

ORIGINAL RESEARCH ARTICLE

The Use of Psychoactive Medications and Non-medication Alternatives for Cats and Dogs in North American Animal Shelters and Rescues

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Introduction: Animals in shelters commonly experience fear, anxiety, and stress. Psychoactive medications and non-medication alternative options are recommended and used in shelters to manage these negative affective states, yet little is known about the current practices, perceptions, and barriers surrounding their use.

Methods: This study investigated the use and perceptions of psychoactive medications and non-medication alternative options in animal shelters and rescues across Canada, the United States, and Mexico. An online survey collected responses from 233 participants representing 148 unique shelters, focusing on the frequency of use, comfort administering, and efficacy, as well as barriers and considerations influencing psychoactive medication and non-medication alternative use decisions.

Results: Results showed that dogs experiencing fear were more frequently treated with psychoactive medications than cats experiencing fear. Gabapentin and fluoxetine were the most commonly used medications for fearful cats, while trazodone and gabapentin were the most commonly used for fearful dogs, with respondents reporting high ratings for both comfort in administering these medications to animals, and perceived efficacy of these medications at reducing anxiety in animals. Pheromones and nutraceuticals were the most commonly used non-medication alternative options. There was high agreement with the statement that admittance to an animal shelter is the main cause of behavior and welfare problems, and that welfare concerns are a key justification for providing psychoactive medication. Cost and uncertainty about the efficacy of treatments emerged as leading barriers to psychoactive medication administration. Specific characteristics, including the respondent's role and type of shelter, influenced perceptions about psychoactive medications and alternatives, and barriers to their use.

Conclusion: These findings highlight the importance of further understanding the efficacy and safety of psychoactive medication and alternatives, as well as addressing the barriers to their administration, to improve overall welfare outcomes for cats and dogs in shelter and rescue environments.

Keywords: *animal shelters; rescues; cats; dogs; North America; gabapentin; trazodone; pheromones; anxiety; surveys and questionnaires*

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Animal shelters across the United States of America (USA), Canada, and Mexico care for millions of cats and dogs each year.^{1–4} Unfortunately, during their time in shelters, cats and dogs often experience unmitigated fear, anxiety, and stress.^{5–9} Effectively recognizing, addressing, and reducing these negative affective states in animals in shelters is crucial not only for improving their health and welfare, but also for improving their adoptability and overall live outcomes (e.g. adopted, reclaimed by their owner, transferred to another organization for adoption).^{10–14}

This challenge is particularly pressing because shelters often need to make care decisions swiftly – usually at intake or within the first few days, when animals are most likely to be at their most fearful, and when decisions about their pathway or outcome may need to be made despite their fear behavior potentially influencing those decisions.^{15,16}

When an animal in a shelter is identified as needing a welfare intervention, shelter guidelines typically recommend environmental management, behavior modification, or the use of psychoactive medications or

non-medication alternative options ('non-medication alternatives') to improve the animal's emotional state and facilitate behavioral management.^{13,17} Psychoactive medications, which encompass a broad range of prescribed drugs, are used to alleviate stress and anxiety.^{15,18,19} These medications include well-known classes such as fast-acting (situational) medications such as benzodiazepines and slower-acting (long-term) selective serotonin reuptake inhibitors (SSRIs) like fluoxetine.¹⁸ While these drug categories and types are widely recognized, the specific medications within them can vary in terms of their mechanism of action, duration of effectiveness, potential side effects, and suitability for individual animals.¹⁸ Psychoactive medications are commonly recommended for use in conjunction with behaviour modification protocols,^{18–20} aiming to address not just the underlying emotional state driving problem behaviors, but also their learning processes and behavioral responses. While there is some research on the impact of psychoactive medication to improve welfare for dogs and cats, most of it has been conducted in settings outside of shelters, such as veterinary hospitals and homes (e.g. ^{17,21–23}), and inferred from studies on other species, case reports, or expert opinion.^{17,18} It is important to emphasize that only veterinarians are qualified to diagnose and prescribe psychoactive medications, underscoring the need for collaboration between shelter staff and veterinary professionals in implementing these interventions.

Non-medication alternative options (called 'non-medication alternatives' throughout) may be used in shelters, including herbal supplements (e.g. bach flower essences/Rescue Remedy®), nutraceuticals (e.g. Anxitane®, Zylkene®, Solliquin®), pheromonal products (e.g. Feliway®, Adaptil®), or cannabinoid products (e.g. cannabidiol (CBD) oil or products). It is important to notice that regional regulations may influence the classification of CBD products, with some jurisdictions categorizing them as psychoactive substances rather than non-medication alternatives.²⁴

There is a notable gap in research that explores current practices or evaluates the social and organizational justifications and implications of the widespread use of psychoactive medications or alternatives in shelters. Moreover, there is limited research on how shelter staff and adopters perceive and feel about the use of psychoactive medications or alternatives in shelter settings. Understanding these perceptions is crucial as they may notably influence how these treatments are implemented in shelter environments.²⁵ For instance, evidence suggests that dog and cat owners' opinions and comfort levels regarding the use of psychoactive medications and alternatives directly impact their likelihood of using these treatments for their companion animals.^{26,27}

This study had several aims. Firstly, we aimed to describe and quantify the frequency of use of psychoactive

medications and non-medication alternatives within animal shelters across North America. We also sought to assess the comfort levels of staff and volunteers in administering these interventions and their perceived efficacy to understand if, when, and how shelters are using these tools as potential welfare interventions. Secondly, we aimed to investigate perceptions of anxiety-related behavior problem causes in shelters, the justification for psychoactive medication use, the considerations influencing decision-making surrounding psychoactive medication use, and the barriers to using these medications in shelters. Through this, we aimed to identify the factors that support or hinder the use of these potential interventions, allowing for more informed and effective decision-making in shelter environments. Finally, we aimed to determine whether factors such as country, type of shelter, total shelter intake, or the respondent's role within the shelter impact their responses, as these variables may reveal differences in practices and attitudes that can guide tailored approaches to improving animal welfare. Overall, we aimed to provide a comprehensive overview that will inform the development of evidence-based shelter behavior protocols across North America and identify key areas for future research based on the current practices and patterns observed in shelters.

Methods

Ethics approval

This study was reviewed and approved by the University of British Columbia's Behavioural Research Ethics Board (H22-00418). The participants provided their written informed consent to participate in this study.

