

Behavior and Behavior Problems in Dogs: What We Can Learn from Internet Surveys

James A. Serpell, PhD
*Center for the Interaction
of Animals and Society*

School of Veterinary Medicine
University of Pennsylvania
<serpell@vet.upenn.edu>



Why Study Dog Behavior?



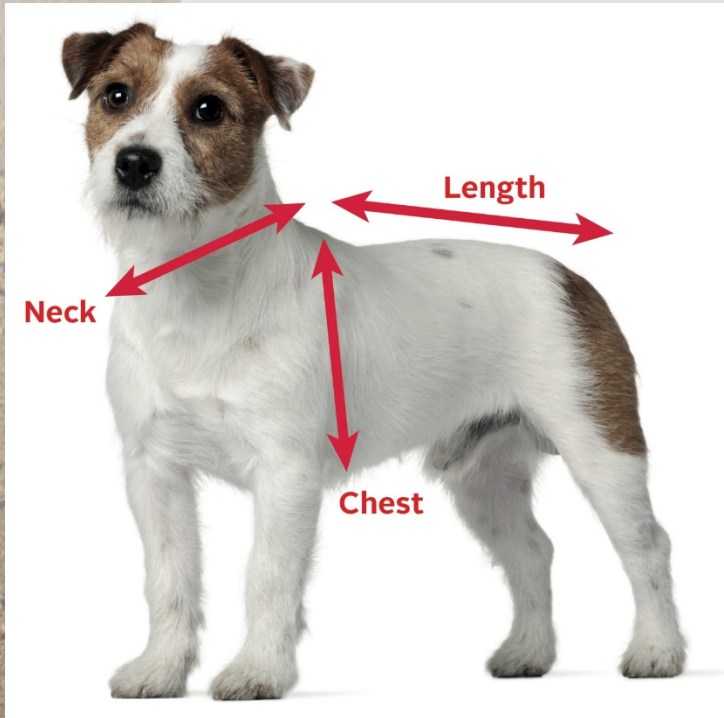
- *Animal Welfare:* Behavior problems are the #1 cause of premature death in American dogs (main reason why dogs are abused, abandoned, or disowned; contributory factor in 40-50% of all shelter relinquishments).
- *Behavioral Counseling:* Behavior problems undermine people's relationships with dogs. The ability to successfully diagnose and treat canine behavior problems can restore these bonds and their benefits.
- *Public Health:* Canine aggression represents a significant public health hazard. 4.5 million Americans are bitten by dogs every year and \pm 800,000 require medical treatment. Dog attacks cause 20-30 human deaths/year in the USA.
- *Public Service:* Behavior problems are the primary reason why working dogs (guide dogs, search & rescue dogs, detector dogs, etc.) are released from breeding and training programs.

Challenges to Studying Dog Behavior



Pet dogs tend to spend most of their time indoors where their behavior is not easily observed and recorded—hence we may need to rely on indirect or ‘proxy’ observations by dog owners, handlers, etc.

Research Goals



- To develop a practical, all-purpose, proxy instrument (i.e. owner questionnaire) for measuring behavior/behavior problems in dogs.
- To determine the reliability and validity of this instrument.
- Make it available to dog owners, veterinarians, breeders, behaviorists, shelters and rescue groups, working dog organizations, scientists, etc.

This Approach to Behavioral Measurement Relies on Two Assumptions:



1. That nobody knows more about a dog's typical behavior than the people who live with it 24/7.
2. That it is possible—by asking the right questions—to extract this knowledge from dog owners in a form that is valid, quantitative, and reliable.



Canine Behavioral Assessment & Research Questionnaire



Dog owners/puppy-raisers/handlers asked to rate their dogs' responses to a 100 different everyday situations or stimuli.

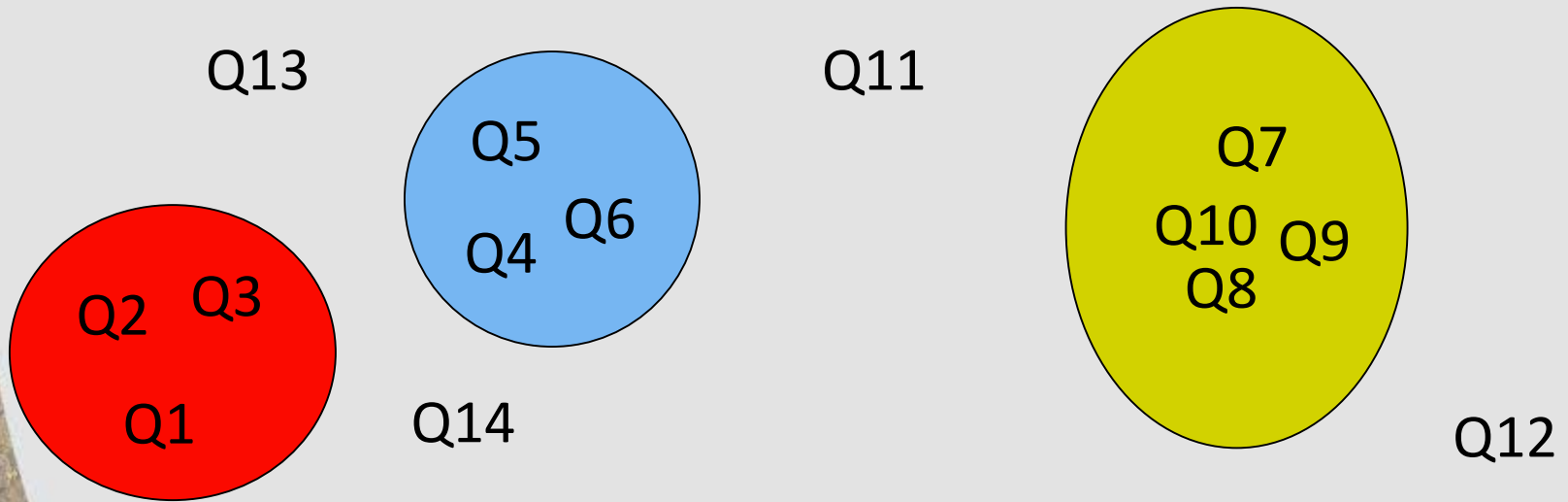


Principal Components Factor Analysis used to extract 14 distinct behavioral subscales, and 22 miscellaneous behaviors.



Validity and reliability of most of these subscales and items have now been confirmed.

Factor Analysis



Factor analysis is a statistical technique for condensing information by grouping related items into separate factors or subscales (Cronbach's alpha coefficient ≥ 0.7).

14 C-BARQ Subscales Extracted by Factor Analysis

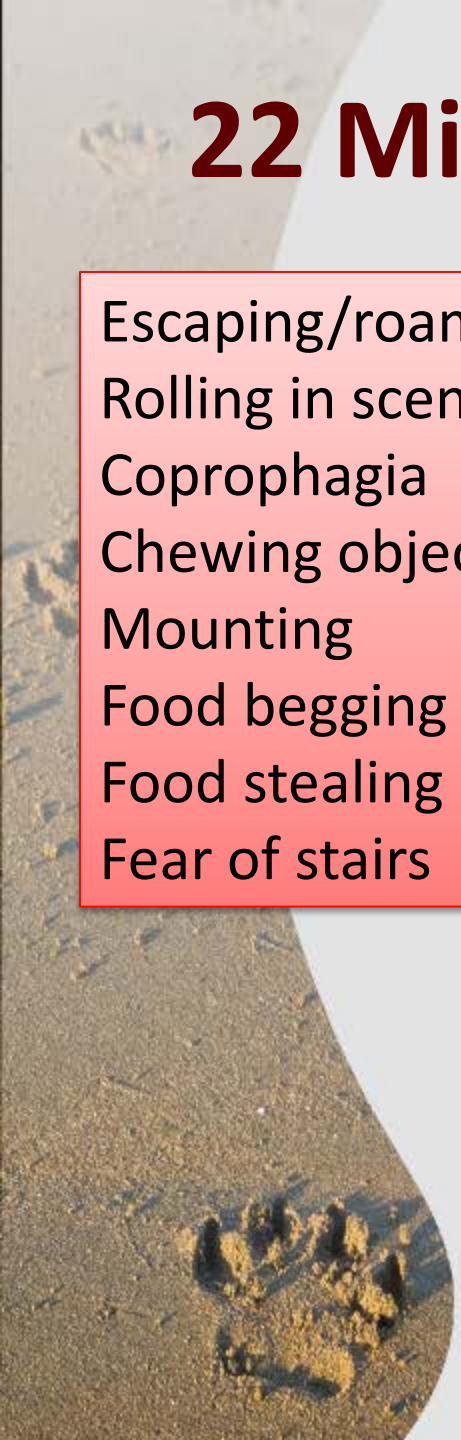
Stranger-directed aggression (10 items)
Owner-directed aggression (8 items)
Dog-directed aggression (4 items)
Familiar dog aggression (4 items)

Stranger-directed fear (4 items)
Dog-directed fear (4 items)
Nonsocial fear (4 items)
Attachment/attention-seeking (6 items)
Separation-related behavior (8 items)
Touch sensitivity (4 items)

Excitability (6 items)
Energy (2 items)
Chasing (4 items)
Trainability (8 items)

Hsu, Y. & Serpell, J.A. *Journal of the American Veterinary Medical Association*, 223(9): 1293-1300, 2003.

22 Miscellaneous C-BARQ Items



Escaping/roaming
Rolling in scent
Coprophagia
Chewing objects
Mounting
Food begging
Food stealing
Fear of stairs

Pulling on leash
Marking with urine
Submissive/emotional urination
Separation urination
Separation defecation
Hyperactivity
Staring (obsessive)

Snapping at flies (obsessive)
Tail-chasing/spinning
Shadow/light-chasing
Persistent barking
Autogrooming (self)
Allogrooming (others)
Other abnormal/stereotypic



Canine Behavioral Assessment & Research Questionnaire

The C-BARQ is designed to provide dog owners and professionals with standardized evaluations of canine temperament and behavior.



Photo credit: Crevko

New to C-BARQ?

Sign up to enter a dog and complete the C-BARQ.

[Sign Up Now](#)

Returning Users

Welcome back! Enter your user name and password below.

User Name

Password

[Sign In](#)

[Forget your password?](#)

What is the C-BARQ?

[Learn more](#) about the C-BARQ and what it measures.

