishing and maintaining a good relationship with a pet cat requires consistent and predictable interaction. According to a study conducted by Strickler and Shull (2014), owners that played with their cats for five minutes or more each play session, reported fewer behavioral problems than those who played for only one minute each session. They concluded that the longer play sessions simulated the cat's natural predation behavior and thus met the behavioral need to hunt, resulting in fewer behavioral problems.

2.2. Behavioral problems

Cats that are unable to express their natural behavior, or are forced to compete for resources in their environment, may display certain behaviors such as scratching or elimination in inappropriate areas and/or aggression toward humans or other animals (Bradshaw 2018). These behaviors are the cat's way of trying to cope with the insufficient environment. They are, however, often perceived as problematic. This can weaken the pet-owner bond, potentially leading to relinquishment or euthanasia of the cat (Salman *et al.* 2000; Da Graça Pereira *et al.* 2014). According to a study conducted by Salman and colleagues (2000), investigating behavioral reasons for relinquishment of dogs and cats to 12 shelters in the United States, the most commonly stated reasons included inappropriate elimination, problems with a new pet and/or aggression toward people. A study in Spain found that inappropriate elimination, furniture scratching and excessive vocalization were the

most common behavioral complaints in relation to cats in the study (Fatjó *et al.* 2006).

The prevalence of undesirable behavioral in cats has been examined in multiple studies. A study in Italy, by Adamelli and colleagues (2005), of 62 cat-owner relationships, revealed that 83.9% of cats showed some sign of abnormal behavior (urination/defecation outside of litter box, aggressive/frightening behavior toward the owner/stranger/cohabiting animals/unknown cats). Another study of 277 respondents in the USA, revealed that 61% of respondents reported at least one undesirable behavior in their indoor cat. The most common problem was aggression toward the owner (36%) with next most common being urination outside of the litterbox (24%) (Strickler & Shull 2014). A study in Germany by Heidenberger (1997), examined housing conditions and associated behavioral problems in 1177 cats of 550 owners. The results revealed that 54.7% of the owners complained of at least one behavioral problem with their cats. The most common problem was a state of anxiety (16.7%), followed by scratching on furniture (15.2%). Another study, of the welfare of privately owned cats in Denmark, revealed that 21.7% of owners reported damage to furniture by scratching, 15.1% reported fear of other animals/people and 12.4% reported problems with urination/defecation outside of the litterbox (Sandøe *et al.* 2017). Overall, these studies reveal a high prevalence of behavioral problems, in households in multiple regions, that can be attributed to an improper environment. With the correct adjustments to the environment, physical and social, these problems could decrease, and the pet-owner bond improve.

2.3. The importance of the pet-owner bond to a cat's welfare

A study conducted by Bulgakova and colleagues (2017) concluded that a stronger pet-owner bond seems to be directly related to better cat welfare and a higher tolerance of cat behavior. This study used the cat-owner relationship scale (CORS) to assess the bond between owner and cat. CORS combines three subscales: pet-owner interactions, perceived emotional closeness and perceived costs, to determine the level of bonding (Howell *et al.* 2017). This bond and the level of care given to the cat are affected by multiple factors including the owner's demographics and the cat's behavior (Adamelli *et al.* 2005). If the owner is not aware of or unable to provide for the behavioral needs of the cat, conflicts can occur that weaken the bond leading to a decline in the welfare of the cat. According to Lue and colleagues (2008), a strong pet-owner bond results in a higher level of veterinary care and improved compliance with veterinary recommendations regardless of cost.

A cat's welfare is directly impacted by the owner. The owner's personality (Finka *et al.* 2019), economic and cultural status (Adamelli *et al.* 2004) and the cat's access to the outdoors (Foreman-Worsley *et al.* 2021) are all factors that affect the cat's environment and thus affect its welfare. The owner determines how many animals live in the house, presence of children and the number of family members (Adamelli *et al.* 2004). Without an understanding of the environmental needs of the cat, it is likely that those needs are not being met. This can lead to behavioral problems in the cat and frustration for the owner. Depending on the owner's reaction to the behavioral problem, the cat's welfare can be impaired by reprimanding by the owner or even relinquishment.

2.4. The role of the veterinarian

The cat's veterinarian should be knowledgeable about the cat's environmental needs and routinely assess the owner's knowledge of and attitudes toward the cat's needs and behavior. This allows the veterinarian to provide the proper advice to prevent and treat behavioral problems. According to a study conducted by Da Graça Pereira and colleagues (2014) in Portugal, the knowledge of how cats manifest stress and interact with humans was not significantly different between animal healthcare professionals (veterinarians/veterinary technicians) and cat owners. This implies that these professionals may not be able to provide the proper help needed when they receive a patient with behavioral problems or are asked for advice in preventing them. If behavioral problems were sufficiently addressed in the clinic, and owners given the tools and advice they need to better manage a problem, the number of animals being relinquished or euthanized due to behavioral problems would likely decrease.

In households with both a cat and a dog, the cat/s are presented to a veterinarian less often than the dog/s in the same household (Lue *et al.* 2008). Eleven percent of owners in this study believed that cats do not get sick and seven percent believed that cats could take care of themselves. These are two risky misconceptions that can result in the cat not receiving needed care. Further, the authors found that 33% of cats in a household with a dog did not visit a veterinarian annually, while only 13% of dogs failed to receive an annual veterinary visit. To provide for those cats not receiving proper care, the veterinarian should routinely collect information on all animals in each client's household and inform the owners of the importance of annual evaluations and preventive care. Preventive care, such as routine physical examinations, vaccinations, parasite prevention and dental care, is an important factor in the early detection of problems and in maintaining good health, thus increasing a cat's welfare.

As a veterinarian, it is important to understand and strive to improve the pet-owner bond. Owners who report having a strong pet-owner bond were more likely to provide a higher level of care for their pet/s, follow the veterinarian's recommendations despite cost and provide more preventive care for their pets (Lue *et al.* 2008).

3. Material and methods

3.1. Survey creation, distribution and design

An online survey generated using Netigate was distributed throughout social media and on the SLUs webpage. Since this was a survey spread through social media this is non-representative sampling, in other words a convenience sample.

The study was conducted between October 1, 2020 and December 31, 2020 with financial aid from Djurvännernas Förening in Stockholm. The survey was open for everyone, cat owner or not, and there were no restrictions placed on the respondents. The survey was in Swedish only, meaning that only respondents who could read and understand Swedish were able to participate in the study.

The survey consisted of 46 questions (Table 1). Depending on respondents' replies, e.g., presence or absence of pets, they were with different routes through the survey. Consequently, not all respondents replied to all questions. There were 23 respondents that were excluded from the results due to them being sent through the wrong route of the survey. These respondents were able to answer the case study questions as if they had experienced them even though they had not experienced them and vice versa. The total number of respondents per question differs due to all individuals not completing the survey.

Open-ended answers were analyzed if the option "other" was chosen by 15% or more of respondents. The most common open-ended answers were reviewed and presented in the data.

Table 1. In the table, there is a description of the survey questions including the specific respondent group for each question.

Questions	Theme	Respondent Group
1-7	Respondent demographics and current living situation (Included open-ended answers)	all
8	age and number of children living in household	those who answered yes to question 7
9	contact with cats during childhood	all
10	childhood relationship with cats	those who answered yes to question 9
11-13	previous living situation and sole responsibility over cats and other animals	all
14	the different types of animals that have lived in the household (Included open-ended answers)	those who answered yes to question 13
15	sole responsibility over animal other than cat	all
16	the type of animal/s respondents were solely responsible over (Included open-ended answers)	those who answered yes to 15
17-18	previous work experience involving cats or other animals	all
19	currently living with cat	all
20-21	number of cats in household currently and the demographics of the cat that has lived the longest in the household (if attained at same time, then the following questions should be answered based on the cat that comes first in alphabetical order) (Included open-ended answers)	those who answered yes to question 19
22	other pets other than cats living in household	all
23	which other types of pets living in the household (Included open-ended answers)	those who answered yes to question 22
24	28 statements about cats, Likert scale	all
25, 28, 31, 34, 37, 40, 43	Case studies: <ol style="list-style-type: none"> 1. Urinating outside of the litterbox 2. Biting and/or scratching the owner 3. Meowing loudly and/or hiding in the cage during a veterinary visit 4. Staying in the cage once home from the veterinarian 5. Scratching on the owner's favorite furniture 6. Stealing from the owner's plate of food 7. Scratching a child after being provoked 	all

	<i>(Included open-ended answers)</i>	
26, 29, 32, 35, 38, 41, 44	the respondents' direct reaction/feeling and direct mode of action, respondents' mode of action if behavior were to repeat itself <i>(Included open-ended answers)</i>	those who answered yes to having experienced the case studies
27, 30, 33, 36, 39, 42, 45	the respondents' direct reaction/feeling and direct mode of action if behavior were to occur, respondents' mode of action if behavior were to repeat itself <i>(Included open-ended answers)</i>	those who answered no to having experienced the case studies
46	current relationship with cats	all

3.2. Data analysis

The data was analyzed through descriptive statistics with a calculation of percentages and some data were analyzed with chi-square test.

Questions 1-9, 19-21, 24-46 were analyzed with descriptive statistics and a calculation of percentages.

Questions 21, 25, 28, 31, 34, 37, 40, 43 were analyzed with chi-square test.

4. Results

In total, 628 respondents opened the survey, and 506 respondents finished the survey. Twenty-three respondents were excluded due to their being sent through the survey incorrectly. The sample size (n) is displayed for each question.

4.1. Demographic results

4.1.1. Human demographics

The majority of respondents were women between the ages of 26-35, living in a larger city, working full-time/part-time and having had contact with cats daily during their childhood (Table 2). On average there were 2.3 people per household, 70% of households were currently living with at least one cat and there was an average of 2.2 cats per household. The majority of households did not include children.