Survey data collection and respondents

Data were collected through an online survey administered via Qualtrics and advertised through social media and word of mouth to respondents working in animal shelters across Canada, the USA, and Mexico. The survey and advertisements were made available in English, French, and Spanish (Supplementary Material A). After the study concluded, all responses were translated into English for analysis.

The survey included a variety of questions designed to gather detailed information on the use and perceptions of psychoactive medications and non-medication alternatives in shelters. Respondents were asked about the frequency of use, perceived efficacy, and comfort levels with administering these medications to dogs and cats in their care, and the frequency of the use of non-medication alternatives. Respondents were able to select more than one psychoactive medication and non-medication alternative, if applicable. Additional questions explored the respondents' perceptions of the causes of behavioral problems in shelter animals, the factors influencing

decisions to use or not use psychoactive interventions, and any barriers they encountered in implementing these treatments. The survey also sought to understand perceptions surrounding the use of non-medication alternatives, and how these non-medication alternatives are integrated into shelter practices (Supplementary Material A). For the purposes of this study, cannabinoids were classified as non-medication alternatives, though classifications may vary by region and product.²⁴

Demographic information was collected from respondents, including their level of involvement in medication decision-making (prescribe medications, suggest medications, or not involved), the type of shelter that they work in (private shelter, private shelter with municipal contract, municipal shelter, foster, or other), their country (Canada, Mexico, or USA), and their total annual intake (low [0–4,000] or high [≥4,000]). This annual intake cut-off was chosen pragmatically to differentiate smaller shelters from larger ones, as it aligns with the midpoint of the intake categories provided in the survey.

The survey received a total of 233 responses from 148 individual organizations. Some of these responses were from duplicate organizations, meaning that the same organization was represented more than once by multiple individual respondents. To address this, a subset of data ($n = 148$) was created in which duplicate organizations were removed, retaining only the response from the individual within the duplicate organization with the highest level of involvement in decision-making. For descriptive summaries of overall trends, the ‘Total Dataset’ ($n = 233$) was used to provide a comprehensive overview, to ensure all respondents were represented in the results. However, due to limited counts in certain demographic categories in the total sample – specifically ‘Other’ shelter types ($n = 8$) and responses from Mexico ($n = 9$) – these categories were excluded from the ‘Analysis Sample Without Duplicate Shelters’ ($n = 136$), which was used for the multivariate model analysis detailed below. This exclusion ensures that the statistical models maintain robustness and validity, as low counts in certain categories could lead to unreliable estimates or overfitting.

In certain instances, some respondents did not complete all questions, resulting in smaller sample sizes for specific analyses. Throughout the methods and results sections, the specific sample size and dataset used are indicated (Table 1).

Statistical analysis

Descriptive statistics were calculated for the frequency of psychoactive medication administration to fearful cats and dogs, as well as for the frequency of individual medications given to cats and dogs (‘Total Dataset Without Duplicate Shelters’, $n = 148$). For each medication type, the mean and standard deviation (SD) of comfort and efficacy ratings were calculated after converting

Table 1. Demographic breakdown of survey respondents by dataset, including role in medication decision-making, type of shelter, country, and total annual intake

	Total Dataset ($n = 233$)	Total Dataset Without Duplicate Shelters ($n = 148$)	Analysis Sample Without Duplicate Shelters ($n = 136$)
Role in Medicine Decisions			
Not Involved	29 (12.4%)	13 (8.7%)	13 (9.5%)
Suggest Medications	85 (36.4%)	50 (33.7%)	41 (30.1%)
Prescribe Medications	119 (51.0%)	85 (57.4%)	82 (60.2%)
Type of Shelter			
Private Shelter	104 (44.6%)	63 (42.5%)	60 (44.1%)
Private with Municipal Contract	57 (24.4%)	37 (25.0%)	37 (27.2%)
Municipal Shelter	45 (19.3%)	27 (18.2%)	27 (19.8%)
Foster	19 (8.1%)	17 (11.4%)	12 (8.8%)
Other	8 (3.4%)	4 (2.7%)	-
Country			
Canada	65 (27.9%)	36 (24.3%)	34 (25.0%)
Mexico	10 (4.2%)	9 (6.0%)	-
USA	158 (67.8%)	103 (69.5%)	102 (75.0%)
Annual Intake			
Low (0–4,000)	134 (57.5%)	90 (60.8%)	79 (58.0%)
High (4,000+)	99 (42.4%)	58 (39.1%)	57 (41.9%)

Likert scale responses into numeric values from 1 to 5. Comfort ratings ranged from ‘Very Uncomfortable’ to ‘Very Comfortable’, while efficacy ratings ranged from ‘Never Effective’, indicating 0% showing improvements, to ‘Always Effective’, indicating 100% showing improvements. Neutral responses were assigned a value of 3 and treated as a midpoint, reflecting neither endorsement nor rejection. Agreement levels, as shown in Fig. 2, were ranked by calculating the mean response value for each, with higher means indicating stronger overall endorsement. Descriptive statistics were also used to calculate the count and percentage of respondents who reported using various non-medication alternatives.

The proportion of respondents who agreed with various statements about the causes of behavior problems, justification for psychoactive medication use, considerations in psychoactive medication decision-making, barriers to administering psychoactive medication, and considerations for the use of non-medication alternatives were also calculated and visualized. Agreement levels were captured on a Likert scale ranging from ‘Strongly Disagree’ to ‘Strongly Agree’.

The study was designed to explore whether factors such as shelter type, country, intake level, and staff roles were associated with differences in the use, perceptions, and barriers surrounding psychoactive medications and

alternatives. We predicted that these factors might influence decision-making processes and the frequency of medication use, providing actionable insights for tailoring interventions to specific shelter contexts. To evaluate whether there was a difference in the frequency of psychoactive medication use between cats and dogs, a Mann–Whitney U test (Wilcoxon rank-sum test) was conducted. Ordinal logistic regression models were used to assess the frequency of psychoactive medication use to examine the relationships between predictor variables and considerations, justifications, and barriers related to psychoactive medication use, as well as beliefs about the causes of behavior problems ('Analysis Sample Without Duplicate Shelters', $n = 136$). The predictor variables included the respondent's role in medication decisions (Not Involved, Suggest Medications, Prescribe Medications), type of shelter (Private Shelter, Private with Municipal Contract, Municipal Shelter, Foster, Other), country (Canada, USA), and annual intake (Low [0–4,000] or High [$>4,000$]).