CAT OWNERS:

Participate in the **Feline Behavioral Assessment & Research Questionnaire**

febarq.org



Help support the C-BARQ and the University of Pennsylvania's Center for Interaction of Animals & Society by [donating to this project](#).

Working dog organizations, veterinarians, researchers, trainers, shelters, breeders, and breed groups can [register with us to participate in the C-BARQ project](#).

©2016 [James A. Serpell](#) and the [University of Pennsylvania](#). All rights reserved.

Questions about this site? Need help? [Visit our contact form](#).





Deborah Duffy

Section 1: Training and obedience

Some dogs are more obedient and trainable than others. By clicking on the appropriate choices, please indicate how trainable or obedient your dog has been in each of the following situations in the recent past.

Selected dog: **TEST DOG**

	← NEVER	SELDOM	SOMETIMES	USUALLY	ALWAYS →	NOT OBSERVED/ NOT APPLICABLE
1. When off the leash, returns immediately when called.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Obeys the "sit" command immediately.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Obeys the "stay" command immediately.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Seems to attend/listen closely to everything you say or do.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Slow to respond to correction or punishment; "thick-skinned".	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Slow to learn new tricks or tasks.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Easily distracted by interesting sights, sounds, or smells.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Will "fetch" or attempt to fetch sticks, balls, or objects.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Reset Scores

Continue -->



Section 2: Aggression

Some dogs display aggressive behavior from time to time. Typical signs of moderate aggression in dogs include barking, growling and baring teeth. More serious aggression generally includes snapping, lunging, biting, or attempting to bite. By clicking on the following scales, please indicate your own dog's recent tendency to display aggressive behavior in each of the following contexts:

Selected dog: **Ralph**



9. When verbally corrected or punished (scolded, shouted at, etc.) by you or a household member.

10. When approached directly by an unfamiliar **adult** while being walked/exercised on a leash.

0 1 2 3 4 -

<http://www.cbarq.org>



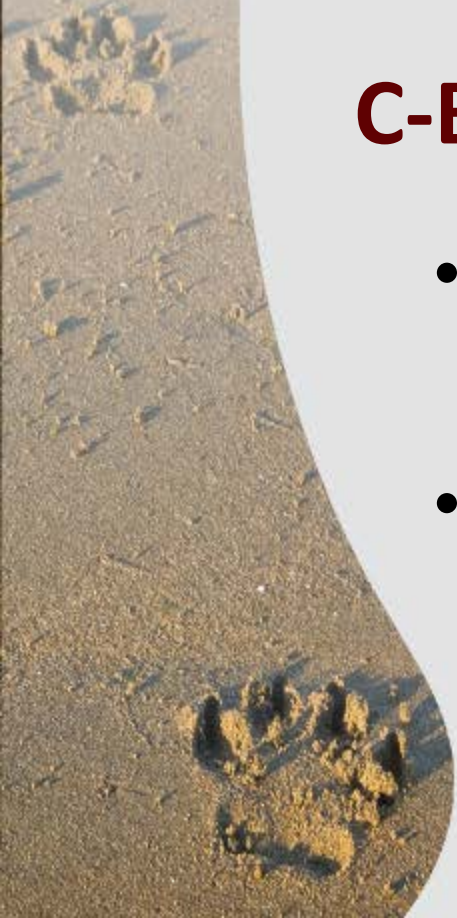
Canine Behavioral Assessment & Research Questionnaire

The C-BARQ is designed to provide dog owners and professionals with standardized evaluations of canine temperament and behavior.



C-BARQ website went live in 2005

- Database now contains behavioral profiles on approximately 40,000 pet dogs, and 30,000 working guide/service dogs.
- Allows us to generate highly reliable normative behavioral data on these dog populations, both as a whole and according to breed.



Some Findings



Using the C-BARQ to Quantify Breed Differences in Behavior

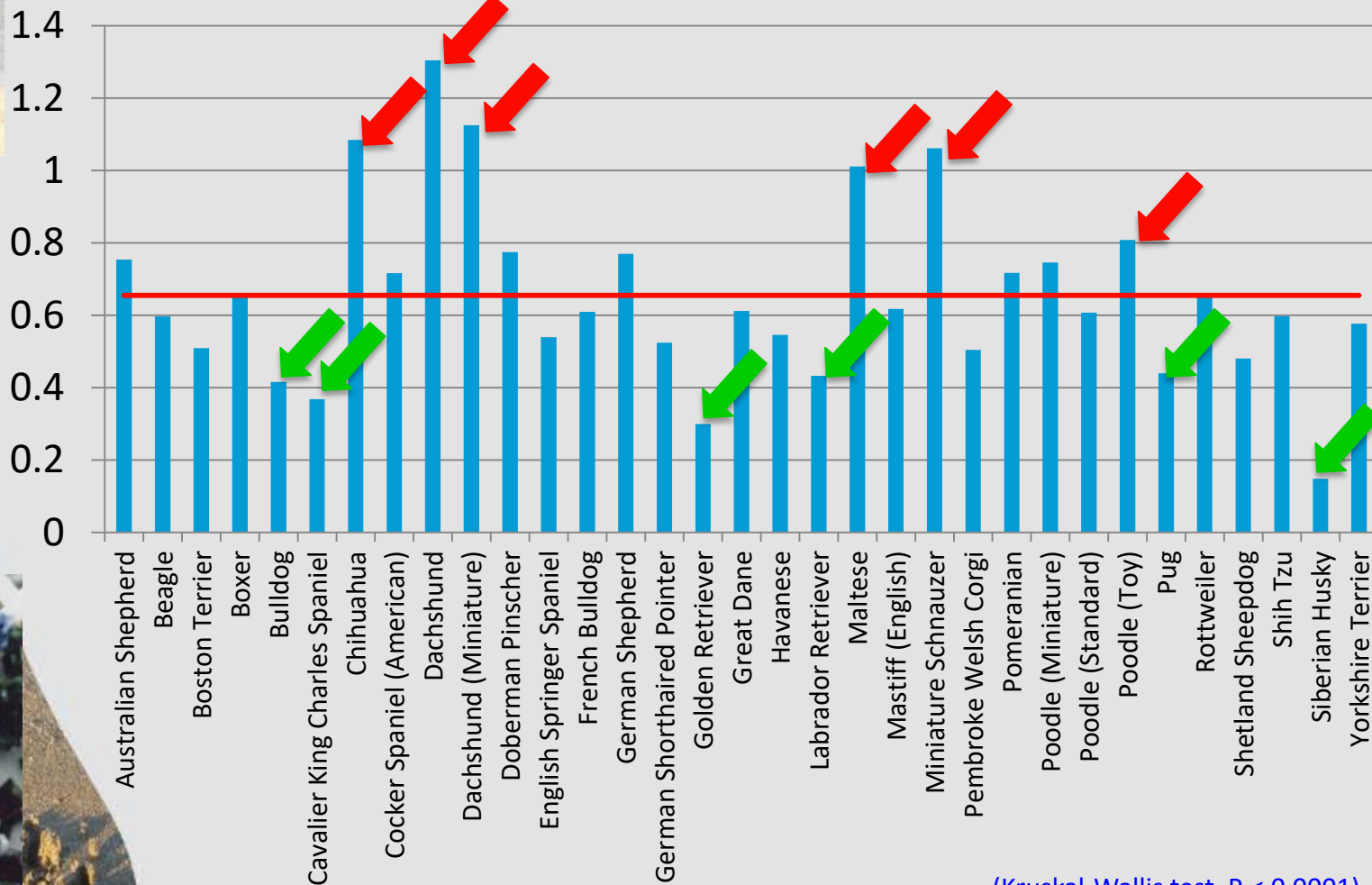


- *Sample:* C-BARQ data on the 30 most popular breeds registered by the American Kennel Club (equal sex ratio; approx. 70% sterilized)
- Two breeds (Dachshund and Poodle) represented by different size variants (Standard, Miniature and/or Toy).
- *Ns* = Range from 49 (Bulldog) to 781 (German Shepherd Dog).

Breed Differences in Behavior (30 most common breeds)



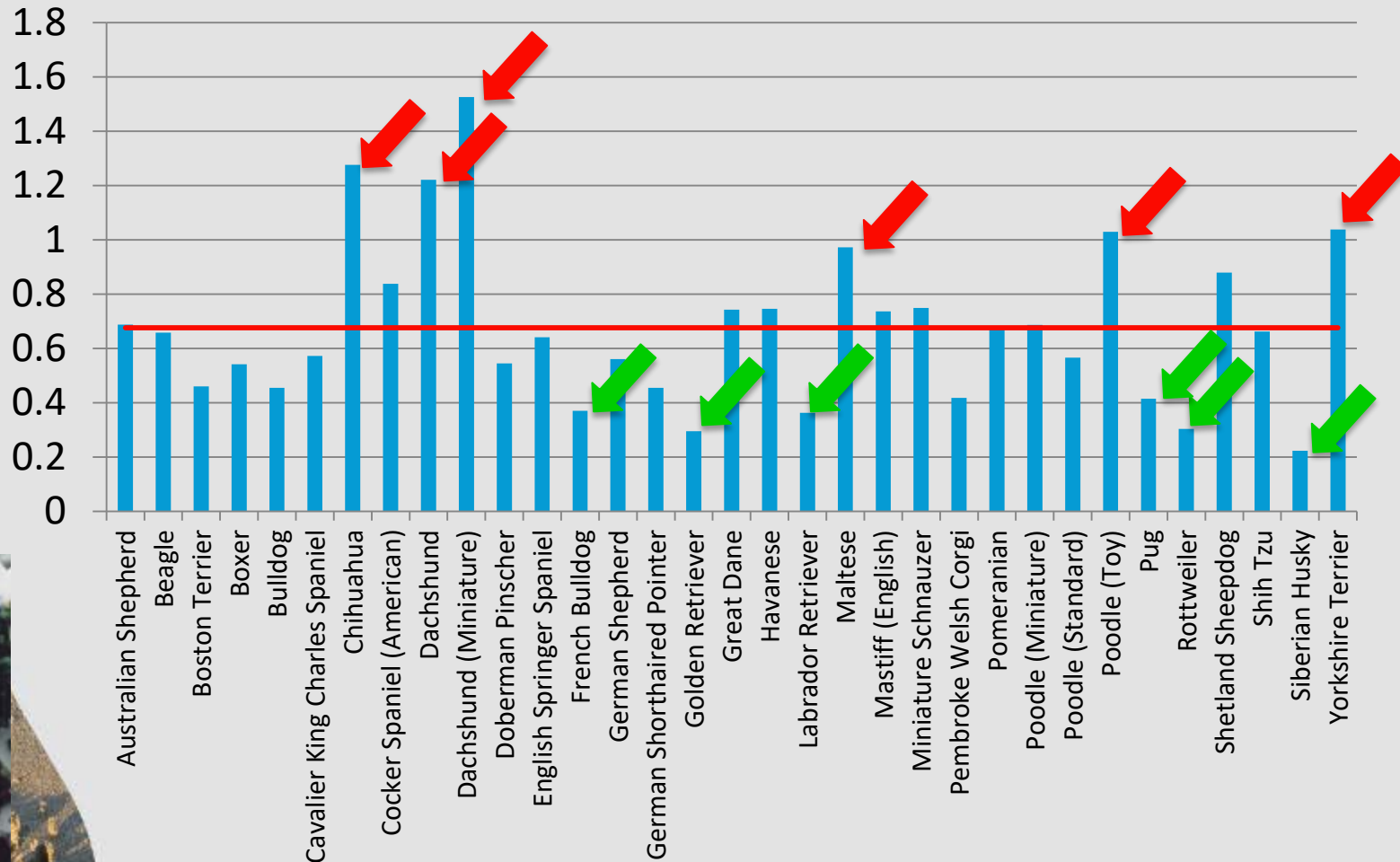
Stranger-directed aggression



(Kruskal-Wallis test, $P < 0.0001$)