4.1.2. Cat demographics

The majority of cats in respondent households, were between the ages of 2-10 years and had lived with their owner for over 5 years (Table 3). The majority of cats were housecats and were marked and registered. The most common source of the cats was the owner of the queen (31%). Twenty-one percent of cats came from a cat shelter and 25% had lived in at least two different homes. The majority of cats had some access to the outdoors, while 21% of cats were kept strictly indoors. The 21% of respondents that chose “other” for this question, described that the cat had access to a balcony, went outside in a harness or were outside only during the summer.

Table 2. The table includes respondent demographics and the proportion of respondents. The number of respondents per question, n, varied due to incomplete surveys and are therefore shown for each demographic category in the table.

Respondent Demographics	Categories	Proportion of respondents (%)
Gender (n=595)	Female	87
	Male	10
	Other	3
Age (n=605)	18-25	5
	26-35	37
	36-45	26
	46-55	18
	56-66+	14
Living Area (n=591)	Urban	36
	Suburban	32
	Rural	32
Occupation (n=653, multiple answers could be chosen)	Working full-time/part-time	72
	Studying full-time/part-time	12
	Parental leave	3
	Unemployed	4
	Retired	4
	Other	5
Number of people living in household (n=582)	1	26
	2	40
	3	18
	4	12
	5	4
Children in household (n= 582)	Yes	31
	No	69
Contact with cat during childhood (n=578)	Daily	61
	At least once per week	9
	Less than once per week	16
	No	14
Cat currently living in household (n=566)	Yes	70
	No	30
Number of cats in household (n=394)	1	37
	2	38
	3	14
	4	5
	5-10+	6

Table 3. The table includes cat demographics as reported by the respondents and the proportion of the sample (n=390).

Cat Demographics	Categories	Proportion of sample (%) n=390
Age	0-6 months	3
	6-24 months	7
	2-10 years	57
	10-15 years	23
	15+ years	10
Breed	House cat	60
	Mixed	19
	Purebred	21
Marked/registered	Both	81
	Only marked	7
	Neither	12
Lived with owner for	up to 6 months	4
	6 months-1 year	3
	1-2 years	9
	2-5 years	27
	5+ years	57
How obtained by owner	Breeder	18
	Owner of queen	31
	Cat shelter	21
	Acquaintance	13
	Unintended ownership	4
	Other	13
First home after separated from mother	Yes	70
	No	25
	Unsure	5
Access to outdoors	Yes, constantly	2
	Yes, through a cat door	16
	Yes, owner lets in/out	31
	Yes, at least once per day	5
	Yes, but less than once per day	4
	No	21
	Other	21

4.2. Respondents' attitudes toward cats

4.2.1. Respondents' opinions to statements about cats

Thirteen out of 28 statements, relevant to the research questions, were chosen from the original survey to present the general attitude of respondents toward cats (Figure 1). The majority of respondents strongly agreed that a cat can be just as meaningful as a family member and/or friend and that petting a cat makes them happy. Fourteen percent of respondents agreed, and four percent of respondents strongly agreed that cats cannot be trusted. Fourteen percent of respondents agreed that cats are manipulative by nature and eleven percent of respondents agreed that cats display certain behaviors, like peeing on the carpet, to punish their owners.

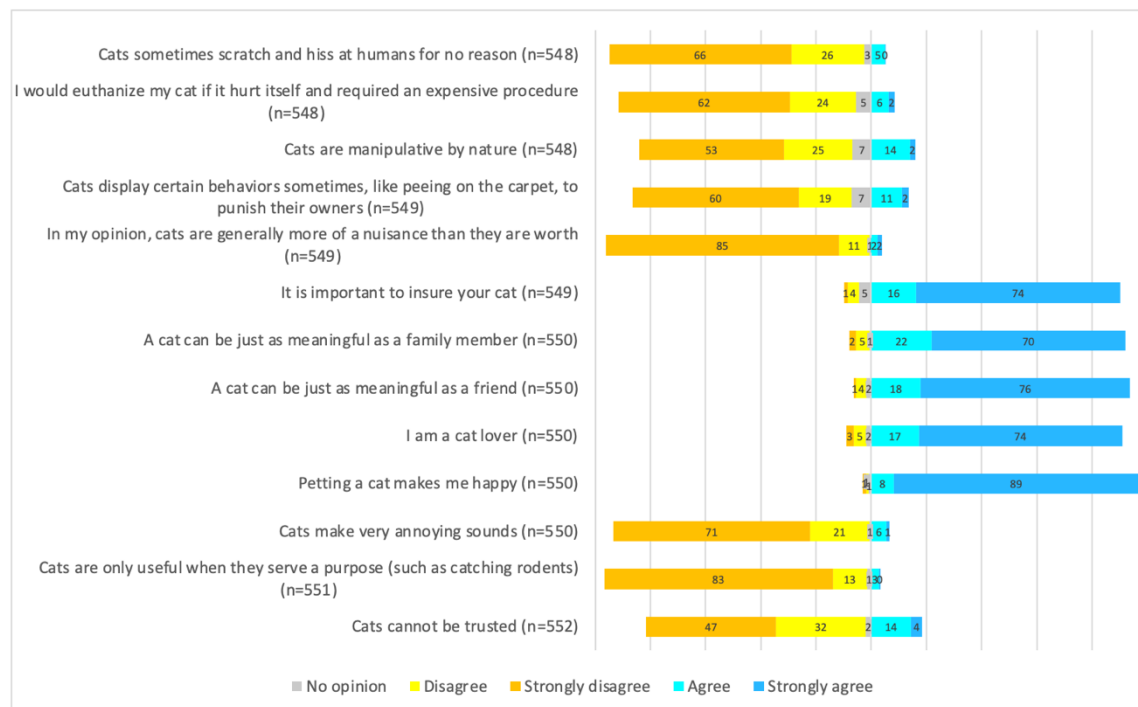


Figure 1. Statements about cats answered according to Likert scale by respondents. The data are displayed in percentages. The sample size (n) differed among statements and is displayed in the figure after each statement.

4.2.2. Respondents' current relationship with cats

Respondents were asked to answer the following statements on a scale of 1-10, 1 being negative/disagree/no and 10 being positive/agree/yes. The majority of respondents would describe their current relationship with cats as positive (81%, n=483), that they feel safe in their current relationship with cats (85%, n=483) and that they view cats as an appropriate house pet (83%, n=483). One percent of respondents would describe their current relationship with cats as negative, that

they do not feel safe in their current relationship with cats and that they do not view cats as an appropriate house pet.

4.3. Case studies

The number of respondents that experienced the behaviors portrayed in the case studies differed between the cases. Respondents were able to choose multiple answers for the emotional response and mode of action questions. Those who had not experienced the situation before were asked to choose an option based on how they would have responded if that situation would have occurred.

4.3.1. Case study 1: Urinating outside of the litterbox

Forty percent of respondents (n=548) had experienced the cat urinating outside of the litterbox.

Emotional response

The most common emotion of those who had experienced case study 1 was irritation (27%) (Figure 2). Twenty percent experienced worry, 16% surprise, 9% stress and 8% disgust. The remaining 20% of responses included, neutral, sadness, anger, interest, fear, shame, other, in consecutive order from most to least.

Of the 60% that had not experienced this problem, the most common emotion was worry (25%) (Figure 2), followed by surprise (23%) and irritation (21%), 10% disgust and 7% stress. The remaining 14% of answers included, sadness, neutral, fear, anger, other, interest and shame, in consecutive order.

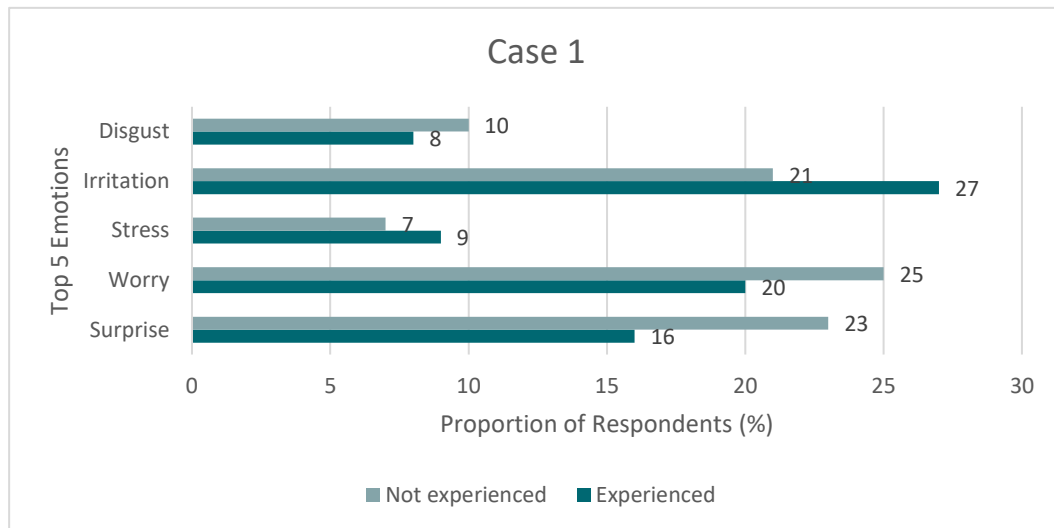


Figure 2. The top 5 emotions for case study 1 (urinating outside of the litterbox) for both those who had experienced it and those who had not experienced it. The specific percent value for each emotion is displayed in the graph following the bar.

Mode of action

The modes of action of those who had experienced inappropriate urination and those who had not experienced it, followed each other closely. The most common mode of action for both those who had experienced the case study and those who had not, was to adjust the cat's environment, followed by cleaning the area properly and using anti-cat products on it (Table 4). Seeking help from an animal healthcare professional (veterinarian/veterinary technician) was the third most common mode of action both for those who had experienced inappropriate urination and those who had not. Three percent of those who had not experienced and 1% of those who had, would seek help from an ethologist.