The models estimated the effect sizes (log odds) for each predictor variable. To account for multiple comparisons and reduce the risk of Type I errors, p -values were adjusted using the Benjamini-Hochberg method.²⁸ Predictor variables with adjusted P -values $< .05$ were considered statistically significant. All predictors (Role in Medication Decisions, Type of Shelter, Country, and Annual Intake) were included in a single ordinal logistic regression model. The model inherently compares levels within each predictor (e.g. Prescribe vs. Suggest within Role) while accounting for other predictors. The proportional odds assumption was tested using Brant-Wald tests.²⁹ All analyses and visualizations were conducted using RStudio, Version 2024.04.2+764.

Results

For a full breakdown of the respondent demographics, see Table 1.

Frequency of use, comfort administering, and perceived efficacy of psychoactive medications

Respondents reported that they rarely administered medication on intake to every dog or cat. For shelters that house cats ($n = 125$ of 148 shelters), 3% (4/125) respondents reported that they administered psychoactive medication on intake to all cats perceived to be medically suitable to receive medication. The frequency of psychoactive medication administration was significantly higher for fearful dogs compared to fearful cats (Mann–Whitney $U = 12,596$, $P < .001$). For shelters that housed dogs ($n = 129$), 4% (5/129) reported that they administered psychoactive medication on intake to all medically suitable dogs. However, when asked how often shelters administered psychoactive medication to fearful

cats or dogs, frequency of administration varied between species. Generally, dogs were more likely than cats to begin on a course of psychoactive medication 'Often' or 'Always' when they exhibited signs of fear or anxiety. For a detailed breakdown of these frequencies by species, refer to Fig. 1. The ordinal logistic regression analysis did not find any statistically significant relationships between the frequency of medication use and predictors such as country, type of shelter, or shelter intake after applying the Benjamini–Hochberg correction.

Among shelters that housed cats ($n = 125$), gabapentin was the most commonly used psychoactive medication by a large margin, with 68% of respondents reporting its use. Fluoxetine, the next most commonly used medication for cats, was reported to be used by nearly half as many respondents of 38%, followed by trazodone use reported by 19% respondents. While the high rate of use of gabapentin was expected due to the evidence of its efficacy and safety for cats,^{19,26} the relatively high reported frequency of slow-acting fluoxetine for cats is notable, considering it may take several weeks to take effect.¹⁸ Under 10% of respondents reported using benzodiazepines, amitriptyline, clomipramine or sertraline for cats, while fluvoxamine and doxepin were not reported at all (Table 1).

Respondents generally reported moderate to high comfort levels and perceived efficacy with all of the medications they reported using. While gabapentin was reported to be used notably more than other medications for cats, it did not receive the highest efficacy score (all mean efficacy scores ranged between 3.0 and 3.5 out of 5). A small number of respondents ($n = 9$) who reported administering benzodiazepines to cats rated its efficacy higher (3.5/5) compared to the 85 respondents who reported using gabapentin (3.3/5). However, as a diverse medication class, benzodiazepines may elicit variable responses and adverse effects between individual drugs. Gabapentin did receive the highest comfort rating among all medication types (4.4/5), though by a small margin (all mean comfort scores ranged between 3.0 and 4.4). However, given the small sample size for certain medications, such as benzodiazepines, and the narrow range of efficacy and comfort scores across medications, these numerical differences should be interpreted with caution, as they are unlikely to reflect meaningful clinical or practical differences. For a detailed breakdown of medication frequency, comfort scores, and efficacy scores for each medication, refer to Table 2.

Among shelters that housed dogs ($n = 129$), trazodone was the most commonly used psychoactive medication, reported to be used by 89 (69%) respondents. Gabapentin was also widely used, with 79 (61%) respondents indicating its use, followed by fluoxetine, reported by 68 (53%) respondents. Clomipramine and benzodiazepines were used less frequently, with 35 (27%) and 18