Breed Differences in Fearfulness

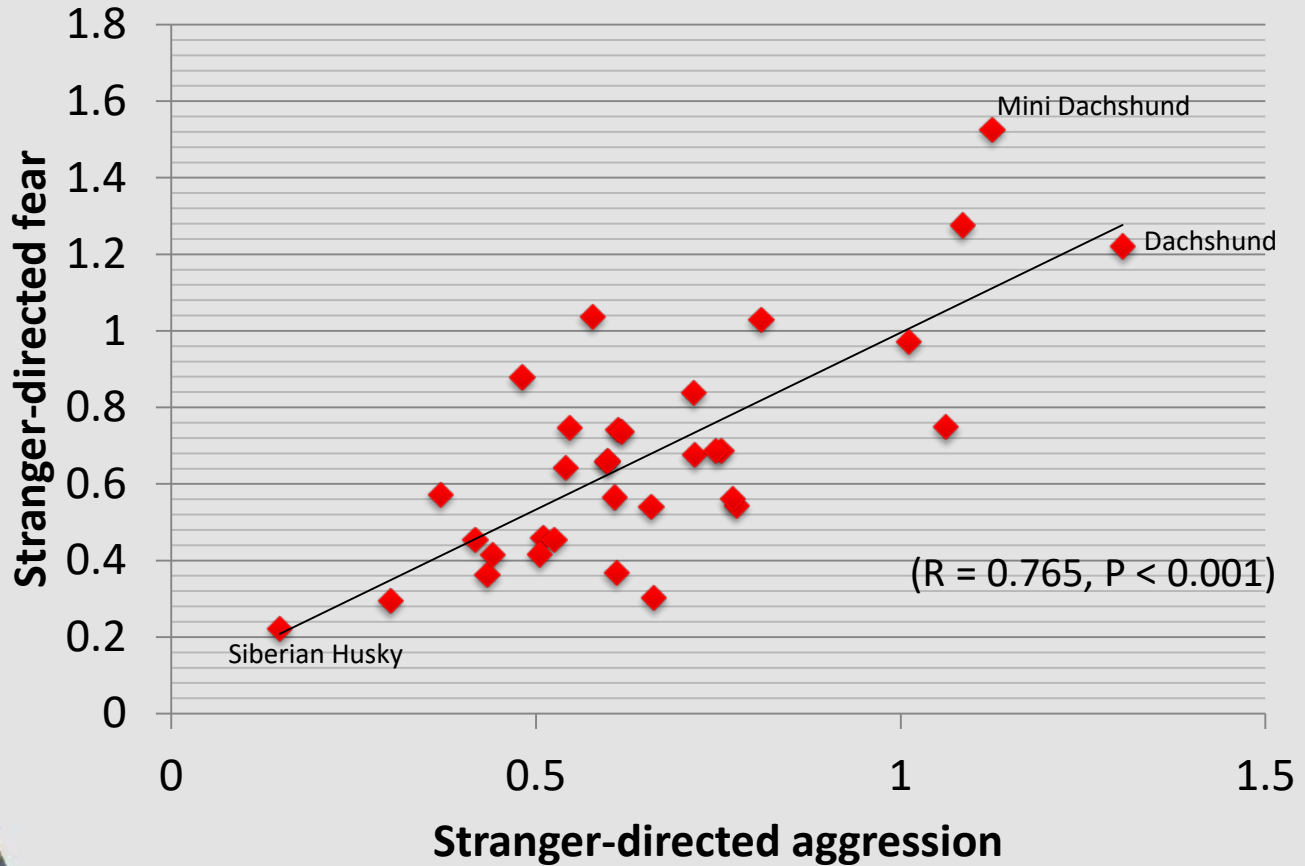
Stranger-directed fear



(Kruskal-Wallis test, $P < 0.0001$)