Table 4. The chosen mode of action for case study 1, the cat urinating outside of the litterbox. The results were split into two groups, the percent of respondents who had experienced it and those who had not. Multiple answers could be chosen. E = respondents who had experienced the case study. NE = respondents who had not experienced the case study.

Mode of action	E (Proportion of respondents, %) n=398	NE (Proportion of respondents, %) n=661
Adjust the cat's environment	38	37
Clean the area properly and use anti-cat products on it	30	26
Make the cat an outdoor cat or provide it with more outdoor access	4	2
Show the cat that the behavior is unacceptable by pushing the cat's nose in the urine and saying "no/bad cat"	1	1
Seek help from an animal healthcare professional	14	19
Seek help from an ethologist	1	3
Do nothing	9	8
Other	4	4

If the behavior were to repeat itself, then more respondents stated that they would seek help with an animal healthcare professional and/or an ethologist (Table 5). A proportion of respondents would choose relinquishment and/or euthanize the cat. The proportion of respondents that would continue to clean and test anti-cat products was 17% of those who had not experienced it and 24% of those who had experienced it.

Table 5. The chosen mode of action for case study 1, the cat urinating outside of the litterbox, if the behavior were to repeat itself. The results were split into two groups, the percent of respondents who had experienced it and those who had not. Multiple answers could be chosen. E = respondents who had experienced the case study. NE = respondents who had not experienced the case study.

Mode of action if repeated	E (Proportion of respondents, %) n=363	NE (Proportion of respondents, %) n=514
Continue to clean and use anti-cat products	24	17
Seek help from an animal healthcare professional	45	54
Seek help from an ethologist	12	15
Relinquish the cat	2	2
Euthanize the cat	2	1
Not sure	4	4
Other	10	6

Correlation between case study 1 and adopted from shelter?

There was no significant difference between respondents having experienced the behavior or not, whether or not the cat came from a shelter ($p=0.2011$, Fisher's exact test).

4.3.2. Case study 2: Biting and/or scratching the owner

Eighty-two percent ($n=533$) of respondents had experienced the cat biting and/or scratching them while petting their cat.

Emotional response

Of the 82% of respondents that had experienced this problem, the most common emotion was surprise (28%) (Figure 3). Twenty-one percent responded neutral, 13% irritation, 8% interest, 7% fear and 7% other. The remaining 16% of answers included worry, sadness, anger, shame, stress and happiness, in consecutive order.

Of the 18% that had not experienced this problem, 36% believe that they would have felt surprised (Figure 3). Twenty-two percent responded worry, 12% irritation, 7% sadness, 5% neutral and the remaining 18% of answers included, anger, fear, stress, other, interest, disgust, in consecutive order.

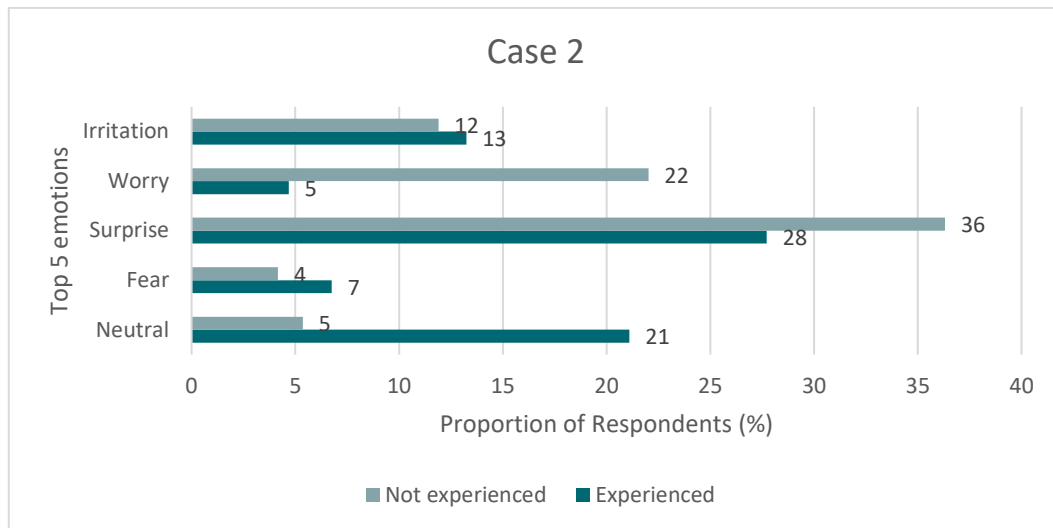


Figure 3. The top 5 emotions for case study 2 (biting and/or scratching the owner) for both those who had experienced it and those who had not experienced it. The specific percent value for each emotion is displayed in the graph following the bar.

Mode of Action

The mode of action between those who had experienced the cat biting and/or scratching the owner and those who had not experienced it, differed. The most common mode of action for both groups was to try to predict similar events by being more aware of the cat's signals and stop petting the cat before it goes to attack (Table 6). The second most common mode of action for those who had experienced it was to adjust their behavior to prevent it from happening again. Nineteen percent of those who had not experienced it would choose to seek help with an animal healthcare professional. This mode of action was chosen by one percent of those who had experienced it.

Table 6. The chosen mode of action for case study 2, being bitten and/or scratched by the cat. The results were split into two groups, the percent of respondents who had experienced it and those who had not. Multiple answers could be chosen. E = respondents who had experienced the case study. NE = respondents who had not experienced the case study.

Mode of action	E (Proportion of respondents, %) n=693	NE (Proportion of respondents, %) n=147
Adjust my behavior to prevent it from happening again (stop petting the cat)	27	12
Try to predict similar event by being more aware of the cat's signals and stop petting it before it goes to attack	53	48
Show the cat that the behavior is unacceptable by yelling at it or pushing it away and saying "no/bad cat"	8	9
Seek help from an animal healthcare professional	1	19
Seek help from an ethologist	1	5
Do nothing	5	5
Other	5	2

If the behavior were to repeat itself, then the most common response for both groups would be to seek help with an animal healthcare professional. Twenty percent of those who had experienced the cat biting/scratching them would have chosen to do something other than was listed (Table 7). These open-ended answers included: "change my own behavior, nothing, normal cat behavior, stop petting the cat/that area of the cat, google/search for information in other forums/friends." Seventeen percent of those who had experienced it and 18% of those who had not would seek help from an ethologist. Relinquishment was chosen as an option by 4% that had not experienced this behavior and 2% that had, while euthanasia was chosen by 5% that had not experienced it and 1% that had.

Table 7. The chosen mode of action for case study 2, being bitten and/or scratched by the cat, if the behavior were to repeat itself. The results were split into two groups, the percent of respondents who had experienced it and those who had not. Multiple answers could be chosen. E = respondents who had experienced the case study. NE = respondents who had not experienced the case study.

Mode of action if repeated	E (Proportion of respondents, %) n=553	NE (Proportion of respondents, %) n=131
Seek help from an animal healthcare professional	46	56
Seek help from an ethologist	17	18
Relinquish the cat	2	4
Euthanize the cat	1	5
Not sure	14	10
Other	20	7

Correlation between case study 2 and adopted from shelter?

There was a significant difference between respondents having experienced the behavior or not, whether or not the cat came from a shelter ($p=0.0026$, Fisher's exact test).

4.3.3. Case study 3: Meowing loudly and/or hiding in the cage during veterinary visit

Forty-six percent ($n=524$) of respondents had experienced the cat meowing loudly and/or hiding in the cage during a veterinary visit.

Emotional response

The most common emotion of those who had experienced the cat meowing loudly and/or hiding in the cage during a veterinary visit was worry (32%) followed by sadness (24%) (Figure 4). Seventeen percent responded neutral, 14% stress, and the remaining 13% responded other, shame, fear, surprise, interest, in consecutive order.

Of the 54% that had not experienced this problem, 35% believe that they would have experienced worry (Figure 4), 17% sadness, 14% neutral, 12% stress, and the remaining 22% - surprise, other, interest, fear, irritation and shame, in consecutive order.

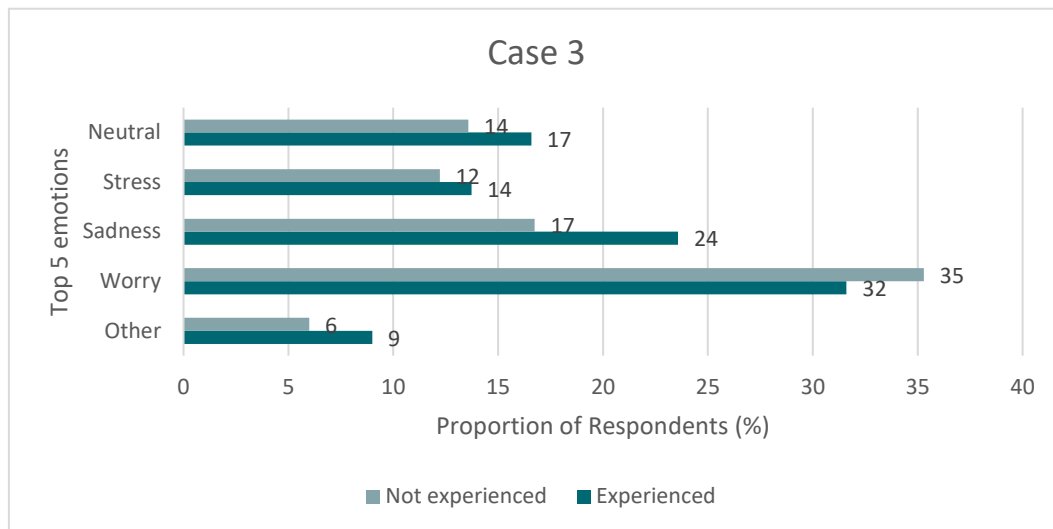


Figure 4. The top 5 emotions for case study 3 (meowing loudly and/or hiding in the cage during veterinary visit) for both those who had experienced it and those who had not experienced it. The specific percent value for each emotion is displayed in the graph following the bar.