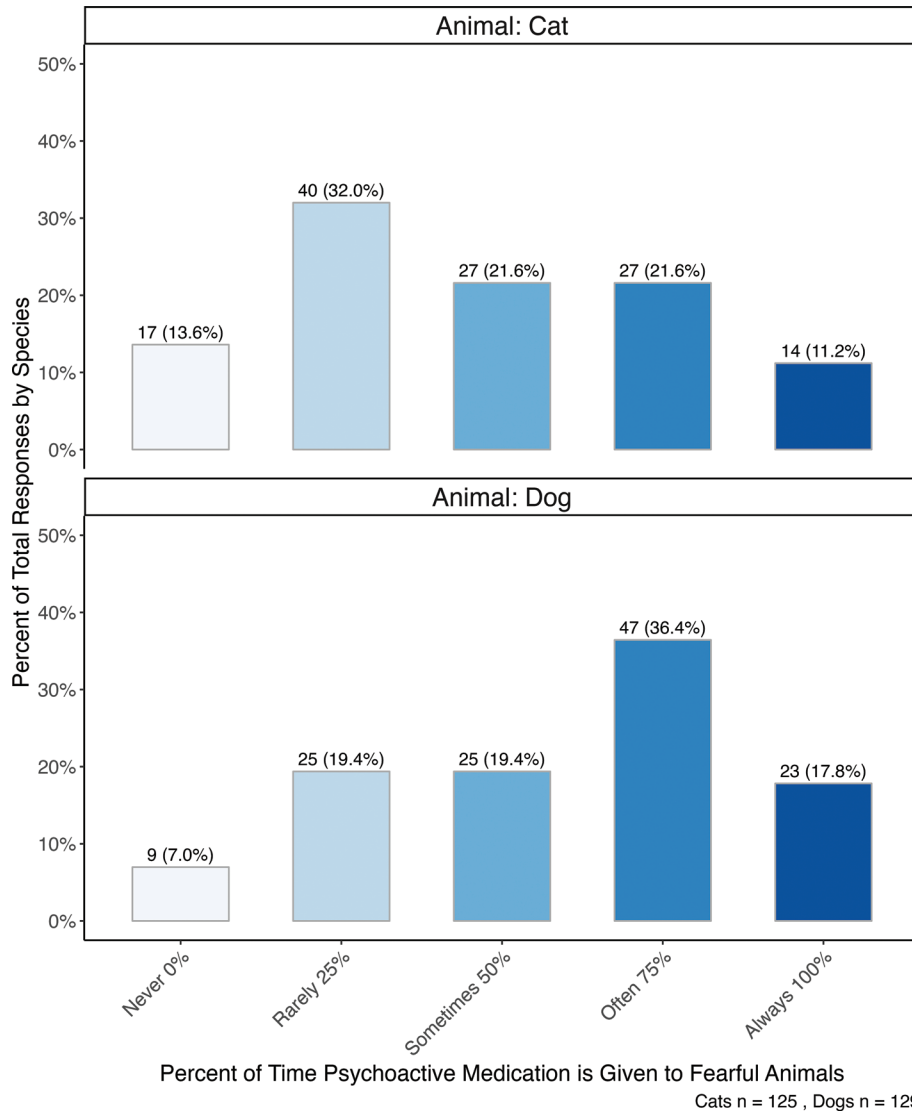


Fig. 1. The percent of time psychoactive medication was reported given to fearful cats ($n = 125$ of 148 shelters) and dogs ($n = 129$ of 148 shelters). The y-axis represents the percentage of total responses within each species, and the x-axis categorizes the frequency of medication administration, from 'Never (0% of the time)' to 'Always (100% of the time)'. Numbers above each bar indicate the count and percentage of responses within each category. Fearful cats were most frequently medicated 'Rarely (25% of the time)' while fearful dogs were most commonly medicated 'Often (75% of the time)'. Datasource: Total Dataset Without Duplicate Shelters ($n = 148$).

(14%) respondents reporting their use, respectively. Other medications, including sertraline, fluvoxamine, amitriptyline, and paroxetine, were reported by fewer than 10% of respondents, with doxepin not being reported as used for dogs at all (Table 2).

As with cats, respondents generally reported moderate to high comfort levels and perceived efficacy with the medications they used for dogs. Again, expectedly, the medication with the highest frequency of use for dogs (trazodone) had the highest comfort rating (4.6/5) and one of the highest efficacy scores (3.4/5). While gabapentin was also commonly used for dogs, its efficacy score was slightly lower than the score for trazodone, despite a

similar comfort rating (4.5/5). For a detailed breakdown of medication frequency, comfort scores, and efficacy scores for each medication, refer to Table 2.

The survey responses highlighted the varying use of non-medication alternatives in animal shelters, with some alternatives being far more common than others. Pheromones emerged as the most frequently used non-medication alternative, with nearly two-thirds of respondents (93/148, 63%) incorporating them into their shelter practices for dogs and cats. Pheromone use was reported nearly as frequently as the most used psychoactive medications detailed above. Nutraceuticals were also fairly common, with just under a third of

Table 2. Medication summary, frequency of use, comfort, and efficacy ratings for psychoactive medications used for fearful cats and dogs in North American animal shelters and rescues

Animal	Medication	Fast or Slow Acting	Type	Count (n=)	Percentage (%)	Mean (SD) Comfort	Mean (SD) Efficacy
Cat	Gabapentin	Fast	Anticonvulsant	85	68	4.4 (1.0)	3.3 (0.7)
	Fluoxetine	Slow	SSRI	47	38	4.2 (0.8)	3.2 (0.6)
	Trazodone	Fast	SARI	24	19	3.7 (1.3)	3.0 (0.7)
	Benzodiazepines	Fast	Benzo	9	7	3.8 (1.1)	3.5 (0.7)
	Amitriptyline	Slow	TCA	8	6	4.0 (1.4)	3.5 (0.9)
	Clomipramine	Slow	TCA	6	5	4.0 (0.8)	3.3 (0.8)
	Sertraline	Slow	SSRI	2	2	3.0 (0.0)	3.0 (0.0)
	Paroxetine	Slow	SSRI	1	1	4.0 (0.0)	3.0 (0.0)
	Fluvoxamine	Slow	SSRI	0	0	-	-
	Doxepin	Slow	TCA	0	0	-	-
Dog	Trazodone	Fast	SARI	89	69	4.6 (0.9)	3.4 (0.6)
	Gabapentin	Fast	Anticonvulsant	79	61	4.5 (1.0)	3.1 (0.7)
	Fluoxetine	Slow	SSRI	68	53	4.1 (1.0)	3.3 (0.7)
	Clomipramine	Slow	TCA	35	27	4.1 (1.0)	3.4 (0.7)
	Benzodiazepines	Fast	Benzo	18	14	3.9 (1.3)	3.2 (0.8)
	Sertraline	Slow	SSRI	9	7	4.5 (0.7)	3.3 (0.7)
	Fluvoxamine	Slow	SSRI	8	6	3.9 (1.2)	3.0 (1.0)
	Amitriptyline	Slow	TCA	8	6	4.3 (0.7)	2.8 (0.8)
	Paroxetine	Slow	SSRI	3	2	4.0 (1.7)	3.3 (0.5)
	Doxepin	Slow	TCA	0	0	-	-

Mean and standard deviation (SD) of comfort and efficacy ratings (1–5) were calculated from Likert scale responses, with comfort ranging from ‘Very Uncomfortable’ (1) to ‘Very Comfortable’ (5) and efficacy from ‘Never Effective’ (1) to ‘Always Effective’ (5). Datasource: Total Dataset Without Duplicate Shelters ($n = 148$).

respondents (44/148, 30%) reporting their use. Herbal supplements and cannabinoids were less frequently used, while some respondents indicated that they used no alternatives at all or relied on other non-medication alternatives (Table 3).

Perceptions of, justifications for, and barriers to psychoactive medication and non-medication alternative use in shelters

Survey respondents from the ‘Total Dataset’ ($n = 233$), when asked about the cause of behavior problems in shelters, had the highest agreement with the statement that the shelter itself is the cause of behavior problems (205/221; 93% reported that they ‘Agree’ or ‘Strongly Agree’ with this statement). Developmental issues, underlying anxiety issues, past environments, genetic factors, and past owners were seen as less influential but still relevant, with a high degree of agreement reported (Fig. 2a).

When considering the justification for psychoactive medication use, respondents showed the highest agreement for its use in situations when there is a welfare concern (208/213; 98% ‘Strongly Agree’ or ‘Agree’), poor prognosis without intervention, and when fear or anxiety interferes with behavior modification or learning. There

Table 3. Frequency and percentage of respondent’s reported use of non-medication alternatives. Datasource: Total Dataset Without Duplicate Shelters ($n = 148$)

Medication Alternative	Count	Percentage (%)
Pheromones	93	63
Nutraceuticals	44	30
Herbal Supplements	23	16
Cannabinoids	20	14
Other Non-Medication Alternatives	11	7
None	16	11

was also moderate agreement that medication should be used as a last resort, while using medication upon intake or the belief that medication is never justified received much lower agreement (199/211; 94% reported they ‘Strongly Disagree’ or ‘Disagree’) (Fig. 2b).