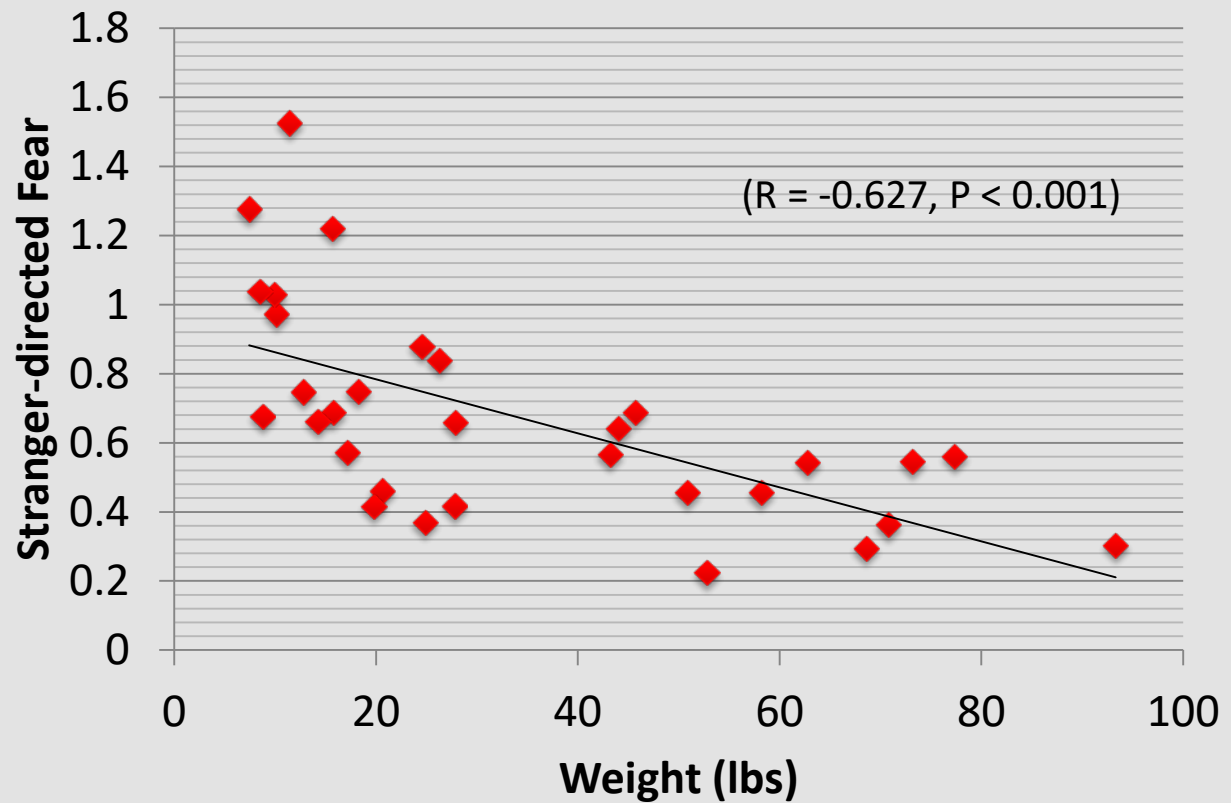


Aggression and Fear Are Correlated Across Breeds

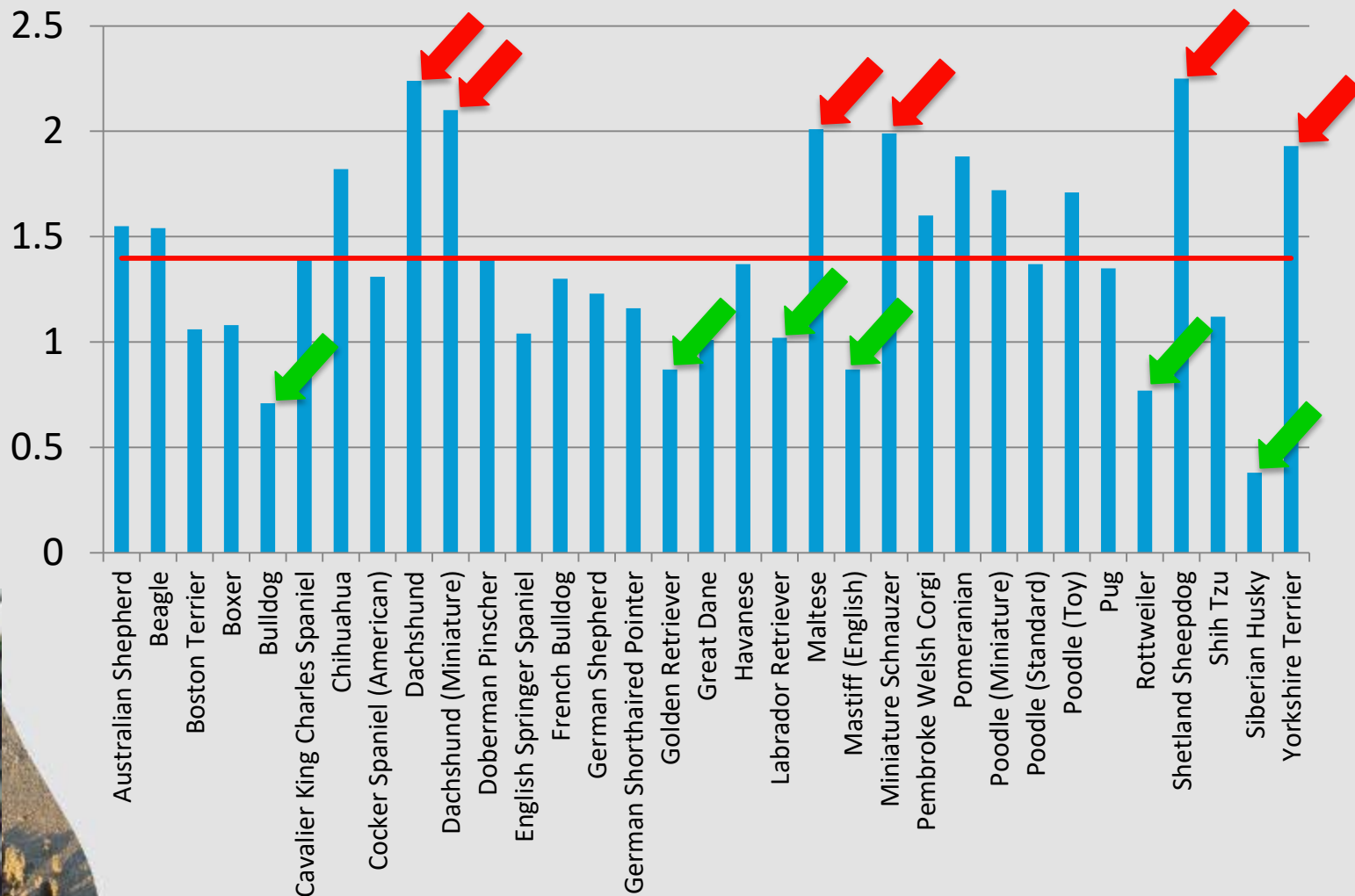


Body Size Is Negatively Correlated with Fear/Anxiety

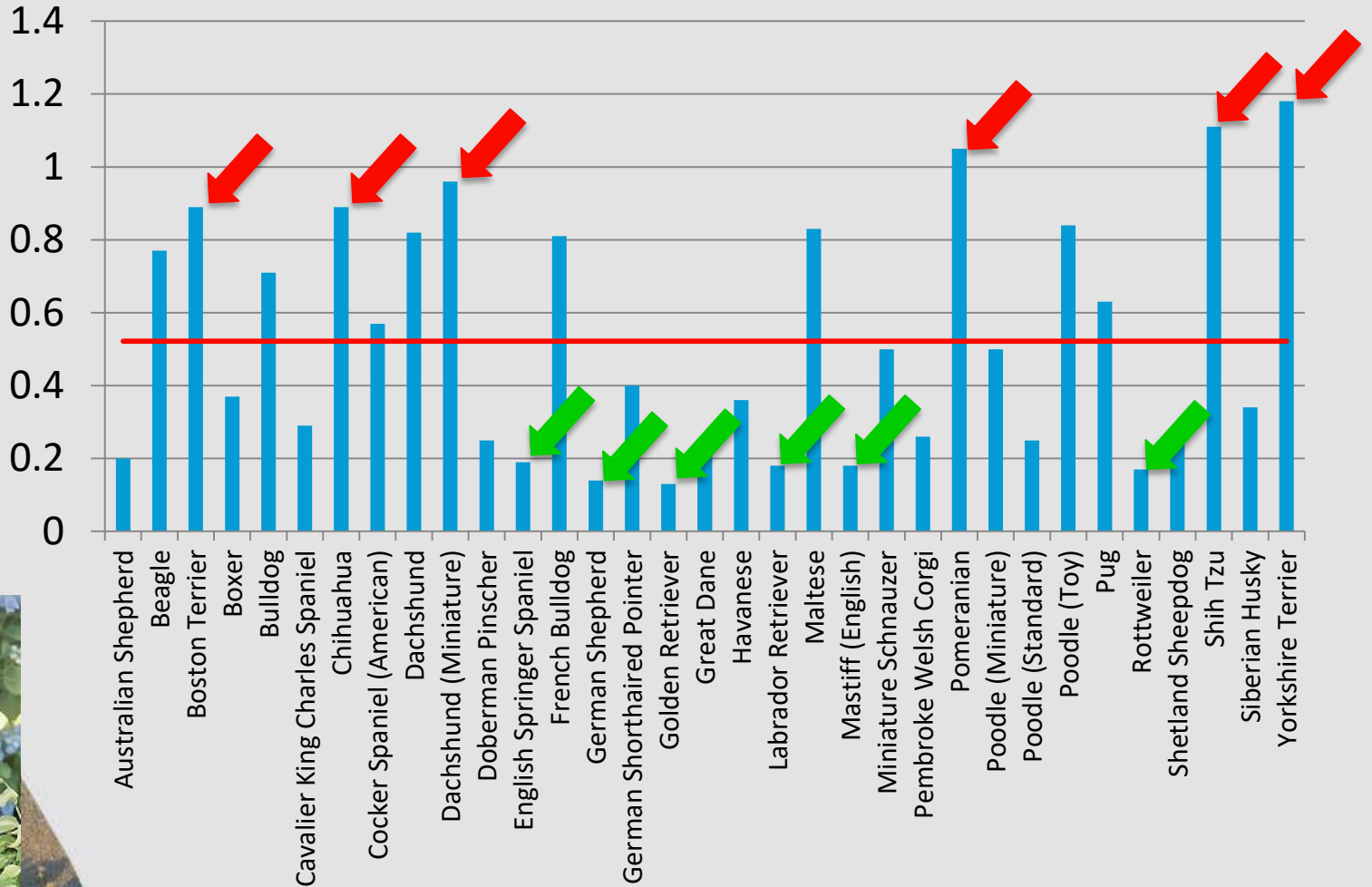
(Small breed dogs are more fearful)



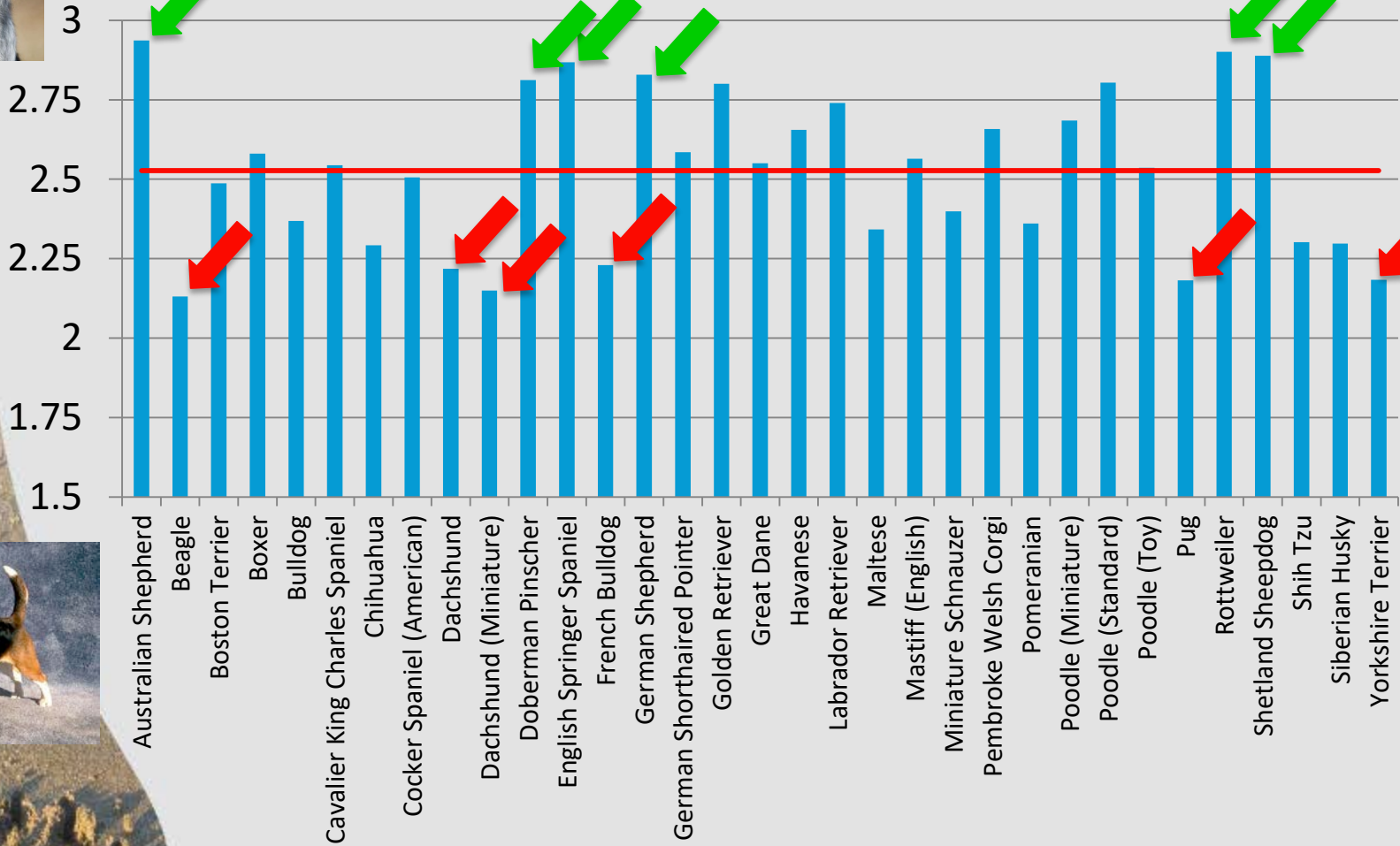
Breed Differences in Persistent Barking



Breed Differences in House Soiling (urination)



Breed Differences in Trainability



(Kruskal-Wallis test, $P < 0.0001$)

Small Breed Dog (SBD) Syndrome?

In addition to showing higher rates of fear/anxiety, small breed dogs also display higher scores for *owner-directed aggression, mounting, attachment/attention-seeking, house-soiling, persistent barking* and *compulsive allogrooming*, and lower scores for *trainability*. This suggests that all of these behavior problems may be related to a common underlying factor:



- Owners of SBDs may be more tolerant of their behavioral issues.
- Owners of SBDs may be less likely to provide them with adequate early socialization.
- These behavioral differences may reflect genetic/physiological correlates of selection for small body size (e.g. overall 'reactivity').
- Owners of large and SBDs may respond to the C-BARQ differently.