Mode of Action

The modes of action in this case were similar between those who had experienced meowing loudly and/or hiding in the cage during a veterinary visit and those who had not experienced it. The most common action for both groups, was to give the cat treats, lure it out of the cage, play with it or something similar in order to create a positive feeling for the situation (Table 8). The next most common action for both those who had experienced it and those who had not, was to train the cat to get used to the situation. The third most common mode of action for those who had experienced it was to do nothing. For those who had not experienced it, the third most common mode of action was to seek help from an animal healthcare professional. Three percent of those who had not experienced it and one percent of those who had, would seek help from an ethologist. None of the respondents in either group would have stopped going to the veterinarian due to this behavior.

Table 8. The chosen mode of action for case study 3, the cat meowing loudly and/or hiding in the cage during a veterinary visit. The results were split into two groups, the percent of respondents who had experienced it and those who had not. Multiple answers could be chosen. E = respondents who had experienced the case study. NE = respondents who had not experienced the case study.

Mode of action	E (Proportion of respondents, %) n=361	NE (Proportion of respondents, %) n=490
Give the cat treats, lure it out of the cage, play with it or something similar to create a positive atmosphere	44	37
Train the cat to get used to the situation	25	30
Stop going to the veterinarian	0	0
Seek help from an animal healthcare professional	10	19
Seek help from an ethologist	1	3
Do nothing	11	7
Other	9	4

If the behavior were to repeat itself, the most common mode of action for those who had experienced the case study before was to do something other than the options presented (Table 9). These open-ended answers included: “use pheromones, do nothing, train the cat, avoid the situation as well as possible.” The most common mode of action for those who had not experienced it before was to seek help from an animal healthcare professional. This mode of action was the second most common choice for those who had experienced it before. Sixteen percent of those who had experienced it before and 22% of those who had not experienced it, would seek help from an ethologist. Seventeen percent of respondents in each group were not sure what their mode of action would be if the behavior repeated itself. Zero percent of respondents in both groups would choose to euthanize the cat and 1% of respondents that had not experienced it before would relinquish the cat.

Table 9. The chosen mode of action for case study 3, the cat meowing loudly and/or hiding in the cage during a veterinary visit, if the behavior were to repeat itself. The results were split into two groups, the percent of respondents who had experienced it and those who had not. Multiple answers could be chosen. E = respondents who had experienced the case study. NE = respondents who had not experienced the case study.

Mode of action if repeated	E (Proportion of respondents, %) n=274	NE (Proportion of respondents, %) n=331
Seek help from an animal healthcare professional	30	43
Seek help from an ethologist	16	22
Relinquish the cat	0	1
Euthanize the cat	0	0
Not sure	17	17
Other	37	17

Correlation between case study 3 and adopted from shelter?

There was a significant difference between respondents having experienced the behavior or not, whether or not the cat came from a shelter ($p=0.0054$, Fisher's exact test).

4.3.4. Case study 4: Staying in the cage once home from the veterinarian

Seven percent of respondents ($n=515$) had experienced that the cat did not want to come out of the cage once home from the veterinary visit.

Emotional response

Of the 7% of respondents that had experienced this problem before, 50% were neutral (Figure 5), 15% felt worried, 10% interest, 8% other, and the remaining 17% felt sadness, stress, surprise, fear, happiness, in consecutive order.

Of the 93% that had not experienced this before, 35% believed that they would feel worried (Figure 5), 19% surprise, 19% neutral, 7% sadness and the remaining 20% responded fear, interest, stress, other, shame, irritation, in consecutive order.

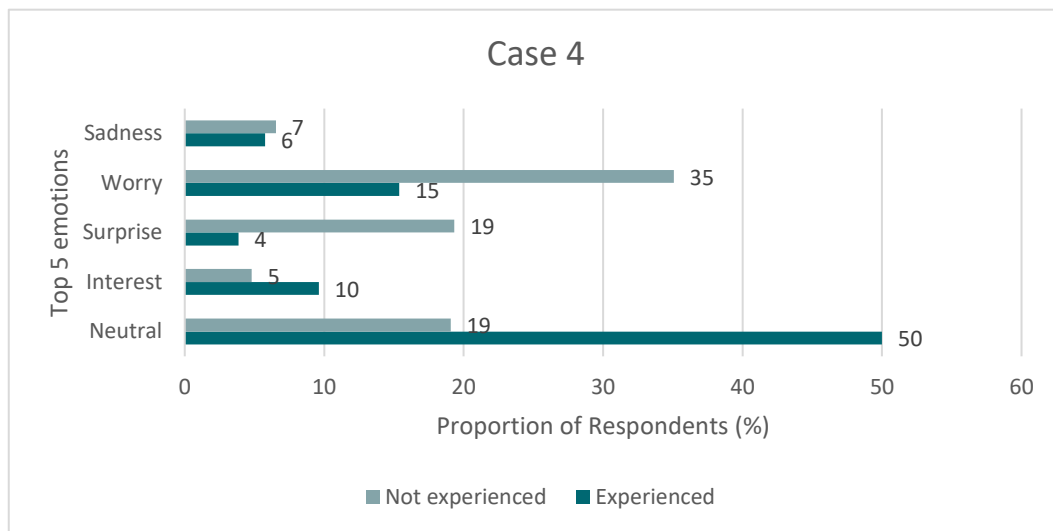


Figure 5. The top 5 emotions for case study 4 (staying in the cage once home from the veterinarian) for both those who had experienced it and those who had not experienced it. The specific percent value for each emotion is displayed in the graph following the bar.

Mode of Action

The modes of action in this case differ between respondents that had experienced the situation and those who had not. The most common mode of action for those who had experienced the case study before was to do nothing (Table 10). The most common mode of action for those who had not experienced it before was to give the cat treats, lure it out of the cage, play with it or something similar to create a positive experience. This was the second most common mode of action for those who had experienced the case study. The second most common mode of action for those who had not experienced the case study was to train the cat to get used to the situation. This was the third most common mode of action for those who had experienced it before. Seven percent of those who had not experienced it and zero percent of those who had, would seek help from an animal healthcare professional. No respondents would stop going to the veterinarian.

Table 10. The chosen mode of action for case study 4, the cat staying in the cage once home from the veterinarian. The results were split into two groups, the percent of respondents who had experienced it and those who had not. Multiple answers could be chosen. E = respondents who had experienced the case study. NE = respondents who had not experienced the case study.

Mode of action	E (Proportion of respondents, %) n=46	NE (Proportion of respondents, %) n=789
Give the cat treats, lure it out of the cage, play with it or something similar to create a positive experience	28	44
Train the cat to get used to the situation	15	21
Actively pick the cat out of the cage by pulling it or pouring it out	2	7
Stop going to the veterinarian	0	0
Seek help from an animal healthcare professional	0	7
Seek help from an ethologist	0	3
Do nothing	41	13
Other	13	4

If the behavior were to repeat itself, the most common mode of action for those who had not experienced it would be to train the cat to handle the situation (Table 11). The most common response for those who had experienced it was to do something other than what was listed. These open-ended answers included: “do nothing, give the cat the time it needs, it is not a problem.” The second most common mode of action for those who had experienced it before would be to train the cat to handle the situation. The second most common choice for those who had not experienced it before would be to seek help from an animal healthcare professional. Sixteen percent of those who had not experienced it before and 10% of those who had were not sure what their mode of action would be. Fourteen percent of those who had not experienced it before and 7% of those who had would seek help from an ethologist.

Table 11. The chosen mode of action for case study 4, the cat staying in the cage once home from the veterinarian, if the behavior were to repeat itself. The results were split into two groups, the percent of respondents who had experienced it and those who had not. Multiple answers could be chosen. E = respondents who had experienced the case study. NE = respondents who had not experienced the case study.

Mode of action if repeated	E (Proportion of respondents, %) n=41	NE (Proportion of respondents, %) n=647
Train the cat to handle the situation	32	36
Seek help from an animal healthcare professional	15	27
Seek help from an ethologist	7	14
Relinquish the cat	0	0
Euthanize the cat	0	0
Not sure	10	16
Other	37	6

Correlation between case study 4 and adopted from shelter?

There was no significant difference between respondents having experienced the behavior or not, whether or not the cat came from a shelter ($p=0.2830$, Fisher's exact test).

4.3.5. Case study 5: Scratching on the owner's furniture

Eighty-two percent ($n=507$) of respondents had experienced the cat scratching on their furniture.

Emotional response

Of the 82% that had experienced this before, the majority felt irritation (Figure 6), 19% neutral, 8% anger, and the remaining 18%, stress, other, sadness, surprise, interest, happiness, worry, in consecutive order.

Of the 18% that had not experienced this before, the majority believed they would feel irritation (Figure 6), 15% anger, 10% neutral, 6% stress, and the remaining 16% believed they would feel sadness, surprise, interest, worry, shame, disgust and/or other, in consecutive order.