Regarding the factors influencing medication decision-making, respondents placed strong emphasis on safety and efficacy, recommendations from a veterinarian, and ease of administration (Fig. 2c). Meanwhile, primary barriers to administering psychoactive medication in shelters included cost, unknown efficacy, adoptability

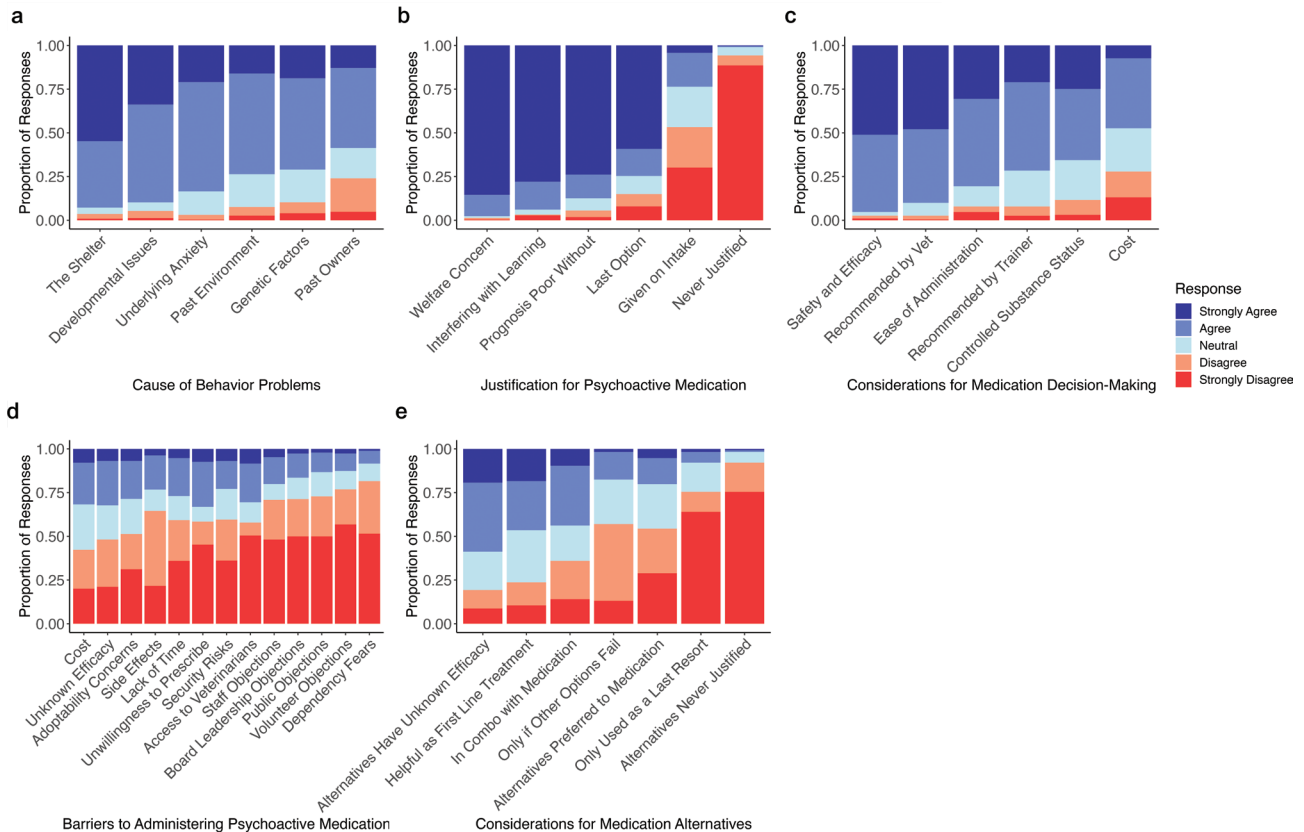


Fig. 2. The proportion of survey respondents' agreement on various aspects related to psychoactive medication and non-medication alternative use in animal shelters, displayed across five key areas: (a) Cause of behavior problems in the shelter, (b) Justification for the use of psychoactive medications, (c) Considerations for psychoactive medication decision-making, (d) Barriers to administering medications, and (e) Considerations for the use of non-medication alternatives. Responses were collected on a Likert scale ranging from 'Strongly Disagree' to 'Strongly Agree', with the proportion of responses falling within each category shown on the y-axis. Within each plot, responses are organized such that the highest levels of agreement are positioned on the left, progressing to the lowest levels of agreement on the right. Datasource: Total Dataset ($n = 233$).

concerns, side effects, and lack of time to administer medications (Fig. 2d). Notably, the prescription of psychoactive medications is legally restricted to veterinarians, underscoring their critical role in these decisions.

Responses regarding the use of non-medication alternatives were varied. Respondents most agreed that non-medication alternatives have limited or unknown efficacy (67/114; 59% reported they 'Strongly Agree' or 'Agree'), but they also acknowledged that these alternatives could be helpful as a first-line treatment or in combination with psychoactive medication. Less agreement was observed for the use of alternatives only when other options failed, as a last resort, or the belief that their use is never justified (Fig. 2e).

Unfortunately, only a small minority of respondents provided an answer to the question, 'Do you inform adopters if an animal is receiving or has received psychoactive medication while in your care?' Of the 11 out of 233 respondents who answered, 8 said 'Yes', 2 said 'Sometimes', and 1 said 'No'. When those respondents were subsequently asked, 'In your experience, if an animal has been given a psychoactive

medication while in the shelter and an adopter is informed, has it been a barrier to adoption?', 1 replied 'Yes', 1 replied 'Sometimes', and 7 replied 'No'. While only a small number of respondents provided answers to these questions, the data suggest minimal reported barriers to adoption when adopters are informed of psychoactive medication use. However, due to the limited sample size, these findings should be interpreted with caution and may not be generalizable. These few specific questions were not made mandatory, likely resulting in the lower response rate.

Influence of predictors on psychoactive medication and non-medication alternative use in shelters

Estimates derived from ordinal logistic regression models, assessing the impact of various predictors reported by survey respondents on responses to questions related to psychoactive medication use in animal shelters (highlighted in Fig. 2) are shown in Fig. 3. Each bar in the plot represents the estimate (effect size) associated with a predictor variable, with significance determined by adjusted

p-values, corrected using the Benjamini–Hochberg method ($P < .05$). The only finding with statistically significant results following the correction are presented in Fig. 3.