Using the C-BARQ to Investigate Individual Differences in Temperament

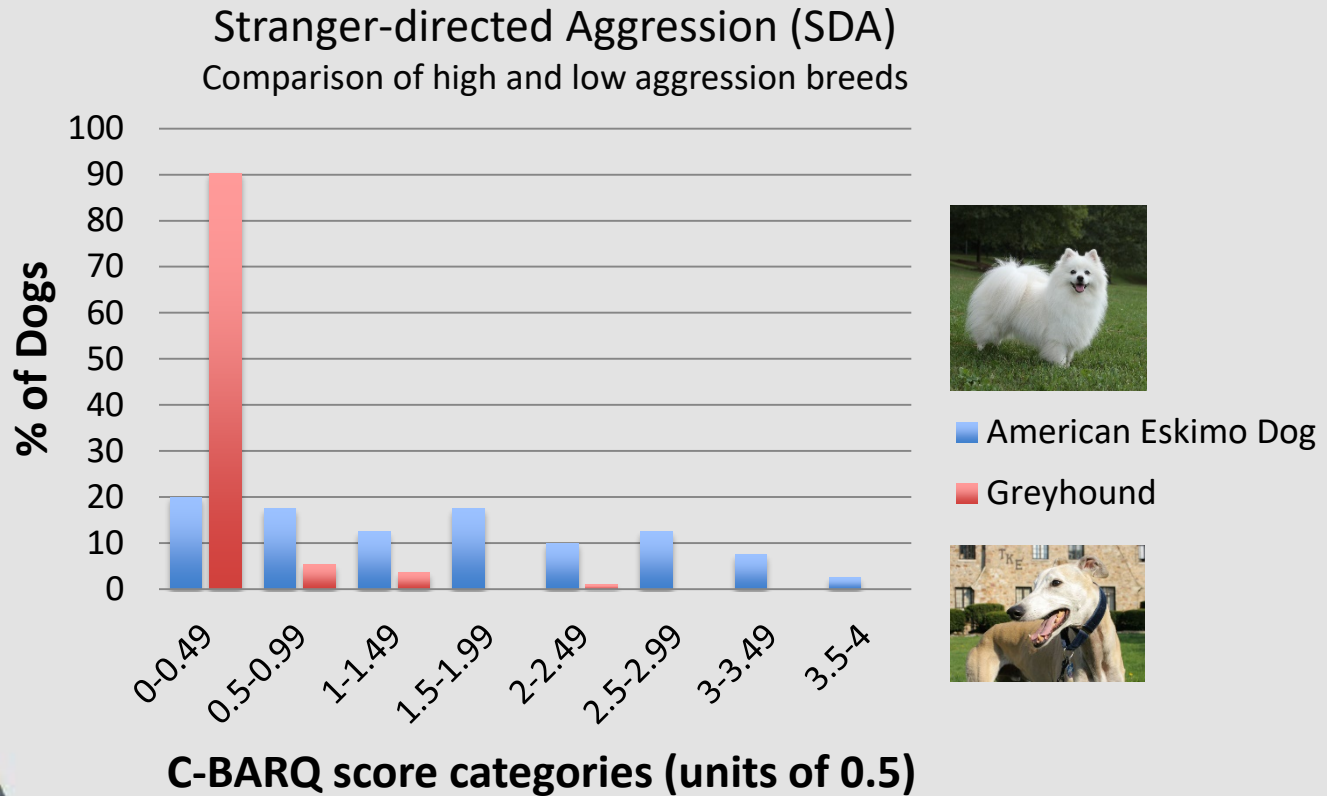


- Individual differences in behavior within breeds are often greater than the differences between breeds.
- Where do these differences come from?

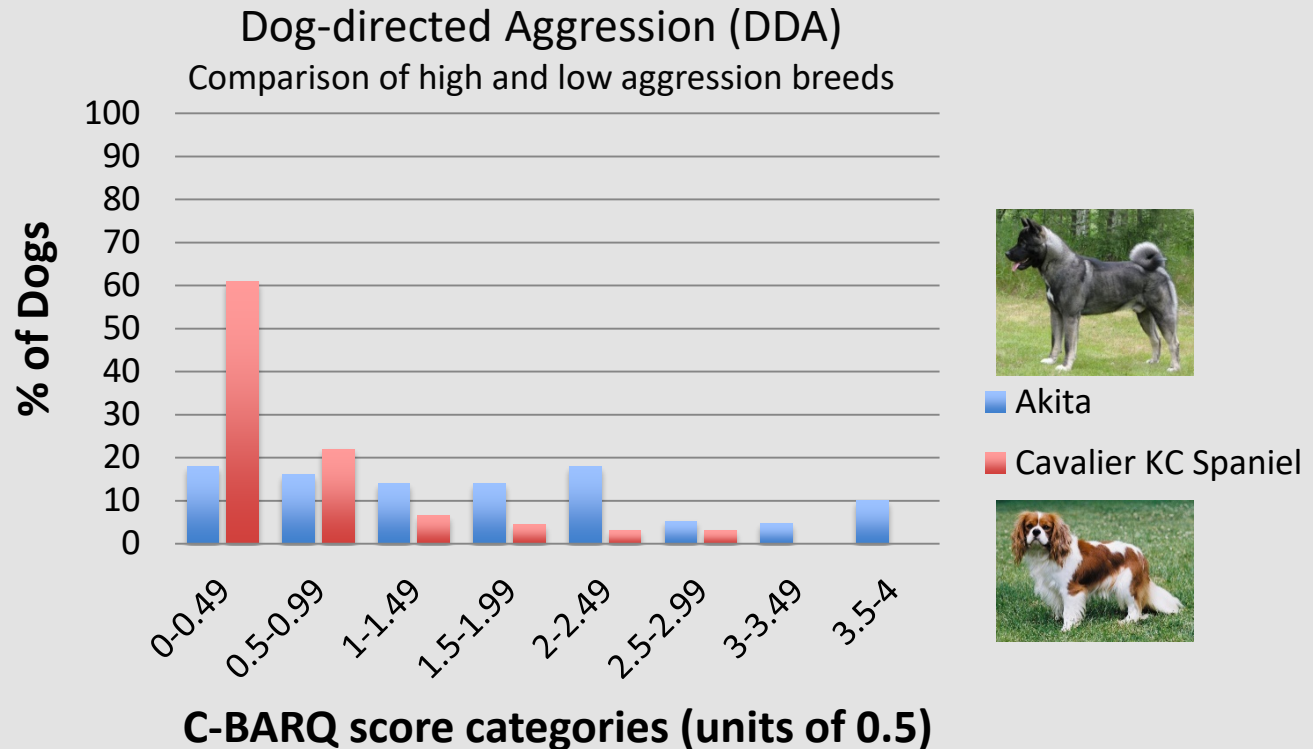
Origins of Individual Differences in Behavior



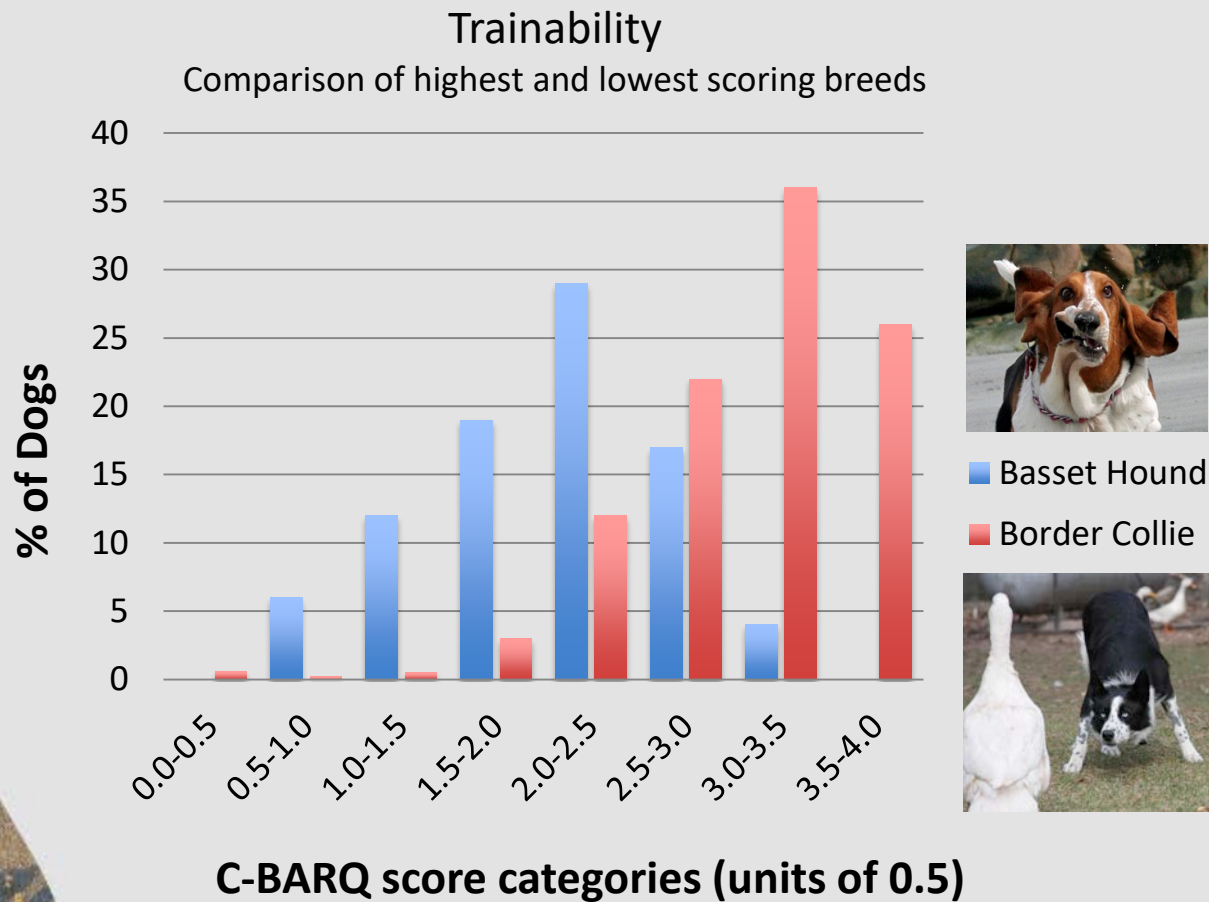
Genetics: Distribution of C-BARQ scores in 'High' and 'Low' scoring breeds



