Hearing Health in Companion Animals:
Observational Study of 10,615 Behavioural Hearing Screenings

This study analysed 10,615 completed behavioural hearing screenings using the Pet Acoustics+ hearing wellness platform by pet owners, veterinary professionals and animal care organisations in 86 countries. The hearing responses across three frequency bands in dogs and cats examined the relationship between age and hearing impairment and explored the feasibility of smartphone-based behavioural hearing screening as a practical first-line wellness assessment. Overall, 46.5% of screened animals demonstrated reduced hearing in at least one frequency band. Senior pets (seven years and older) showed higher rates of hearing impairment than younger animals (50.2% vs. 42.5%), while dogs and cats demonstrated comparable overall patterns of hearing decline. High-frequency hearing loss was the most common finding, consistent with recognised patterns of age-related auditory degeneration.

These findings support the value of incorporating routine hearing screening into preventive companion animal healthcare. Behavioural screening is not intended to replace diagnostic audiological testing such as BAER, it offers a rapid, non-invasive method for identifying animals that may benefit from further evaluation, monitoring, or environmental adaptations. The scale and international diversity of this dataset demonstrate the feasibility of behavioural hearing screening as an accessible wellness tool and highlight hearing health as an important, overlooked, component of veterinary preventive care.

Hearing is a primary sensory pathway in companion animals, fundamental to environmental awareness, communication, behavioural regulation and the human-animal bond. Despite its clinical significance, auditory health remains among the least routinely assessed wellness parameters in companion animal practice. Standard wellness examinations typically include vision, dental, cardiac and musculoskeletal assessment, but no systematic hearing evaluation is widely adopted as a routine component of preventive care.

Age-related hearing loss progresses gradually and is frequently attributed by owners and clinicians to behavioural changes such as disobedience, reduced responsiveness, increased anxiety, or apparent cognitive decline. This misattribution delays appropriate clinical response and denies animals the adaptational support that early identification enables.

The gold standard for veterinary audiological assessment – the Brainstem Auditory Evoked Response (BAER) test – requires specialised equipment, trained operators and in many cases sedation. These requirements effectively limit its use to specialist referral contexts, rendering routine hearing surveillance impractical for general practice. The Pet Acoustics+ application was developed to address this gap by delivering a non-invasive, species-specific behavioural hearing screening on any standard smartphone or tablet.

Companion Animal Hearing Physiology
Dogs detect frequencies between approximately 40 Hz and 65 kHz, with peak sensitivity between 500 Hz and 16 kHz. Cats demonstrate an even broader range, from approximately 48 Hz to 79 kHz. Both species rely on hearing for threat detection, social communication and spatial orientation.

Age-related sensorineural hearing loss in dogs typically manifests progressively from approximately seven years of age, with high-frequency sensitivity declining first. Similar patterns are observed in cats. Congenital deafness is documented in specific breeds, particularly those carrying the piebald or merle gene.

The Screening Methodology
The Pet Acoustics+ app presents species-specific sounds across three frequency bands – low (125 Hz to 1 kHz), mid (1 kHz to 4 kHz), and high (4 kHz to 16+ kHz) – and records the human observer's assessment of the animal's behavioural response per band: clear reaction, partial reaction, or no reaction. Results produce a functional hearing profile suitable for baseline establishment, longitudinal monitoring and clinical triage.

STUDY DESIGN, METHODOLOGY AND LIMITATIONS

Data Sources
This study draws on two complementary datasets:

- Hearing screening results database: 10,615 completed behavioural hearing screenings recorded through the Pet Acoustics+ application, representing pet owners, veterinary professionals and animal care organisations across 86 countries.

- Veterinary sample request database: 318 veterinary clinics and animal care professionals who requested Pet Acoustics sample kits, spanning 48 US states and multiple international territories.