Several key relationships were identified. The barrier of lack of time was less of an issue in private shelters compared to municipal shelters (estimate = -1.02 , odds ratio [OR] = 0.36 , 95% confidence interval [CI] = 0.13 – 0.97 , $P = .04$), as was cost (-1.11 , 0.33 , 0.12 – 0.91 , 0.03), and objections from board leadership (-0.99 , 0.37 , 0.14 – 0.97 , 0.04). The barrier of dependency fear was lower in high-intake shelters (annual intake over 4,000) compared to low-intake shelters (annual intake under 4,000) (-0.90 , 0.41 , 0.19 – 0.87 , 0.03). The barriers of access to a veterinarian and veterinarian unwillingness to prescribe were expectedly lower among respondents directly involved in prescribing psychoactive medications compared to those who are not involved (-0.86 , 0.42 , 0.20 – 0.86 , 0.03 ; -0.88 , 0.42 , 0.23 – 0.77 , 0.02).

In terms of considerations for the use of psychoactive medications, ease of administration was rated as a higher consideration among those involved in prescribing compared to those not involved (1.09 , 2.97 , 1.25 – 7.06 , 0.01). Regarding justifications for the use of psychoactive medications, interfering with learning was a greater concern among those involved in prescribing medication compared to those who are not (1.54 , 4.67 , 1.34 – 16.32 , 0.03). Lastly, agreement that alternatives should be used as a first-line treatment was lower for private shelters compared to municipal shelters (-1.44 , 0.24 , 0.08 – 0.74 , 0.02), and for high-intake shelters compared to low-intake shelters (-1.05 , 0.35 , 0.13 – 0.91 ,

0.04). Finally, compared to municipal shelters, foster shelters had lower agreement that non-medication alternatives should only be used as a first-line treatment (-0.97 , 0.38 , 0.15 – 0.94 , 0.04).

While the effect sizes observed in these analyses are relatively small, they align with expected trends and provide insight into subtle but potentially meaningful differences in how barriers and considerations are perceived across shelter types, roles, and intake levels. In resource-limited shelter environments, even modest differences may have practical significance in guiding decision-making and intervention priorities.

Discussion

This survey study provides insights into the current practices and perceptions surrounding the use of psychoactive medications and non-medication alternatives in animal shelters across Canada, the USA, and Mexico. Overall, psychoactive medications are rarely given to every animal on intake as a population-level strategy, and psychoactive medications are more frequently administered to fearful dogs than to fearful cats. Only a small percentage of respondents reported routinely administering psychoactive medication to all medically suitable cats and dogs at intake, with 3.20% for cats and 3.87% for dogs. These findings suggest that shelters do not administer psychoactive medications to all animals, despite recognizing the potential stressors within shelter environments.

A small body of emerging research suggests that psychoactive medications may play a valuable role in improving the welfare of shelter animals. A study by Eagan et al.¹⁹

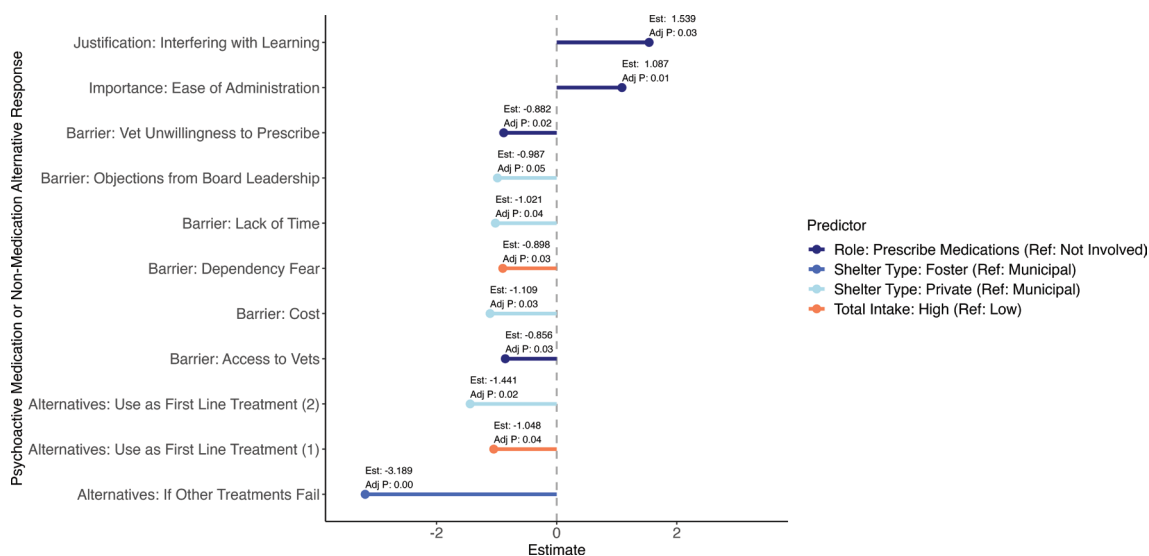


Fig. 3. Estimates derived from ordinal logistic regression models evaluating the influence of various predictors reported by survey respondents ($n = 136$) on responses related to psychoactive medication and non-medication alternative use in animal shelters. Each line represents the estimate (effect size) associated with a predictor variable, with the adjusted p-value, corrected using the Benjamini–Hochberg method, indicating the significance level ($P < .05$). Color indicates different predictor levels. Datasource: Analysis Sample Without Duplicate Shelters ($n = 136$).

found that daily gabapentin given on intake to fearful cats rescued from hoarding environments resulted in accelerated progress on a standardized behaviour modification program,¹⁹ decreased the Cat Stress Score (CSS),³⁰ and decreased latency to emerge from hiding compared to a placebo group. One correlational study by Abrams et al.¹⁵ found that, compared to a historical control, dogs given prophylactic trazadone on intake showed associations with reduced illness, shorter length of stay, and a higher adoption rate, suggesting that trazadone may be effective in mediating transitional stress in a shelter for dogs.¹⁵ This limited research indicates that select psychoactive medication use in shelters, particularly beginning with intake, shows promise for improving the welfare and outcomes of cats and dogs in shelters.^{15,19} However, the evidence to support the widespread use of these practices is still currently lacking, relying primarily on a small number of studies with narrow focus.