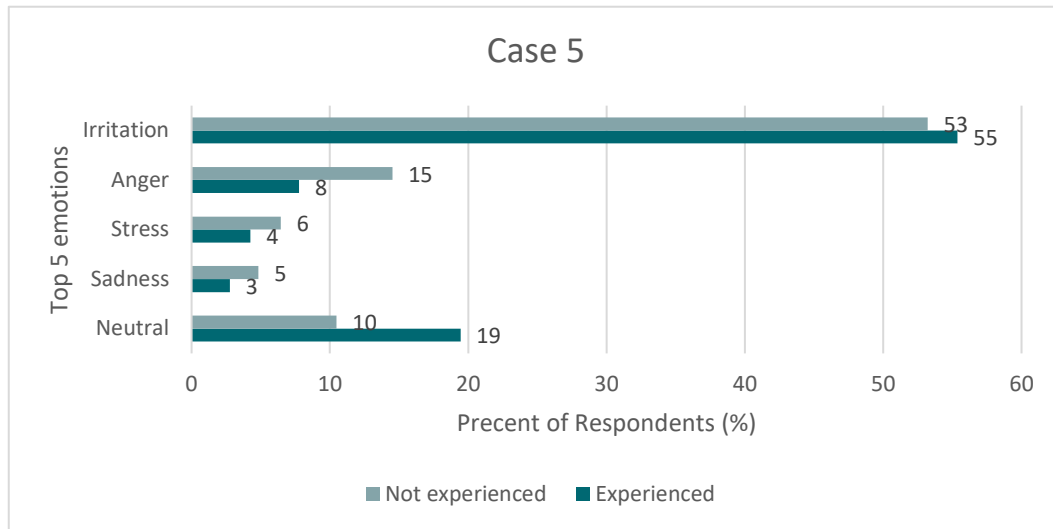


Figure 6. The top 5 emotions for case study 5 (scratching on the owner's favorite furniture) for both those who had experienced it and those who had not experienced it. The specific percent value for each emotion is displayed in the graph following the bar.

Mode of Action

The modes of action in this case were very similar between those who had experienced and those who had not experienced undesired scratching. The most common mode of action for those who had experienced it before was to provide more scratching areas for the cat as an alternative to furniture (Table 12). This was the second most common mode of action for those who had not experienced it. The most common choice for those who had not experienced it was to try to make existing scratching areas more interesting. This was the second most common choice for those who had experienced the case study. The third most common choice for both groups was to show the cat that the behavior is unacceptable by saying “no/bad cat”.

Table 12. The chosen mode of action for case study 5, the cat scratching on the owner's furniture. The results were split into two groups, the percent of respondents who had experienced it and those who had not. Multiple answers could be chosen. E = respondents who had experienced the case study. NE = respondents who had not experienced the case study.

Mode of action	E (Proportion of respondents, %) n=870	NE (Proportion of respondents, %) n=184
Provide more scratching areas for the cat as an alternative to furniture	36	37
Show the cat that the behavior is unacceptable by saying "no/bad cat"	24	16
Try to make existing scratching areas more interesting/attractive	31	39
Seek help from an animal healthcare professional	1	2
Seek help from an ethologist	0	1
Do nothing	2	2
Other	5	3

If the behavior were to repeat itself, the majority of those who had experienced it before would choose something other than the options presented (Table 13). The open-ended answers included: "accept that it is normal behavior, do nothing, let the cat scratch, provide more alternatives for scratching, spray with anti-scratch products, cover the furniture with something to protect it, train the cat to not scratch on the furniture." The most common answer of those who had not experienced the case study was "not sure." This was the second most common answer of those who had experienced the case study. Twenty-four percent of those who had not experienced it and 14% of those who had would seek help from an ethologist. Twenty-one percent of those who had not experienced it and 13% of those who had, would seek help from an animal healthcare professional. Of those who had not experienced the case study, 5% would choose to relinquish the cat and 1% would choose to euthanize the cat. None of the respondents in either group would choose to relinquish or euthanize the cat.

Table 13. The chosen mode of action for case study 5, the cat scratching on the owner's furniture, if the behavior were to repeat itself. The results were split into two groups, the percent of respondents who had experienced it and those who had not. Multiple answers could be chosen. E = respondents who had experienced the case study. NE = respondents who had not experienced the case study.

Mode of action if repeated	E (Proportion of respondents, %) n=448	NE (Proportion of respondents, %) n=101
Seek help from an animal healthcare professional	13	21
Seek help from an ethologist	14	24
Relinquish the cat	0	5
Euthanize the cat	0	1
Not sure	21	29
Other	51	21

Correlation between case study 5 and adopted from shelter?

There was no significant difference between respondents having experienced the behavior or not, whether or not the cat came from a shelter ($p=0.6589$, Fisher's exact test).

4.3.6. Case Study 6: Stealing from the owner's plate of food

Sixty-seven percent ($n=493$) of respondents had experienced the cat taking food from the owner's unattended plate of food.

Emotional response

Of the 67% that had experienced this situation before, the most common emotion was irritation (35%) (Figure 7), followed by 22% that responded neutral, 10% surprise, 10% other, 6% happy, and the remaining 17% anger, interest, disgust, stress, worry, in consecutive order.

Of the 33% that had not experienced this situation before, 33% believed that they would experience irritation (Figure 7), 22% surprise, 15% neutral, 7% anger, 7% disgust, 6% other and the remaining 10% interest, worry, happiness, sadness, in consecutive order.

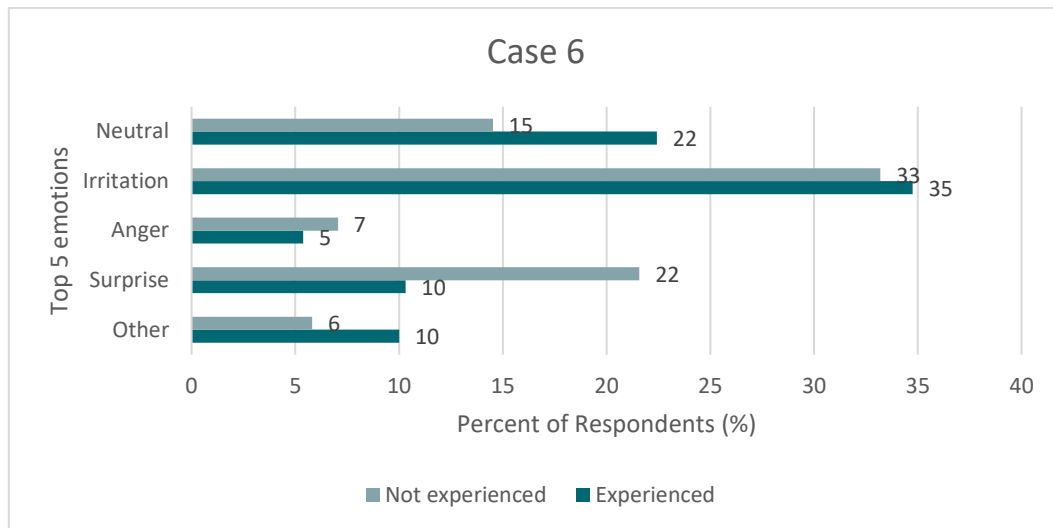


Figure 7. The top 5 emotions for case study 6 (stealing from the owner's plate of food) for both those who had experienced it and those who had not experienced it. The specific percent value for each emotion is displayed in the graph following the bar.

Mode of Action

The modes of action in this case were very similar between those who had experienced it and those who had not experienced it. The most common mode of action among both those who had experienced the case study and those who had not was to never leave food unattended (Table 14). The second most common response for both groups was to show the cat that the behavior was unacceptable. Fifteen percent of those who had not experienced it and 9% of those who had, would choose to always feed the cat during a mealtime.

Table 14. The chosen mode of action for case study 6, the cat stealing from the owner's plate of food. The results were split into two groups, the percent of respondents who had experienced it and those who had not. Multiple answers could be chosen. E = respondents who had experienced the case study. NE = respondents who had not experienced the case study.

Mode of action	E (Proportion of respondents, %) n=477	NE (Proportion of respondents, %) n=244
Never leave food unattended	50	49
Show the cat that the behavior is unacceptable by saying "no/bad cat"	25	23
Feed the cat during a mealtime	9	15
Seek help from an animal healthcare professional	1	1
Seek help from an ethologist	0	1
Do nothing	8	9
Other	7	2

If the behavior were to repeat itself, 40% of those who had not experienced it and 64% of those who had, would choose to do something other than the options given (Table 15). These open-ended answers included: "not leaving food unattended, the cat gets its own food when the owner eats, saying to the cat 'no, not okay', this is not a problem, train the cat." The next most common answer for both groups was "not sure." Thirteen percent that had not experienced it and 6% that had experienced it would seek help from an animal healthcare professional. Of those who had not experienced the case study before, 2% would choose to relinquish the cat and 1% to euthanize the cat. None of the respondents who had experienced this before would choose to relinquish or euthanize the cat.

Table 15. The chosen mode of action for case study 6, the cat stealing from the owner's plate of food, if the behavior were to repeat itself. The results were split into two groups, the percent of respondents who had experienced it and those who had not. Multiple answers could be chosen. E = respondents who had experienced the case study. NE = respondents who had not experienced the case study.

Mode of action if repeated	E (Proportion of respondents, %) n=335	NE (Proportion of respondents, %) n=172
Seek help from an animal healthcare professional	6	13
Seek help from an ethologist	6	10
Relinquish the cat	0	2
Euthanize the cat	0	1
Not sure	24	34
Other	64	40

Correlation between case study 6 and adopted from shelter?

There was no significant difference between respondents having experienced the behavior or not, whether or not the cat came from a shelter ($p=1$, Fisher's exact test).

4.3.7. Case Study 7: Scratching a child after being provoked

Nineteen percent (n=488) of respondents had experienced the cat scratching a child after being provoked.

Emotional response

Of the 19% that had experienced this situation, 20% were neutral, 17% experienced irritation, 13% worry, 13% stress, 13% other. The remaining 23% felt shame, fear, sadness, surprise, anger, happiness, in consecutive order (Figure 8).

Of the 81% that had not experienced this situation, 16% believed that they would feel worried (Figure 8). Fourteen percent believed they would feel stress, 13% irritation, 10% other, 9% neutral, 8% surprise, 8% sad, 8% shame, and the remaining 14% fear, anger, happiness, in consecutive order.