Genetics: Distribution of C-BARQ scores in 'High' and 'Low' scoring breeds



Genetics: Distribution of C-BARQ scores in 'High' and 'Low' scoring breeds



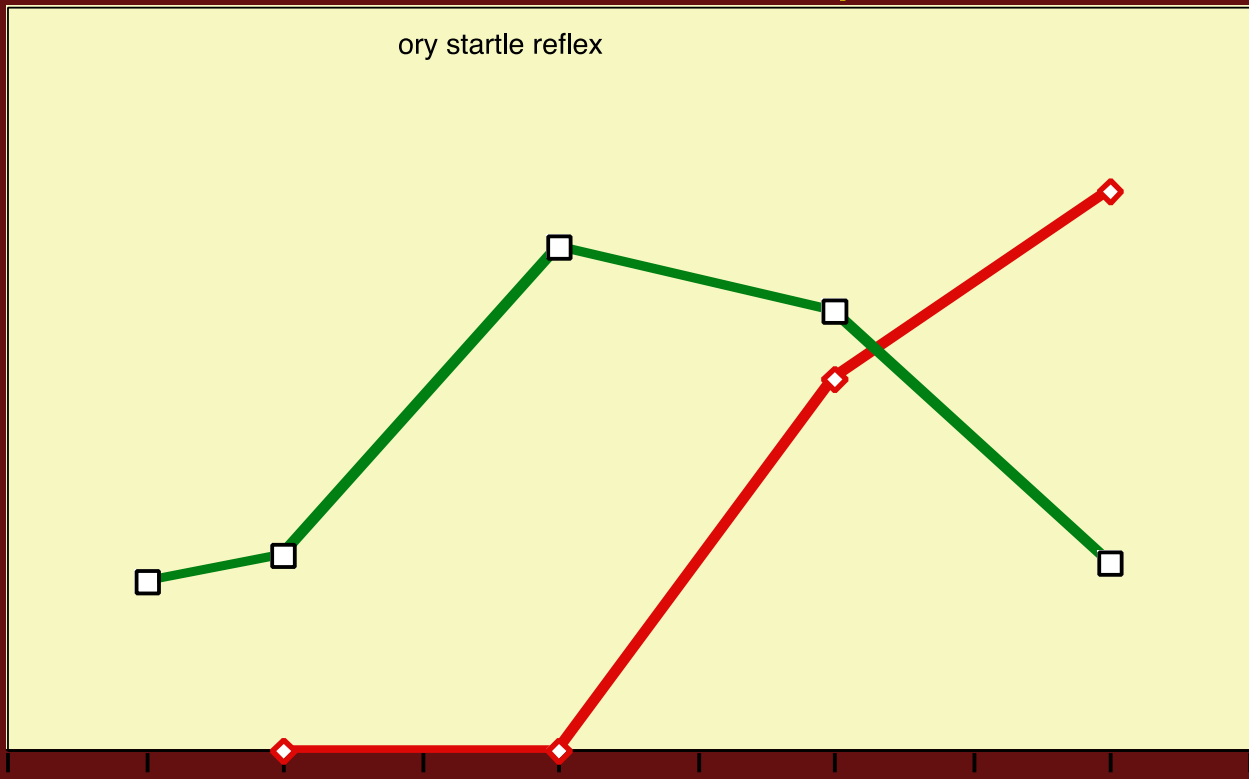
**Using the C-BARQ to Investigate
the Influence of Early
Environment on the Development
of Behavior in Dogs.**