The Behavioural Observation Methodology
The Pet Acoustics+ screening tool presents species-specific sounds across three frequency bands and asks the human observer – whether a pet owner, veterinary professional, or animal care worker – to watch the animal and record its behavioural response. This methodology is by design accessible, non-invasive and scalable. It does not require specialist equipment, sedation, or clinical training.

However, it is essential to understand precisely what this methodology measures and what it does not. The result recorded in every test is the observer's perception of the animal's behavioural response – not a direct physiological measurement of auditory function. This distinction has specific implications for how findings should be interpreted.

What the Test Measures
The test measures functional behavioural response to sound at three frequency ranges. A positive result indicates that the animal produced a detectable behavioural reaction – ear rotation, head turn, eye shift, whisker movement, or body orientation – that the observer perceived and recorded. This is a meaningful clinical indicator: animals that consistently respond across all three bands are demonstrating functional hearing across those ranges.

SOURCES OF INACCURACY

Observer Variability – The Primary Source of Inaccuracy
Different observers have different thresholds for what constitutes a 'reaction.' An experienced animal handler may detect a subtle ear twitch that a first-time pet owner does not notice.

Conversely, an observer may misinterpret a spontaneous movement unrelated to the sound as a hearing response. No blinding, standardisation, or inter-rater reliability protocol was applied across the 10,615 records in this dataset. This is the most significant methodological limitation of the study and should be weighed when interpreting all findings.

Animal Non-response does not Confirm Hearing Loss
A cat or dog may fail to produce an observable behavioural response to a sound it can hear. Animals that are sleeping, highly distracted, habituated to the sound, or simply disengaged may not react even when auditory detection has occurred. This means that 'no response' outcomes in the data likely include some animals with intact hearing who chose not to react – producing false negatives. The practical consequence is that the 46.5% hearing impairment rate reported in this study is more likely to be a conservative lower bound than an overestimate.

Observer Over-reporting is also Possible
In the opposite direction, an observer who expects a reaction may interpret a coincidental movement as a hearing response, producing a false positive. This risk is higher with animals that are naturally active or restless during testing. However, false positives of this kind would suppress the measured hearing loss rate, making them directionally less concerning from a clinical standpoint than false negatives.

Direction of Bias and Conservative Interpretation
Taken together, the two primary sources of inaccuracy – false negatives (animals that hear but do not react) and observer misses – both tend to reduce the measured hearing loss rate rather than inflate it. A test that requires a visible behavioural reaction to confirm hearing will systematically under-identify hearing loss in animals that are stoic, distracted, or habituated to the test sounds.

Methodological Interpretation Principle
The hearing impairment rates reported in this study (46.5% overall, 50.2% high-frequency loss) should be interpreted as conservative estimates of true prevalence. The actual proportion of companion animals carrying subclinical hearing impairment is likely equal to or greater than the figures reported here. This does not weaken the study's conclusions – it strengthens them.

This Is Not a Diagnostic Tool
The Pet Acoustics+ screening tool is designed as a first-line functional assessment, not a clinical diagnosis. A result showing absent response in one or more frequency bands indicates that the observer did not detect a behavioural reaction to that frequency range during that session. It does not constitute a diagnosis of sensorineural hearing loss conductive hearing loss, or any specific audiological condition. Animals with abnormal screening results should be referred for formal audiological evaluation, including BAER testing where clinically indicated.

Comparison to Other Behavioural Screening Methodologies
The limitations described above are not unique to the Pet Acoustics methodology. All behavioural hearing screening approaches – including the commonly used techniques of hand-clapping, key-rattling, or calling the animal's name – carry equivalent or greater subjectivity. The Pet Acoustics protocol improves on informal behavioural tests by standardising the stimulus (species-specific sounds at defined frequency ranges), structuring the observation task (three defined bands, three defined outcomes), and recording results systematically across a large population. No informal behavioural test produces the kind of structured, frequency-specific dataset presented in this study.