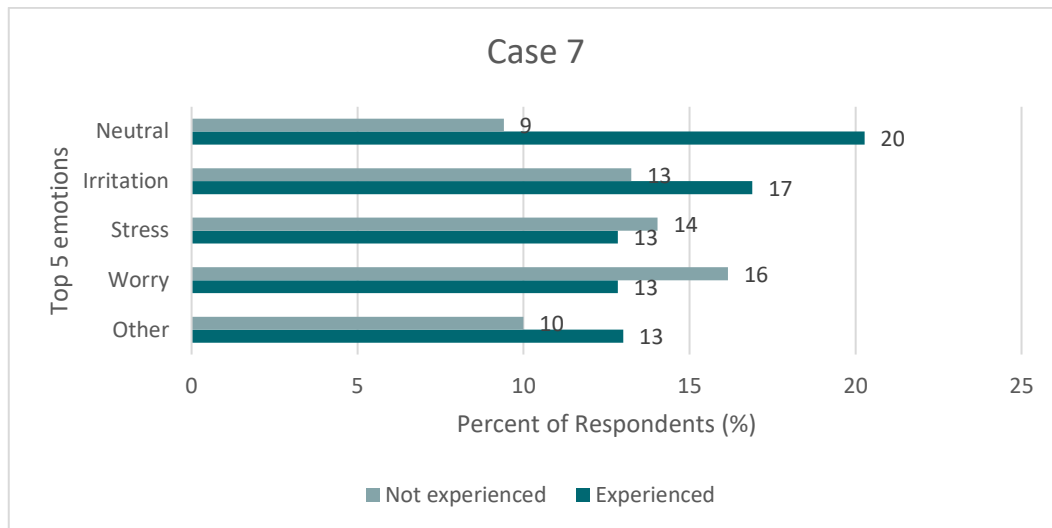


Figure 8. The top 5 emotions for case study 7 (scratching a child after being provoked) for both those who had experienced it and those who had not experienced it. The specific percent value for each emotion is displayed in the graph following the bar.

Mode of Action

The modes of action in this case were very similar between those who had experienced the cat scratching a child after being provoked and those who had not experienced it. The most common response among both groups of respondents was to talk with guests about how they should act and interact with cats (Table 16). The next most common response among those who had experienced the case study was to never leave children unattended with a cat. Among those who had not experienced the case study before, 28% would choose to never leave children unattended with a cat and another 28% would create an elevated sleeping area for the cat that a child cannot reach. Twenty-four percent of respondents that had experienced it before chose to create an elevated sleeping area for the cat. Five percent of those who had not experienced it and 3% of those who had would stop inviting children over. Two percent of those who had experienced the case study before chose to do nothing. None of the respondents would seek help from an animal healthcare professional. One percent of those who had not experienced it before would seek help from an ethologist.

Table 16. The chosen mode of action for case study 7, the cat scratching a child after being provoked. The results were split into two groups, the percent of respondents who had experienced it and those who had not. Multiple answers could be chosen. E = respondents who had experienced the case study. NE = respondents who had not experienced the case study.

Mode of action	E (Proportion of respondents, %) n=207	NE (Proportion of respondents, %) n=994
Never leave children unattended with a cat	28	28
Show the cat that the behavior is unacceptable by saying “no/bad cat”	3	3
Talk with guests about how they should act and interact with cats	38	35
Create an elevated sleeping area for the cat that children cannot reach	24	28
Stop inviting children over	3	5
Seek help from an animal healthcare professional	0	0
Seek help from an ethologist	0	1
Do nothing	2	0
Other	3	1

If the behavior were to repeat itself, 52% of those who had not experienced it and 78% of those who had, would choose to do something other than the options given (Table 17). These open-ended answers included: “keep the child away from the cat, explain to the child how to interact with cats, avoid the situation, elevated areas for the cat, according to previous answer, no children allowed in the home.” The next most common response for both groups of respondents was “not sure.” Of those respondents that had not experienced the case study before, 11% would seek help from an animal healthcare professional and 10% from an ethologist. Two percent of this group would choose to relinquish the cat and 1% would choose euthanasia. Six percent of the respondents that had experienced this before would choose to seek help from an animal healthcare professional and 6% from an ethologist. None of the respondents in this group would relinquish or euthanize the cat.

Table 17. The chosen mode of action for case study 7, the cat scratching a child after being provoked. The results were split into two groups, the percent of respondents who had experienced it and those who had not. Multiple answers could be chosen. E = respondents who had experienced the case study. NE = respondents who had not experienced the case study.

Mode of action if repeated	E (Proportion of respondents, %) n=93	NE (Proportion of respondents, %) n=424
Seek help from an animal healthcare professional	6	11
Seek help from an ethologist	6	10
Relinquish the cat	0	2
Euthanize the cat	0	1
Not sure	9	24
Other	78	52

Correlation between case study 7 and adopted from shelter?

There was no significant difference between respondents having experienced the behavior or not, whether or not the cat came from a shelter ($p=0.4909$, Fisher's exact test).

5. Discussion

The purpose of this study was to gain an understanding on how cat owners, as well as non-cat owners, in Sweden view cats and their behavioral problems. The study provided an insight into the prevalence of different behaviors and how they are perceived and managed by owners in Sweden. Respondents were asked to describe their emotional response to a certain behavior, their initial action and their action if the behavior were to repeat itself. It even provided an understanding of the general attitude of these respondents toward cats, by presenting respondents with 24 statements about cats to determine the degree in which they agreed or disagreed with the statements.

The survey data was a non-representative sample and therefore does not assess the general human population. This is a well-known disadvantage of non-representative convenience samples. The data seemed to, however, follow the general trend in comparison to other surveys involving cats; the majority of respondents were cat owners and women (Adamelli *et al.* 2005; Grigg & Kogan 2019; Foreman-Worsley *et al.* 2021). Most of the respondents in this study reported having a positive attitude toward cats, a good current relationship with them and had contact with a cat during their childhood. The majority of respondents considered themselves cat lovers. This could mean that the respondents felt more strongly toward cats in comparison to the general population. It could also mean that respondents were more familiar with a cat's natural behavior and their environmental needs compared to the general population.

The majority of cats in this study had access to the outdoors. Having access to the outdoors is associated with fewer behavioral problems according to multiple studies (Amat *et al.* 2009; Sandøe *et al.* 2017). The high prevalence of the behaviors presented in this study and the high proportion of cats with outdoor access were not consistent with the literature. This could be due to epidemiological differences and how respondents interpreted the case studies. Further, the current survey did not ask if the behaviors presented were viewed as problematic. It only described cat behavior, and situations, commonly seen as problematic by cat owners.

Most respondents had a positive attitude toward cats. They believed that a cat could be just as meaningful as a family member or as a friend, and that cats were important in other ways than just to serve a purpose, like a rodent hunter. These results showed that the majority of respondents had high regard for cats and viewed them as an important part of the family. This was consistent with the literature (Grigg & Kogan 2019). Maintaining and enhancing this positive attitude can help increase the cat's status in society, potentially leading to more routine veterinary care and thus an increased welfare for the general cat population.

A few respondents agreed with common misconceptions about cats. Five percent of respondents agreed that cats sometimes scratch and hiss at humans for no reason. Cats use scratching and hissing as a defense mechanism to warn of a potential threat and to discourage conflict and avoid injury (Bradshaw *et al.* 2012). Thirteen percent of respondents agreed, or strongly agreed, to the statement that cats sometimes display certain behaviors, like urinating on the carpet, to punish their owners. Inappropriate urination, not always indicative of a medical condition, can be caused by fear and anxiety in the home (Carney *et al.* 2014). An anxious cat may use its urine as a scent-marker to make the home smell more familiar and thus increase its comfort and confidence. Therefore, inappropriate urination should always be taken seriously, and seen as a signal that something is wrong.

Cats have multiple environmental needs that mirror those of the cat's ancestor, the North African Wildcat. To enhance the cat's welfare, these needs should be met. The prevalence of some of the behavior reported in this study, could possibly suggest that many of these cats experience anxiety/fear/stress, possibly due to a less-than-ideal environment. How the owner responds to these behaviors (e.g. yelling/punishment) can increase the cat's anxiety/fear (Bradshaw 2018).

In some of the behaviors used in this study, many owners chose to repeat their initial action, or simply do nothing, if the behavior were to repeat itself. This means that there is a risk that the behavior, and more importantly, the cause of the behavior, are not addressed and the behavior will likely continue. These behaviors included: biting and/or scratching the owner, meowing loudly and/or hiding in the cage during a veterinary visit, staying in the cage once home from the veterinarian and scratching a child after being provoked. These behaviors can all be expressions of fear/anxiety/stress in a cat and need to be addressed to ensure the general welfare of the cat.

This study recorded respondents' reaction to, and action taken, when a behavioral problem was presented and repeated. The proportion of respondents that would seek help from an animal healthcare professional was dependent on the behavior, and

whether it had occurred previously. It was more common for those who had not previously experienced the behavior to visit an animal healthcare professional. For example, 19% of those who had not experienced being bitten and/or scratched, stated that they would seek professional help if it were to happen, while only 1% of those who had experienced it, actually sought professional help. This could mean that a large number of cats are experiencing fear/stress/anxiety in the home, without the owner's seeking help to reduce the cause of the behavior. It reveals a gap in the help that owners say they would seek versus the help they seek. It could also mean that the owner does not consider the behavior as one requiring professional help. If the behavior were to be repeated, the proportion of respondents in both groups that would visit an animal healthcare professional increased substantially, with the exception of case study 6 (stealing from the owner's plate of food). It was also more common to seek help from an animal healthcare professional than from an ethologist – a non-medical behavioral specialist. These findings underline the value of questioning owners on behavioral problems in the home, addressing those behavioral problems and then informing the owner on which behaviors could indicate a potential health or welfare concern. If behavioral problems are not within the veterinarian's competence, it is encouraged to refer the patient to a behavioral specialist who can properly address the matter.