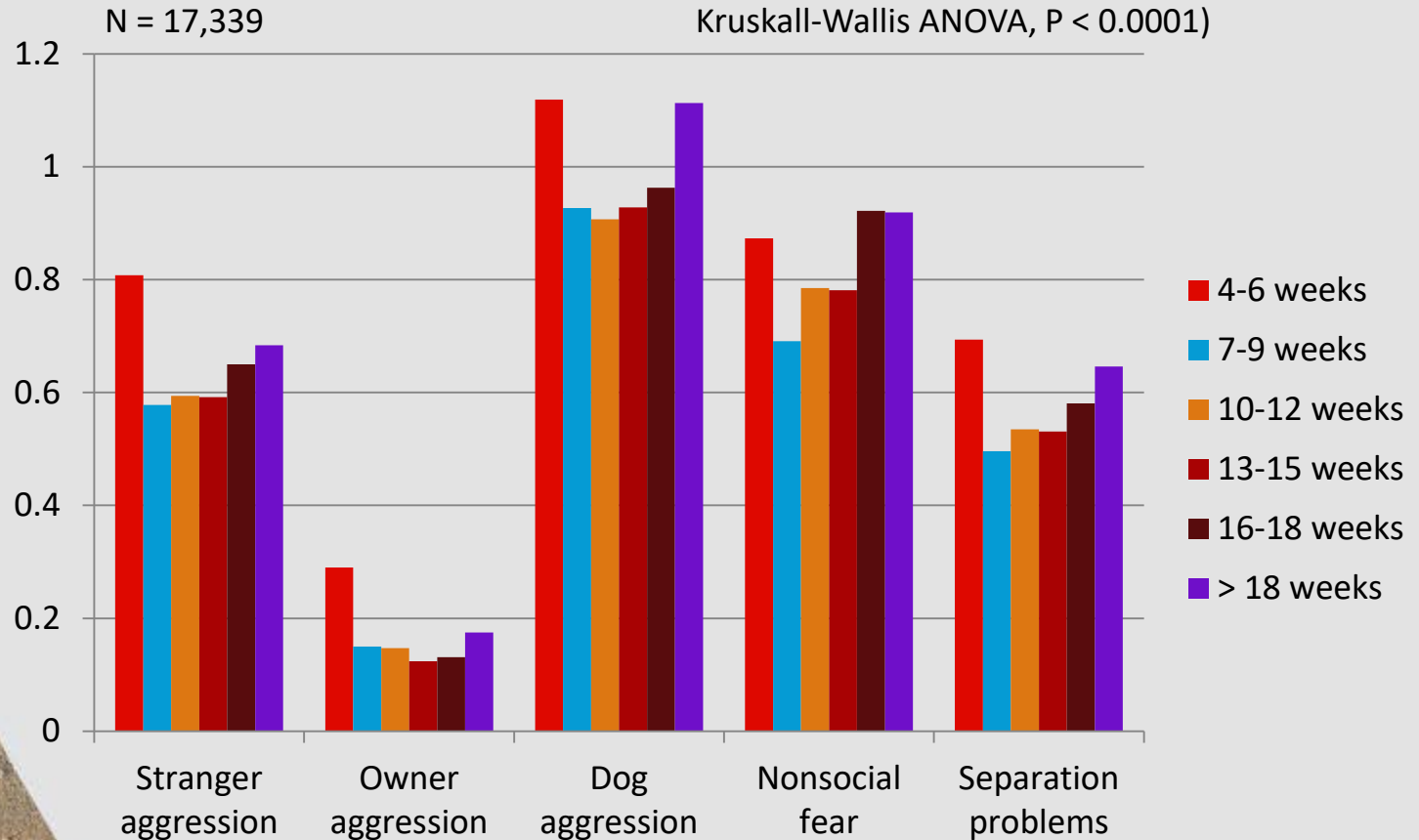
← socialization period →

ory startle reflex

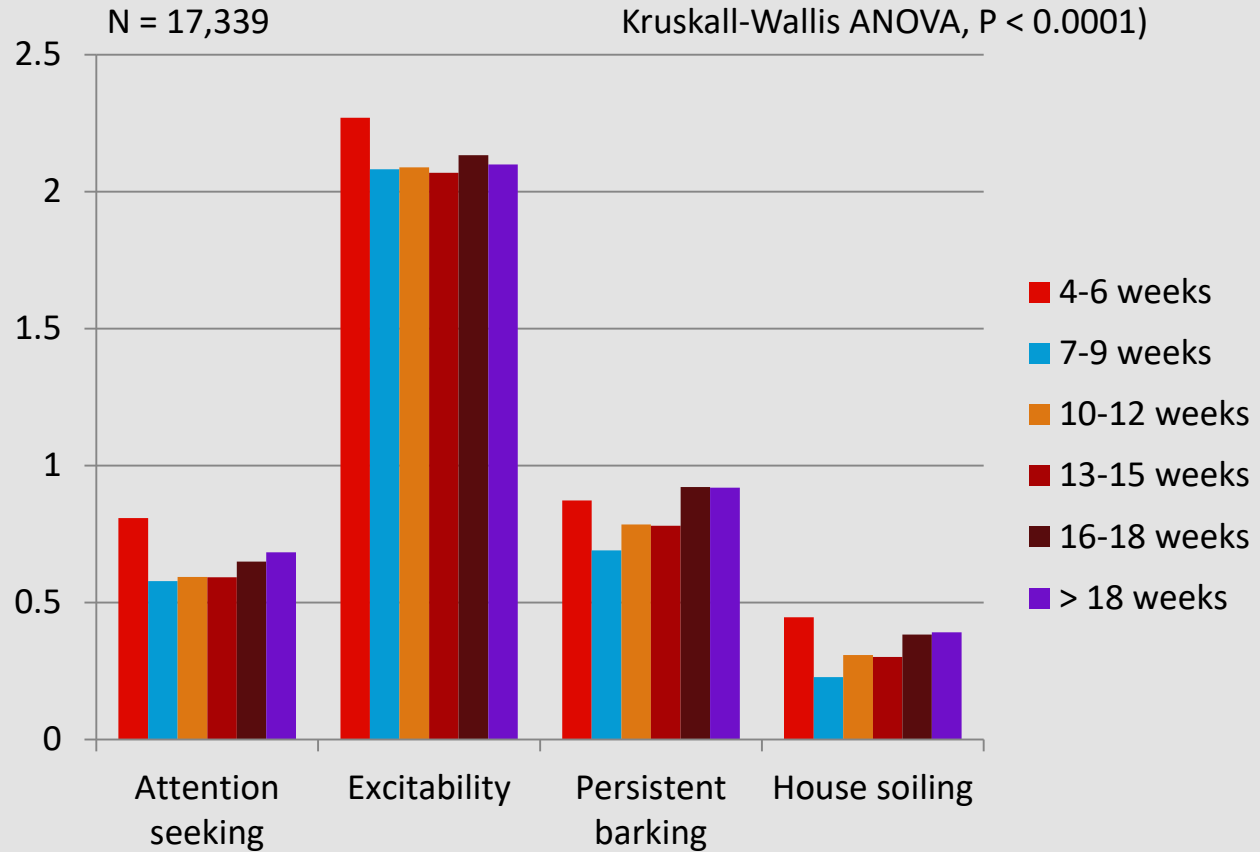
Attraction



Effects of Early Environment: Age When Acquired



Effects of Early Environment: Age When Acquired



Effects of Early Environment: Pet Stores vs. Noncommercial Breeders



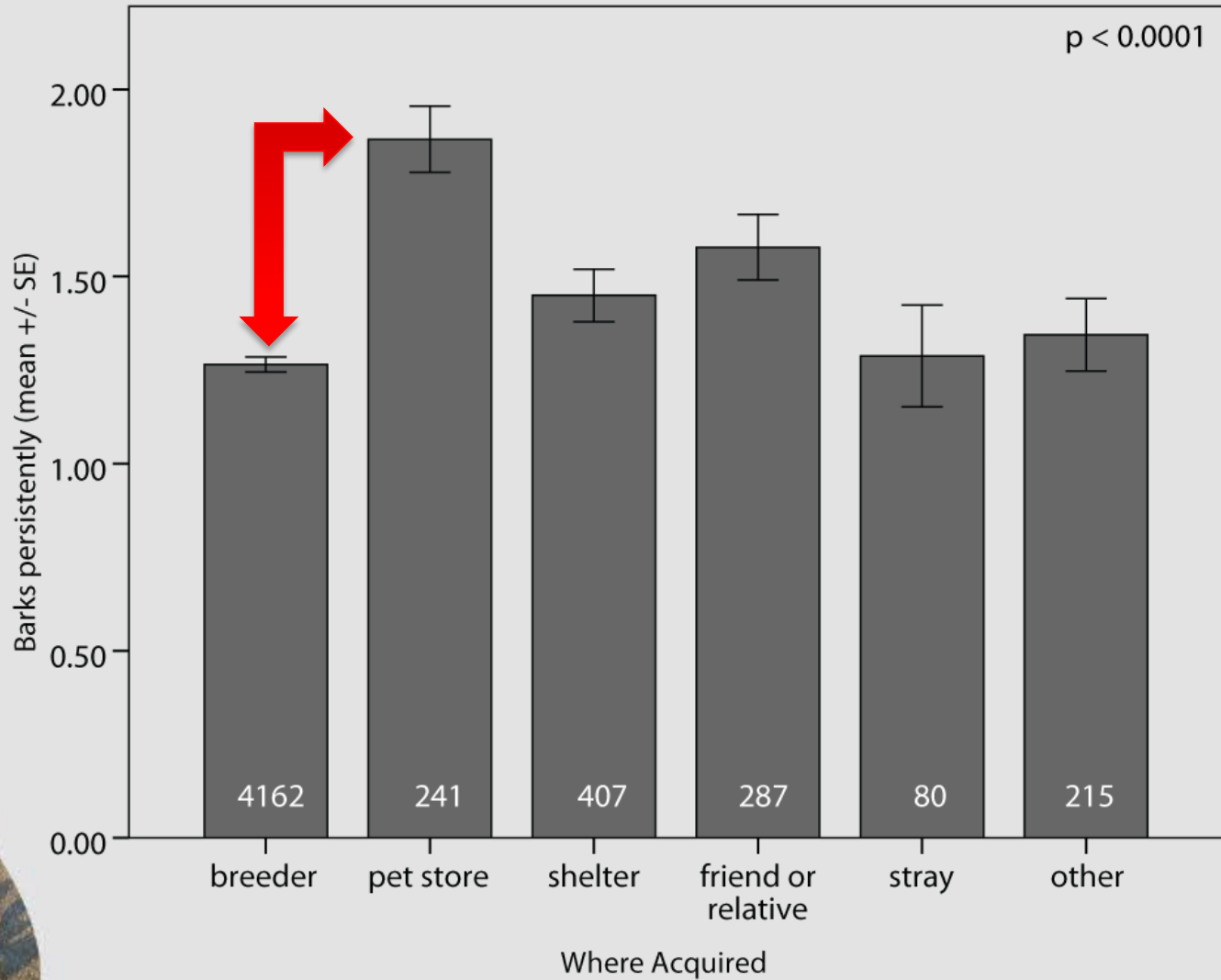
- ❖ Compared the C-BARQ scores of dogs whose owners acquired them as puppies from either pet stores (N=413) or noncommercial breeders (N=5657).
- ❖ Puppies from these two sources are comparable because they are usually purebred and acquired at similar ages.

McMillan, F.D., Serpell, J.A., Duffy, D.L., Masaoud, E. & Dohoo, I.R. Differences in behavioral and psychological characteristics between dogs obtained as puppies from pet stores and those obtained from noncommercial breeders. *JAVMA*, 2013.

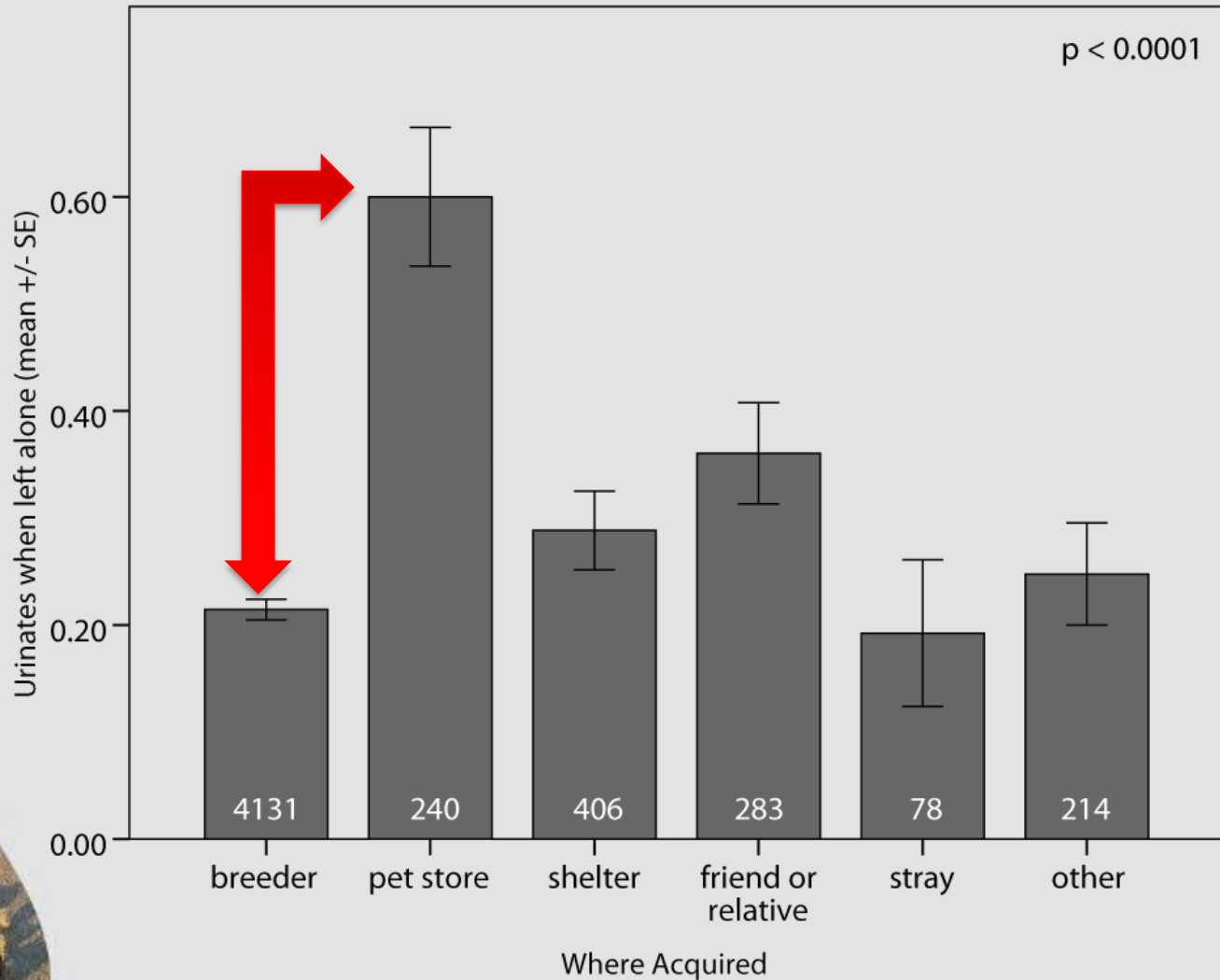
C-BARQ Data: Owner-directed aggression



C-BARQ Data: Persistent barking



C-BARQ Data: House soiling (urination)



Results (Logistic Mixed Model)

Acquisition from a pet store predicted greater prevalence of:

Outcome	Predictor	Odds Ratio	P-value	95% CI
Separation-related behavior	Pet store	1.58	0.002	(1.19, 2.11)
Owner-directed aggression	ps - intact	3.13	<0.001	(1.87, 5.23)
	ps - neutered	1.44	0.006	(1.11, 1.87)
Stranger-directed aggression	Pet store	1.59	0.003	(1.18, 2.16)
Non-social fear	Pet store	1.44	0.047	(1.01, 2.07)
Dog rivalry	Pet store	1.35	0.021	(1.05, 1.74)
Dog-directed fear	Pet store	1.33	0.030	(1.03, 1.71)
Dog-directed aggression	Pet store	1.96	<0.001	(1.44, 2.67)
Touch sensitivity	Pet store	1.58	0.002	(1.18, 2.11)

* Possible effects of breed, sex, age, body weight, whether neutered, presence of other dogs in household, and training all taken into account in the analyses.

Using the C-BARQ to Determine how a Guide Dog's Adolescent Environment Can Affect Behavioral Development.