The BAER test, while more precise, requires sedation in many animals, specialist equipment, and trained operators – conditions that preclude its use as a population-level screening tool. The data presented here would not exist in any form without a behavioural screening approach, and its limitations should be understood in that context.

RESULTS

Dataset Overview

10,615	86	8,777	1,838	9,626
Total screenings multi-year dataset	**Countries** represented	**Dogs screened** 82.7% of total	**Cats screened** 17.3% of total	**With age data** 90.7% of records

Geographic Distribution
Screenings were conducted across 86 countries. Among records with country data, the United States represented the largest single population (2,494 records), followed by the United Kingdom (405), Australia (229), and Canada (198). The 318 clinics in the veterinary sample request database spanned 48 US states, with the highest concentrations in Florida, Texas, Pennsylvania, California and North Carolina.

Hearing Screening Outcomes
The following outcomes are recorded behavioural observation results. As noted in Section 3, these figures are conservative estimates of true hearing impairment prevalence due to the inherent false-negative rate of behavioural observation methodology.

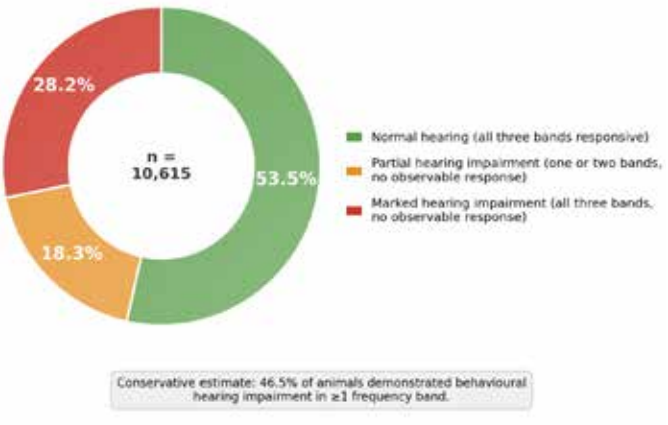

Figure 1. Overall Behavioural Hearing Screening Outcomes (n = 10,615)

Outcome	N	Percentage	Clinical interpretation
Normal hearing — all 3 bands clear	3,452	32.5%	No immediate clinical action required
Some hearing loss — 1+ bands absent	4,940	46.5%	Clinical attention or monitoring indicated
Significant loss — all 3 bands absent	2,991	28.2%	BAER referral recommended
High-frequency loss only	1,527	14.4%	Early or age-related loss pattern
Partial sensitivity reduction	2,223	20.9%	Monitoring and baseline documentation

Interpretation Note
The 46.5% hearing impairment rate represents the proportion of animals for whom the human observer did not detect a behavioural response in at least one frequency band. Due to the conservative nature of behavioural observation — where non-reaction does not confirm non-detection – the true prevalence of hearing impairment in this population is likely higher than reported.

Frequency band	Range	Clear response	Absent response
Low frequency	125 Hz – 1 kHz	54.4%	28.8%
Mid frequency	1 kHz – 4 kHz	53.7%	32.8%
High frequency	4 kHz – 16+ kHz	49.8%	50.2%

Frequency Band Analysis

High-frequency absent response was the most prevalent finding (50.2%). Animals with preserved low and mid frequency response may still respond to verbal cues and household sounds while carrying significant high-frequency impairment – a pattern that causes owners and clinicians to underestimate the degree of hearing loss present.

Frequency-band-specific screening detects this pattern where gross behavioural tests such as clapping do not.