Not all the behaviors presented in this study were considered problematic by owners. Unfortunately, this study did not directly ask if the respondents viewed the behaviors as problematic or not. This study included behaviors affecting the cat's wellbeing as well as natural behaviors that owners view as problematic or undesirable (scratching the owner's furniture and stealing food from the owner's plate). It would be interesting to analyze which behaviors owners in Sweden view as problematic to compare with studies conducted in other countries and to provide a deeper understanding into which behaviors are more likely to cause tension in the cat-owner relationship. It would be helpful to know which behaviors might be present and affect the cat's welfare, without owners mentioning them to a veterinarian, since the behavior is not viewed as problematic by the owner. An example of such a behavior from the present study included staying in the cage once home from the veterinarian. The veterinarian should question owners in order to be aware of all these behaviors, to provide early intervention and educate the owner on what is normal and what may be indicative of stress/anxiety. It is important to emphasize to owners that even if some behaviors are not viewed as problematic, they may still be signs of stress/anxiety/fear/frustration and should be addressed to maintain the cat's wellbeing.

The prevalence of the behavioral problems in this study was much greater than previously reported. Eighty-two percent of respondents in this survey, reported the

cat biting and/or scratching the owner, compared to 36% (Strickler & Shull 2014) and 24.3% (Grigg & Kogan 2019) in other studies. Forty percent of respondents reported having stepped in urine, compared to 24% (Strickler & Shull 2014), 12.4% (Sandøe *et al.* 2017) and 26.5% (Grigg & Kogan 2019). Eighty-two percent of respondents in this survey reported their cat scratching the furniture, compared to 49.7% (Grigg & Kogan 2019), 21.7% (Sandøe *et al.* 2017) and 15.2% (Heidenberger 1997). Several factors could account for these different prevalence rates, such as, geographical differences and how the question/case study was phrased. For example, case study 6, “biting and/or scratching the owner” may be worded as “aggression toward the owner” in other studies. Biting and/or scratching the owner is not only a display of aggression in cats, but also a play/hunting behavior (Bradshaw 2018). The differences in phrasing made it difficult to directly compare this study with others, however similar trends were observed.

The prevalence of some of these behaviors possibly suggests that a large number of cats in the present study are not living in ideal environments. For example, forty percent of respondents had experienced the cat urinating outside of the litterbox. This was much higher than in other studies (Strickler & Shull 2014; Sandøe *et al.* 2017; Grigg & Kogan 2019). This could indicate that there were not enough elimination areas for the cat or that there were stressors in or outside of the home, causing the cat to feel the need to mark its inside territory. Eighty-two percent of respondents had experienced the cat biting and/or scratching them. This was also a very high prevalence compared to other studies (Strickler & Shull 2014; Grigg & Kogan 2019). How the respondents interpreted the question, whether they viewed it as aggression or play, could indicate that many cats may be living in a state of anxiety and/or may not have adequate hiding areas. It could also indicate that owners cannot interpret the cats warning signals before the cat bites/scratches, causing the cat to take certain measures to defend itself. Biting as a form of defense or hunting, and urination and scratching as a form of scent-marking, are all natural behaviors of the domestic cat’s ancestor, the North African Wildcat. It is clear that the domestic cat has retained many behaviors of its ancestor regarding its responses to its environment. If the domestic cat’s environment is not adjusted to meet these needs, expressions of stress/fear/anxiety/frustration may present as the behavioral problems mentioned in this study. This may result in decreased welfare, depending on how owners react to such behaviors.

Relinquishment and euthanasia of the cat were options offered in the present study for “mode of action if repeated.” The percentage of respondents that chose the option relinquishment or euthanasia, differed between those who had experienced the behavior previously, and those who had not. In general, both options were chosen more often in the group that had not experienced the behavior before. One

might speculate that this can be due to the behavior not being viewed as problematic once experienced or that owners that have experienced these behaviors have a higher tolerance for them than those who have not experienced them. In general, the choice of request for relinquishment and euthanasia were relatively low in comparison to the other “modes of action” presented in this study. This can be interpreted as the owners managing the behavior in other ways first and that they may not even consider relinquishment or euthanasia despite repetition of the behavior. Scratching on the owner’s furniture and biting and/or scratching the owner were the behaviors with the highest choice of relinquishment among respondents that had not experienced these behaviors previously. Inappropriate urination and biting and/or scratching the owner were the behaviors with the highest choice of relinquishment among respondents that had experienced these behaviors previously. Biting and/or scratching the owner was the behavior with the highest choice of request for euthanasia among respondents that had not experienced the behavior previously. Inappropriate urination was the behavior with the highest choice of euthanasia among those who had experienced the behavior previously. These findings were consistent with the literature which reports inappropriate elimination and aggression toward people as the most common reasons for relinquishment (Salman *et al.* 2000; Grigg & Kogan 2019). According to these findings, it can be speculated that inappropriate urination, biting and/or scratching the owner and scratching the owner’s furniture are the three behaviors that put the most strain on the cat-owner relationship since these are the three behaviors were the options “relinquishment” and/or “euthanasia” were chosen.

Some of the case studies presented were examples of a cat’s natural behavior that may be viewed as problematic by owners. For example, case study 6, stealing from the owner’s plate of food, is a natural behavior. Domestic cats, just like the North African Wildcat, are opportunistic hunters and will therefore take food if it is available and of interest (Bradshaw *et al.* 2012). The majority of respondents had experienced this behavior before and were most likely to be irritated by it. A fourth of those who had experienced it before would verbally reprimand the cat to show that the behavior is unacceptable. The owner’s response, suppressing a natural behavior, could eventually lead to anxiety and a decrease in the cat’s welfare. Verbal and physical punishment is not effective, can instead increase the fear that a cat experiences, and should be avoided (Horwitz & Pike 2014; Lindell 2016).

The behavior that caused the most irritation, for both those who had experienced it and those who had not experienced it, was case study five, scratching the owner’s furniture. This was also an example of a natural behavior, scratching as a form of scent marking, that can be viewed as problematic by owners. These findings were consistent with the literature reports that designate scratching furniture to be the

behavior that bothers owners the most (Grigg & Kogan 2019). Despite the owner's irritation at a cat scratching the furniture, the most commonly chosen reaction was redirecting the cat to alternative, acceptable, targets, instead of reprimanding it. This could be due to the respondents understanding that scratching is a natural behavior for cats and that they need to be able to express this behavior.

The behaviors, biting and/or scratching the owner, and meowing loudly at the veterinary clinic, could both be expressions of fear and anxiety. There was a significant difference ($p < 0.05$) between cats that came from a shelter, and those obtained in other ways, for both of these behaviors. Living in a shelter environment can be stressful for cats and can result in a decreased immunity, making them more susceptible to illness (Gourkow *et al.* 2014). It is important to be aware that some objectionable behaviors might be exhibited by cats from this source. Their new environments should accommodate their need to hide and mark their scent so that they can create a familiar and predictable environment to facilitate adjustment to a new home.

This study confirmed that a large proportion of respondents would seek help from an animal healthcare professional for most behavioral problems. Natural behavior, environmental needs and behavioral problems are not topics that are widely discussed in the veterinary curriculum in Sweden (SLU 2021). It is important that this information be made available to provide Swedish veterinarians with the knowledge necessary to advise owners. If behavioral problems were properly addressed the number of animals being relinquished or euthanized due to them would likely decrease. Veterinarians are an important resource for owners experiencing behavioral problems. A feline patient presented for house soiling/urine marking is not uncommon. Once medical causations have been ruled out it is important to address the potential behavioral/environmental causes of this problem. If a veterinarian does not feel comfortable providing advice for a behavioral problem, the patient should be referred to a behavioral specialist.

6. Conclusions

The general attitude toward and relationship with cats were positive. Among the respondents in this survey study, many viewed cats as being as meaningful as family members and/or friends. Many respondents had experienced the behaviors presented in this study. This may indicate that cat owning households commonly lack understanding and ability to provide an adequate natural environment for their cats. Still, further investigation of household environments of cats living in Sweden is needed to provide more of an understanding about the high prevalence of undesired behaviors reported in this study.

When considering the respondents' emotional response to undesired behaviors, reaction to initial occurrence and action if repeated, one can predict that inappropriate urination, biting and/or scratching the owner and scratching of the owner's furniture would be three behaviors that put the most tension on the cat-owner relationship. It is important for animal healthcare professionals to be aware of this and provide early intervention before dissolution of the cat-owner bond occurs.

The inclination to seek help from an animal healthcare professional became more common if the behavior were repeated. For multiple behaviors, it was more common for respondents who had not experienced the behavior before to seek advice from an animal healthcare professional compared to respondents who had experienced it before. This may reveal a gap in the intentions of owners to seek advice versus actually following through on obtaining it.

There was a significant correlation between a cat coming from a shelter and showing behaviors that could indicate anxiety and stress. These behaviors included biting and/or scratching the owner and meowing loudly and/or hiding in the cage during a veterinary visit. Therefore, it is particularly important to provide cats from shelters with a secure, and predictable environment by offering them adequate hiding areas and areas for the cat to leave its scent.