While Abrams¹⁵ studied psychoactive medication on intake protocols for dogs in shelters, showing promising preliminary results, this remains a relatively unstudied area. In a position statement on the use of behavioral pharmacology for animals in shelters and rescues, the American Society for the Prevention of Cruelty to Animals (ASPCA) does not recommend routine use of psychoactive medication for all animals upon arrival or throughout their stay.²⁰ Rather, the ASPCA recommends basing medication decisions on individual animal case and needs, except in situations when short-term population-level medication may be justified (e.g. to ease intake stress for an under socialized group of animals from a hoarding case).²⁰ Due to the very limited body of research assessing the impact of psychoactive medication use in shelters, there is little evidence available to inform these decisions. Interestingly, our survey also revealed that a majority of respondents had a high degree of agreement that shelter environments themselves are the primary cause of behavior problems. However, this belief does not translate into routine administration of psychoactive medication to animals experiencing fear. This is in contrast to veterinary clinics, where prophylactic treatment is often recommended to mitigate stress.³¹

There was a notable discrepancy in the frequency of administration of psychoactive medications between fearful cats and dogs in shelters, with dogs experiencing fear were much more likely to be given psychoactive medication 'Often' or 'Always' compared to cats. This disparity may reflect differences in the perception of anxiety severity between species or possibly the greater availability of research and guidance on medicating fearful dogs compared to cats.¹⁷ Furthermore, it is also possible that fear or stress may be more difficult to interpret or identify in cats, given the sometimes-subtle and varied behavioral signs of stress in cats.³²

This underscores the need for further investigation into why cats are less frequently medicated, despite evidence suggesting cats in shelters can benefit from psychoactive medications.¹⁹ These findings highlight the importance of developing and promoting evidence-based guidelines that address the specific needs of both species to ensure that all animals receive appropriate care, especially considering the unique welfare challenges cats in shelters face, and the historically lower likelihood cats are to experience positive outcomes in shelters compared to dogs.^{12,33} However, recent national data from Shelter Animals Count indicates that non-live outcomes (e.g. euthanasia, death in care) for cats and dogs in the USA are becoming increasingly similar. Of non-live outcomes in 2023, 53% were cats and 47% were dogs.³⁴ This supports the need to improve outcomes for both species and the potential role that psychoactive medication and alternatives may play in this.

Despite the limited research on the impact of psychoactive medications in shelters, this survey reveals that the most commonly used medications align with those currently studied in shelters. For cats, gabapentin was the most frequently used medication, consistent with its documented benefits in improving behavior modification progress, reducing stress scores, and decreasing latency to emerge from hiding in cats rescued from hoarding situations.¹⁹ For dogs, trazodone was the most commonly used medication, reflecting research that associates it with improved disease outcomes, shorter lengths of stay, and higher adoption rates.¹⁵ Even when accounting for baseline improvement rates and placebo effects, the number needed to treat suggests that psychoactive medications can still offer meaningful benefits for managing anxiety in shelter animals. The relatively high frequency of use, comfort, and reported efficacy of certain medications, such as fluoxetine and trazodone for cats and gabapentin, fluoxetine, or clomipramine for dogs, suggest that these medications may warrant further systematic study to better understand their potential benefits in shelter settings as well. Future studies should not only explore which medications improve welfare and outcomes but also, further explore safety and side effects, and aim to determine the most effective protocols (e.g. at intake, ongoing use, population-level strategies versus individual protocols, use of fast versus slow-acting medications) for achieving the best welfare outcomes. However, medications must always be tailored to each animal's unique needs and circumstances, and be employed alongside environmental management and behavior modification.

Currently, there are many varying opinions on the efficacy and value of the use of non-medication alternative options^{35,36} and their role in shelters.¹⁸ Some studies have directly assessed the impact of pheromones on shelter dogs^{37,38} and cats.^{39,40} While Chadwin et al.³⁹ found no difference in cat stress (as indicated by CSS) with the use

of feline facial pheromone for shelter cats, Patel et al.⁴⁰ found a difference in CSS during a preliminary physical examination for shelter cats. A study by Tod et al.³⁷ found that dog appeasing pheromone (DAP) reduced barking amplitude and frequency in shelter dogs, while another study by Corsetti et al.⁴¹ assessed the impact of CBD for shelter dogs for reducing aggressive behavior toward humans (possibly driven by fear or anxiety), but found no statistically significant differences between CBD and the control group.

Limited research exists on the use of non-medication alternatives outside of shelters, but some evidence suggests possible benefits, such as the use of Zylkene and Anxitane for stress reduction in home and veterinary settings for dogs and cats.^{42–44} The need for more rigorous research methodologies in this area has only recently been recognized (e.g. Vitale⁴⁵). Despite some evidence suggesting potential benefits, there is no comprehensive research on the effectiveness of non-medication alternatives in improving cat and dog welfare specifically within shelter settings.

Respondents of our survey reported widespread use of non-pharmaceutical psychoactive medications alternatives in animal shelters, particularly pheromones, which were reported to be used by nearly two-thirds of respondents. This relatively high usage may suggest that many shelters see non-medication alternatives, such as pheromones, as a low-barrier, relatively safe and accessible option for managing stress in shelter animals, despite the mixed evidence regarding their efficacy.^{35,36,45} Respondents of our survey acknowledged that non-medication alternatives have limited or unknown efficacy, but also reported with moderately high agreement that they may be helpful as a first line treatment. The varied responses suggest that while some shelters are open to adopting these alternatives, there remains a need for further research to ensure these resources are used effectively,¹⁸ and contribute to the best possible outcomes. Such research would clarify their actual benefits and potential risks, ensuring that shelters are not inadvertently choosing less efficacious treatments. Some alternative interventions may also divert funds from more effective treatments, especially when cost is a primary barrier to the administration of psychoactive medications, potentially compounding resource limitations in shelters.

Regarding barriers to the use of psychoactive medications in animal shelters, cost emerged as a primary concern, which was expected considering the often resource limited environment in shelters.¹³ Given the limited financial, staff, and time resources that many shelters operate under, justifying the expense of medications or alternatives may be a challenge. Furthermore, the time required for administering and monitoring these treatments further complicates their use, especially considering best practices

suggest that animals receiving medication should be regularly monitored,¹⁸ and could be at risk of a number of side effects, both minor (gastro-intestinal upset; increased anxiety),⁴⁶ and severe (hepatotoxicity,⁴⁷ serotonin syndrome¹⁷). Although adoptability concerns were reported as a barrier, our survey suggests this may be less of an issue with adopters than anticipated, though more research is needed to fully understand any potential impacts on adoption rates. Importantly, these medications should only be prescribed under veterinary supervision and monitored with appropriate veterinary care, as any medication carries the potential for life-threatening adverse effects.