Species Comparison

Metric	Dogs (n=8,777)	Cats (n=1,838)
Some hearing loss – any band	47.4%	42.3%
All 3 bands absent	28.8%	22.6%
Normal hearing – all clear	32.1%	41.0%
High-frequency loss	50.6%	41.9%

Age and Hearing Loss

Age group	N	Some hearing loss	All bands absent
Under 7 years	4,706	42.5%	23.1%
7 years and older	4,920	50.2%	33.4%

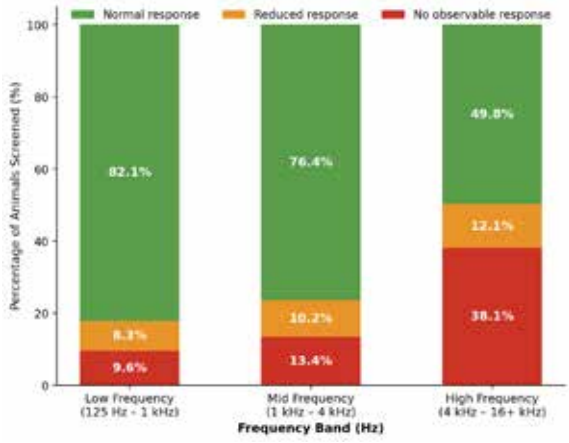

Figure 2. Behavioural Response Across Hearing Frequency Bands (n = 10,615)

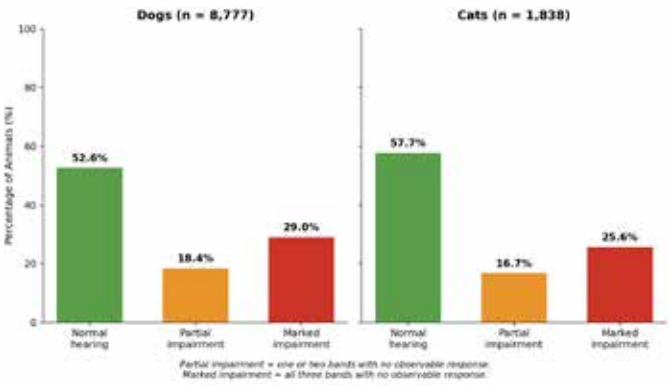

Figure 3. Hearing Screening Results by Species

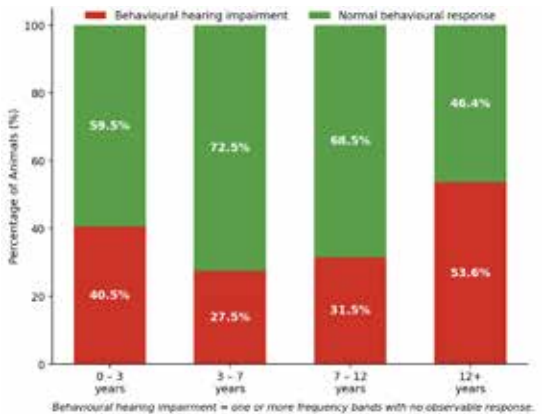

Figure 4. Behavioural Hearing Impairment Rate by Age Group (n = 9,626 with age data recorded)

Veterinary Clinic Engagement
Among 318 veterinary clinics requesting sample kits, 79.2% reported having no existing hearing assessment product or protocol. Qualitative responses include.

- "We are excited to try this in our office for patients with suspected hearing loss."
- "I am a hospice veterinarian and would love to see this used more – clients constantly mention their dogs' hearing loss."
- "I usually just clap my hands loudly to see if a pet hears it or drop a heavy book."

DISCUSSION

Prevalence in Context
The 46.5% hearing impairment rate, interpreted in light of the observer variability and false-negative bias described in Section 3, suggests that subclinical hearing loss in companion animals is substantially more prevalent than current clinical practice reflects. Even a conservative adjustment for behavioural false negatives would leave a prevalence rate that warrants systemic clinical attention.

The clinical consequences of undetected hearing loss extend well beyond audiology: anxiety, startle-based aggression, misattributed behavioural problems, reduced training responsiveness and social withdrawal are all documented sequelae of sensory impairment in companion animals. Early identification enables owner education, environmental adaptation and appropriate referral – all of which improve welfare outcomes.