References

- Adamelli, S., Marinelli, L., Normando, S. & Bono, G. (2005). Owner and cat features influence the quality of life of the cat. *Applied Animal Behaviour Science*, 94 (1), 89–98. <https://doi.org/10.1016/j.applanim.2005.02.003>
- Adamelli, S., Marinelli, L., Normando, S., Camperio ciani, A. & Bono, G. (2004). Factors influencing the quality of life of the cat in its relationship with owners. *Veterinary Research Communications*, 28 Suppl 1, 149–51. <https://doi.org/10.1023/B:VERC.0000045393.79440.cd>
- Amat, M., de la Torre, J.L.R., Fatjó, J., Mariotti, V.M., Van Wijk, S. & Manteca, X. (2009). Potential risk factors associated with feline behaviour problems. *Applied Animal Behaviour Science*, 121 (2), 134–139. <https://doi.org/10.1016/j.applanim.2009.09.012>
- AVMA (2021) *Animal Welfare: What is it?* American Veterinary Medical Association. <https://www.avma.org/resources/animal-health-welfare/animal-welfare-what-it> [2021-10-25]
- Bradshaw, J. (2018). Normal feline behaviour: ... and why problem behaviours develop. *Journal of Feline Medicine and Surgery*, 20 (5), 411–421. <https://doi.org/10.1177/1098612X18771203>
- Bradshaw, J.W.S., Casey, R.A. & Brown, S.L. (2012). The cat: domestication and biology. In: Bradshaw, J.W.S., Casey, R.A., & Brown, S.L. (eds.) *The Behaviour of the Domestic Cat*. 2. ed Wallingford: CABI, 1–15. <https://doi.org/10.1079/9781845939922.0001>
- Carenzi, C. & Verga, M. (2009). Animal welfare: review of the scientific concept and definition. *Italian Journal of Animal Science*, 8 (sup1), 21–30. <https://doi.org/10.4081/ijas.2009.s1.21>
- Carney, H.C., Sadek, T.P., Curtis, T.M., Halls, V., Heath, S., Hutchison, P., Mundschenk, K. & Westropp, J.L. (2014). AAFP and ISFM guidelines for diagnosing and solving house-soiling behavior in cats. *Journal of Feline Medicine and Surgery*, 16 (7), 579–598. <https://doi.org/10.1177/1098612X14539092>
- Da Graça Pereira, G., Fragoso, S., Morais, D., Villa de Brito, M.T. & de Sousa, L. (2014). Comparison of interpretation of cat's behavioral needs between veterinarians, veterinary nurses, and cat owners. *Journal of Veterinary Behavior*, 9 (6), 324–328. <https://doi.org/10.1016/j.jveb.2014.08.006>

- Ellis, S.L.H., Rodan, I., Carney, H.C., Heath, S., Rochlitz, I., Shearburn, L.D., Sundahl, E. & Westropp, J.L. (2013). AAEP and ISFM feline environmental needs guidelines. *Journal of Feline Medicine and Surgery*, 15 (3), 219–230.
<https://doi.org/10.1177/1098612X13477537>
- Fatjó, J., Ruiz-de-la-Torre, J. & Manteca, X. (2006). The epidemiology of behavioural problems in dogs and cats: A survey of veterinary practitioners. *Animal Welfare*, 15
- Faure, E. & Kitchener, A.C. (2009). An archaeological and historical review of the relationships between felids and people. *Anthrozoös*, 22 (3), 221–238.
<https://doi.org/10.2752/175303709X457577>
- Finka, L.R., Ward, J., Farnworth, M.J. & Mills, D.S. (2019). Owner personality and the wellbeing of their cats share parallels with the parent-child relationship. *PLoS ONE*, 14 (2), e0211862. <https://doi.org/10.1371/journal.pone.0211862>
- Foreman-Worsley, R., Finka, L.R., Ward, S.J. & Farnworth, M.J. (2021). Indoors or outdoors? An international exploration of owner demographics and decision making associated with lifestyle of pet cats. *Animals (Basel)*, 11 (2), 253-.
<https://doi.org/10.3390/ani11020253>
- Gourkow, N., Hamon, S.C. & Phillips, C.J.C. (2014). Effect of gentle stroking and vocalization on behaviour, mucosal immunity and upper respiratory disease in anxious shelter cats. *Preventive Veterinary Medicine*, 117 (1), 266–275.
<https://doi.org/10.1016/j.prevetmed.2014.06.005>
- Grigg, E.K. & Kogan, L.R. (2019). Owners' attitudes, knowledge, and care practices: exploring the implications for domestic cat behavior and welfare in the home. *Animals*, 9 (11), 978. <https://doi.org/10.3390/ani9110978>
- Heidenberger, E. (1997). Housing conditions and behavioural problems of indoor cats as assessed by their owners. *Applied Animal Behaviour Science*, 52 (3), 345–364.
[https://doi.org/10.1016/S0168-1591\(96\)01134-3](https://doi.org/10.1016/S0168-1591(96)01134-3)
- Herron, M.E. & Buffington, C.A.T. (2010). Environmental enrichment for indoor cats. *Compendium (Yardley, PA)*, 32 (12), E4
- Horwitz, D.F. & Pike, A.L. (2014). Common sense behavior modification: A guide for practitioners. *Veterinary Clinics of North America: Small Animal Practice*, 44 (3), 401–426. <https://doi.org/10.1016/j.cvsm.2014.01.009>
- Howell, T.J., Bowen, J., Fatjó, J., Calvo, P., Holloway, A. & Bennett, P.C. (2017). Development of the cat-owner relationship scale (CORS). *Behavioural Processes*, 141, 305–315. <https://doi.org/10.1016/j.beproc.2017.02.024>
- Lindell, E.M. (2016). Top 5 kitten behavior tips. *Clinicians Brief*, February 2016.
<https://www.cliniciansbrief.com/article/top-5-kitten-behavior-tips>
- Lue, T.W., Pantenburg, D.P. & Crawford, P.M. (2008). Impact of the owner-pet and client-veterinarian bond on the care that pets receive. *Journal of the American Veterinary Medical Association*, 232 (4), 531–540.
<https://doi.org/10.2460/javma.232.4.531>

- Macdonald, D., Yamaguchi, N. & Kerby, G. (2000). Group-living in the domestic cat: Its sociobiology and epidemiology. *The Domestic Cat: The Biology of its Behaviour*. 95–118
- O’Haire, M. (2010). Companion animals and human health: Benefits, challenges, and the road ahead. *Journal of Veterinary Behavior*, 5 (5), 226–234.
<https://doi.org/10.1016/j.jveb.2010.02.002>
- Salman, M.D., Hutchison, J., Ruch-Gallie, R., Kogan, L., New, J.C., Kass, P.H. & Scarlett, J.M. (2000). Behavioral reasons for relinquishment of dogs and cats to 12 shelters. *Journal of Applied Animal Welfare Science*, 3 (2), 93–106.
https://doi.org/10.1207/S15327604JAWS0302_2
- Sandøe, P., Nørspang, A., Forkman, B., Bjornvad, C., Kondrup, S.V. & Lund, T. (2017). The burden of domestication: A representative study of welfare in privately owned cats in Denmark. *Animal Welfare*, 26, 1–10.
<https://doi.org/10.7120/09627286.26.1.001>
- SJVFS 2020:8 (2020). *Allmänna råd om hållande av hundar och katter*. Jönköping: Statens jordbruksverk. [2021-12-06]
- SLU (2021) *Veterinärprogrammet, för antagna fr.o.m. 2017*. Studentwebben, Sveriges lantbruksuniversitet. <https://student.slu.se/studier/kurser-och-program/program-pa-grundniva/veterinarprogrammet-2017/> [2021-12-06]
- Strickler, B.L. & Shull, E.A. (2014). An owner survey of toys, activities, and behavior problems in indoor cats. *Journal of Veterinary Behavior*, 9 (5), 207–214.
<https://doi.org/10.1016/j.jveb.2014.06.005>

Acknowledgements

I would like to thank my mentors, Maria Andersson and Elin Hirsch, for helping me greatly in editing this thesis and providing inspiration for the topics discussed.

I would also like to thank Djurvännernas Förening in Stockholm for providing the funding needed in order to conduct this study.

Finally, I would like to thank my dad, Dan Wolf, for meticulously editing this thesis and providing constructive feedback.

Popular science summary

The modern cat has many environmental needs similar to those of its wild ancestor, the North African Wildcat. If these needs are not met it can result in the cat becoming stressed/anxious/fearful/frustrated. This can be expressed in certain behaviors that can be problematic both for the cat and the owner. The cat's wellbeing could decrease even further depending on how the owner chooses to react to such behaviors.

This study used an online questionnaire in Sweden to survey the general attitude of humans toward cats and their behavioral problems. Respondents were asked how they experienced the problems emotionally and how they chose to react, both initially and if the behavior was repeated. The general attitude of respondents toward cats in this study was positive. The majority viewed cats as an appropriate house pet and believed that they were as meaningful as a family member or a friend.

The behaviors presented in this study included: the cat urinating outside of the litterbox, biting and/or scratching the owner, meowing loudly and/or hiding in the cage during a veterinary visit, staying in the cage once home from the veterinarian, scratching the owner's furniture, stealing from the owner's plate of food and scratching a child after being provoked.

The behaviors reported most frequently were biting and/or scratching the owner, scratching the owner's furniture and stealing from the owner's plate of food. These reportedly occurred more commonly in this study than prior studies. This could be interpreted to mean that a large number of cats in Sweden do not have the proper household environment to provide for the wellbeing of the cat. The behavior that caused the most irritation was scratching the owner's furniture, even though this seemed to be viewed as normal behavior. The behaviors that respondents indicated would cause the most strain on the cat-owner bond included: inappropriate urination, biting and/or scratching the owner and scratching the owner's furniture.

The results of this study revealed a connection between the cat obtained from a shelter and its exhibiting behaviors that could indicate stress and anxiety. These behaviors included biting and/or scratching the owner and meowing loudly and/or

hiding in the cage during a veterinary visit. These findings emphasize the importance to all cats, but especially those from a shelter, of a safe and secure environment.

The findings of this study are important to raise awareness of the frequency of behavioral problems in cats and how they are experienced by owners in Sweden. This will help veterinarians become more aware of which behaviors cause tension on the cat-owner bond and potentially decreased wellbeing for the cat. Veterinarians can then educate and provide owners with the tools they need to improve the quality of life for the cat.