Barriers and perceptions of psychoactive medication and alternative use varied depending on shelter characteristics, such as type and intake level, as well as the respondent's role within the organization. For example, private shelters reported fewer barriers related to time and cost compared to municipal shelters, while foster shelters showed more support for the use of non-medication alternatives. Expectedly, those directly involved in prescribing medications perceived fewer barriers related to access and veterinary support. A barrier to administering psychoactive medications is the requirement for a licensed veterinarian to oversee the process, including reviewing records, examining animals, prescribing medications, and ensuring appropriate monitoring. These variations in responses based on individual characteristics underscore the need for tailored strategies in developing psychoactive medication and alternative protocols, ensuring that solutions are adaptable to different operational contexts.

The cost and responsibility of continuing psychoactive medication or non-medication alternatives following adoption has been suggested as a potential barrier to adoption. Marder⁴⁸ observes that potential adopters may be reluctant to take on the financial burden and the ongoing responsibility of maintaining an animal on psychoactive medication (if warranted), which may decrease the animal's desirability for adoption. Bennett²⁵ suggests several suspected concerns surrounding psychoactive medication use for dogs in shelters, including concerns that it may sedate the animal, mask symptoms, change personality, or negatively impact adoption potential. However, evidence for many of these potential barriers or concerns, and their impact on animal behavior and adoption, remain largely anecdotal.

Additionally, while welfare concerns were identified as a key justification for the use of psychoactive medications, barriers such as cost, unknown perceived efficacy in the shelter setting, and concerns about the impact of psychoactive medication administration on adoptability were significant factors influencing medication practices and decision-making. Practices and perspectives varied across staff roles and shelter types, with private and high-intake shelters generally facing fewer barriers to psychoactive

medication use. Furthermore, foster shelters exhibited a low agreement that non-medication alternatives should only be used if other treatments fail, indicating a preference for earlier intervention with alternatives. These findings highlight the complexities shelters face in implementing psychoactive interventions and the importance of considering shelter-specific characteristics when developing and applying these protocols. For example, municipal shelters may face greater constraints due to limited budgets or higher animal intake, while private shelters might have more resources but may rely heavily on donor preferences or board approval.

This survey study has several limitations that warrant consideration. Firstly, the use of a convenience sample may limit the generalizability of the findings, as the sample may not represent all shelters across North America, particularly with the low response rate from shelters in Mexico. While response rates were not calculated by country, non-response bias remains a potential concern across all regions included in the study. This gap restricts our understanding of practices in Mexico, unfortunately, despite the many animals living in shelter systems in the region.⁴⁹ Furthermore, the potential influence of the placebo effect should not be overlooked, as it may impact the caregiver's perception of the efficacy of psychoactive medications and alternatives.

Incomplete or misinterpreted responses may have also posed a challenge for specific questions. Some questions may have been ambiguous, potentially leading to varied interpretations by respondents. In addition, while treating neutral responses as a midpoint is standard practice, it may not always capture the full intent of respondents, as neutrality could represent indecision or a lack of strong feelings. The absence of a 'don't know' option represents a limitation, as it may have influenced neutral responses, potentially reflecting uncertainty rather than the intended construct. The length, complexity of the survey, and not requiring responses to all questions likely contributed to this issue, leading to higher rates of partial completion and limiting the ability to draw comprehensive conclusions in some areas, such as the perceived impact of psychoactive medication as a barrier to adoption. Future research is needed to address this, especially given its emergence as a primary barrier and its frequent discussion as a potential concern for shelters.²⁵

We did not investigate whether psychoactive medications or alternatives were administered in combination with other treatments or inquire about the form of the medications (e.g. liquid or tablet), both of which could affect the reported frequency, comfort, and ease of use. For instance, compounded versus commercially available medications, or the practical challenges of administering liquid versus tablet formulations, are variables that could influence shelter practices but remain unexplored in this

study. The absence of specific questions on these factors leaves a gap in understanding their role in shelter practices. Future research should address these gaps to provide a more comprehensive understanding of psychoactive interventions for cats and dogs in shelters. This includes examining whether certain formulations or combinations of treatments are associated with improved ease of administration, efficacy, or compliance in shelter settings.

Finally, the underlying motivations for responses across different shelter types were not thoroughly examined. Access issues may stem from resource constraints, such as limited funding, geographic isolation, or inconsistent availability of veterinary services, which could prevent shelters from obtaining necessary prescriptions or administering medications. For example, foster shelters may favor non-medication alternatives due to potentially experiencing limited access to prescribed medications, an area that future research should investigate further. Additionally, the role of in-house veterinary teams in the use of anxiety medications and alternatives, as well as their perceptions and the barriers they face, also warrants further exploration. The observed variability in responses across shelter types suggests that future studies should examine the reasons behind these differences, providing insights into how access, resources, and staff experience influence medication practices in shelters.

Conclusion

This study provides critical insights into the current practices and perceptions surrounding the use of psychoactive medications and non-medication alternative options in animal shelters across the United States, Canada, and Mexico. Psychoactive medications such as gabapentin for cats and trazodone for dogs are frequently used to address fear and anxiety, with dogs experiencing fear receiving these medications more often than cats experiencing fear. Respondents reported moderate to high levels of comfort administering psychoactive medications and perceived them as effective at reducing fear and anxiety. Non-medication alternatives, particularly pheromonal products, are widely used despite uncertain efficacy. High agreement was reported with the statement that admittance to a shelter is a primary cause of behavior problems, and welfare concerns were identified as a key justification for administering psychoactive medications. However, barriers such as cost, uncertainty about efficacy, and the time required for administration limit their broader use. These findings provide a foundation for developing evidence-based guidelines to improve welfare outcomes for shelter animals.

Authors' contributions

The survey was developed by contributors involved in conceptualization and methodology (BHE, KVH, AA,

AP). BHE managed the survey distribution, data curation, data cleaning, and formal analysis, and prepared the original draft of the manuscript under the supervision of AP. All contributors provided support in reviewing and editing the manuscript.

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