Why Behavioural Screening Remains Valuable Despite Its Limitations
The limitations of behavioural observation are real and have been addressed transparently in this study. However, they do not diminish the value of the approach – they contextualise it. No tool that could generate 10,615 hearing assessments across 86 countries without equipment, sedation, or clinical training would produce data free of observer variability. The question is not whether behavioural screening is perfect, but whether it is better than the current standard – which, for the vast majority of companion animals, is no screening at all.

The data presented here would not exist without a behavioural approach. The pattern of findings – high-frequency loss predominating, progressive increase with age, comparable rates across species – is internally consistent with known audiological science. This consistency across a large, diverse, independent dataset provides meaningful epidemiological signal even where individual observations carry uncertainty.

Recommendations
Routine hearing screening should be incorporated as a standard wellness parameter at annual examinations, beginning at middle age with baseline documentation from earlier visits. The two-to-three-minute duration and zero-equipment requirement make this integration practically feasible within existing consultation workflows.

Conclusions

1. 46.5% of screened pets showed observed hearing impairment – a conservative estimate given behavioural observation bias toward false negatives.
2. High-frequency loss was the most common pattern (50.2%), consistent with age-related sensorineural degeneration.

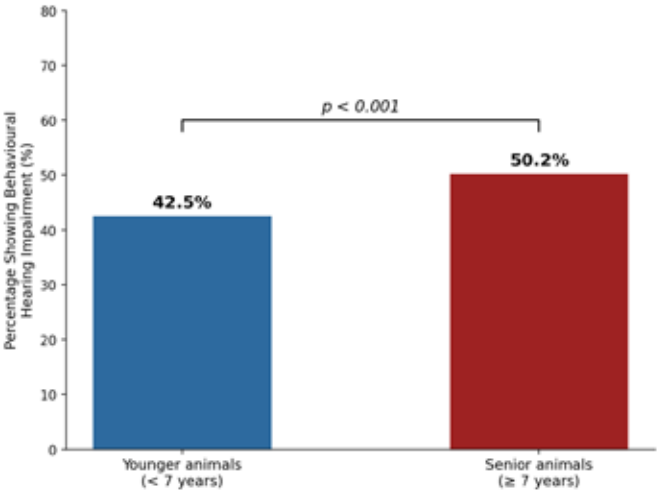

Figure 5. Hearing Impairment: Senior vs. Younger Animals (n = 9,626 with age data)

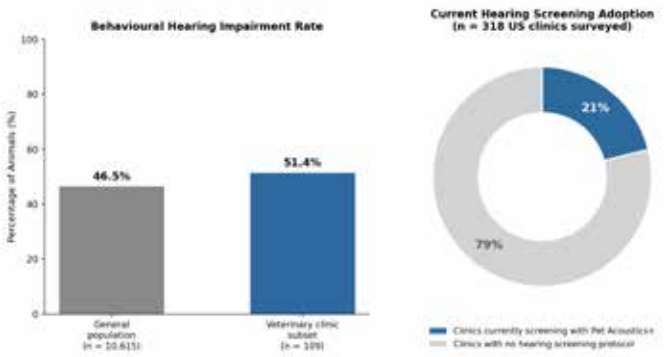

Figure 6. Veterinary Clinic Subset Findings

3. Senior pets (7+) showed a 50.2% loss rate versus 42.5% in younger animals.
4. Results represent human-observed behavioural response, not audiological diagnosis. BAER referral is indicated for animals with multi-band absent responses.
5. Hearing should be incorporated as a routine wellness parameter in companion animal care.

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Conflict of Interest Statement
The author is the founder of Pet Acoustics, Inc. No external funding was received for this study.

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Janet Marlow is the founder and CEO of Pet Acoustics, Inc., a pioneer in animal hearing wellness and species-specific sound therapy. She developed the first behavioural hearing screening for dogs and cats and is the creator of the Certified Sound Behaviourist™ (CSB™) program. Her research focuses on advancing hearing wellness in veterinary medicine.