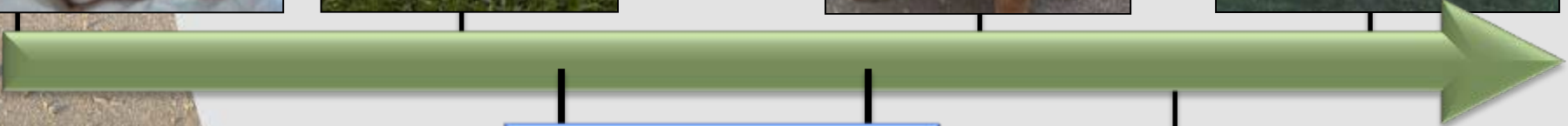
- All guide dog puppies C-BARQ'ed by puppy-raisers at 12 months of age.
- Additional surveys used to collect information from puppy raisers regarding characteristics of puppies' rearing environment.
- Analyzed associations between these environmental variables and C-BARQ scores at 12 months of age.

Field Service
(15-24 months old)

Return to Center
For Training
(15-18 months old)

Placement with
Volunteer Puppy Raiser
(7-9 weeks old)

Birth



C-BARQ

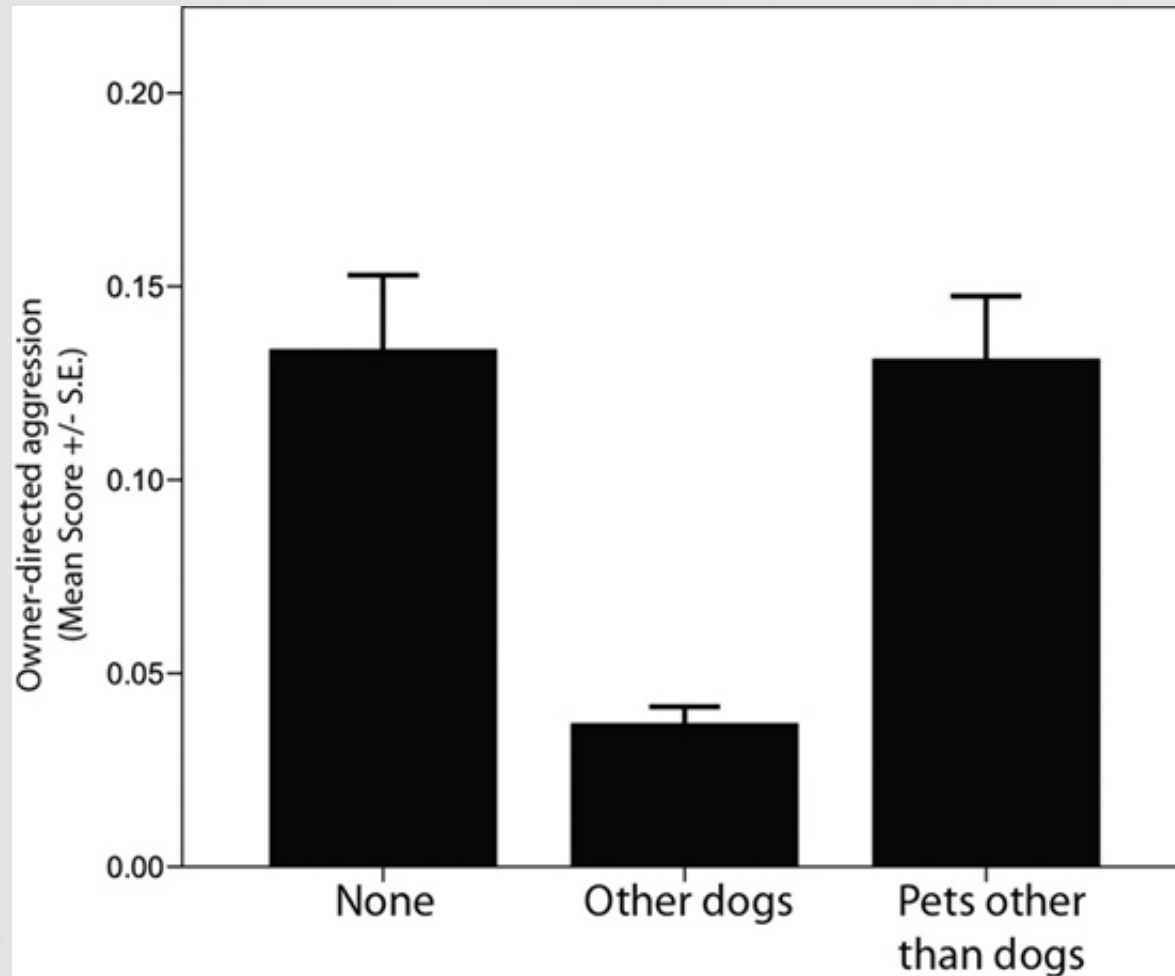
6 mos

12 mos

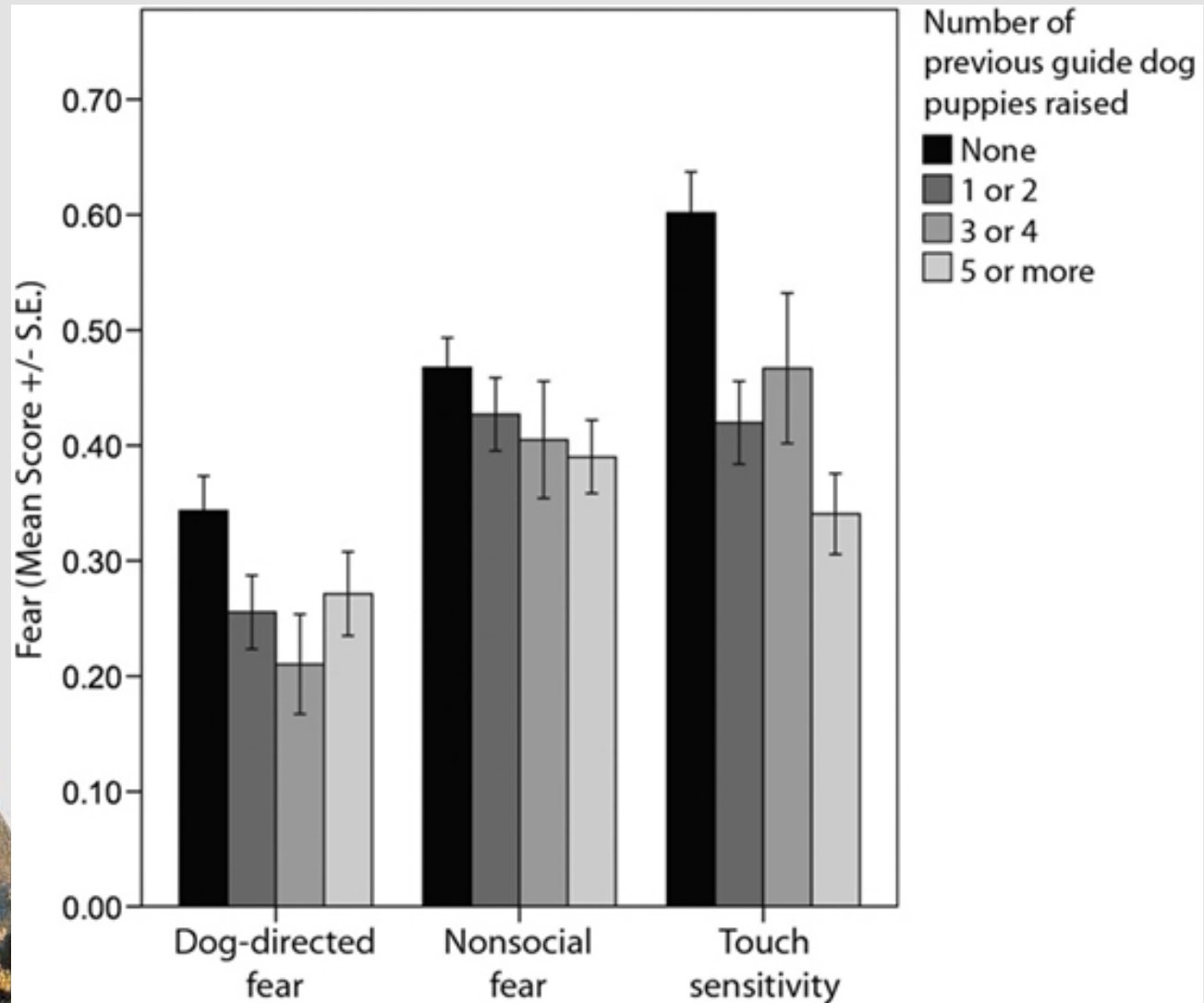
Released
& Adopted



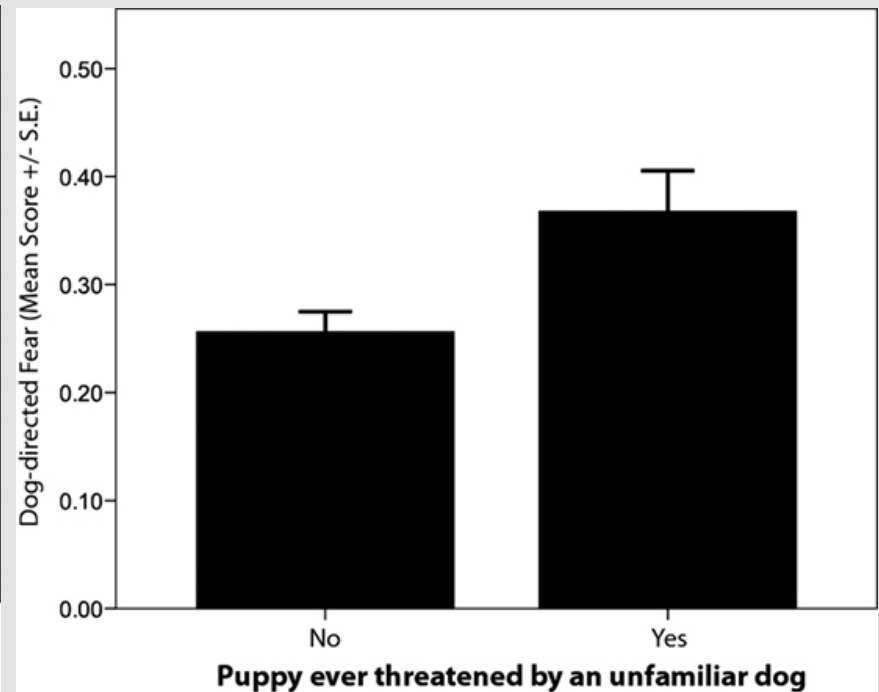
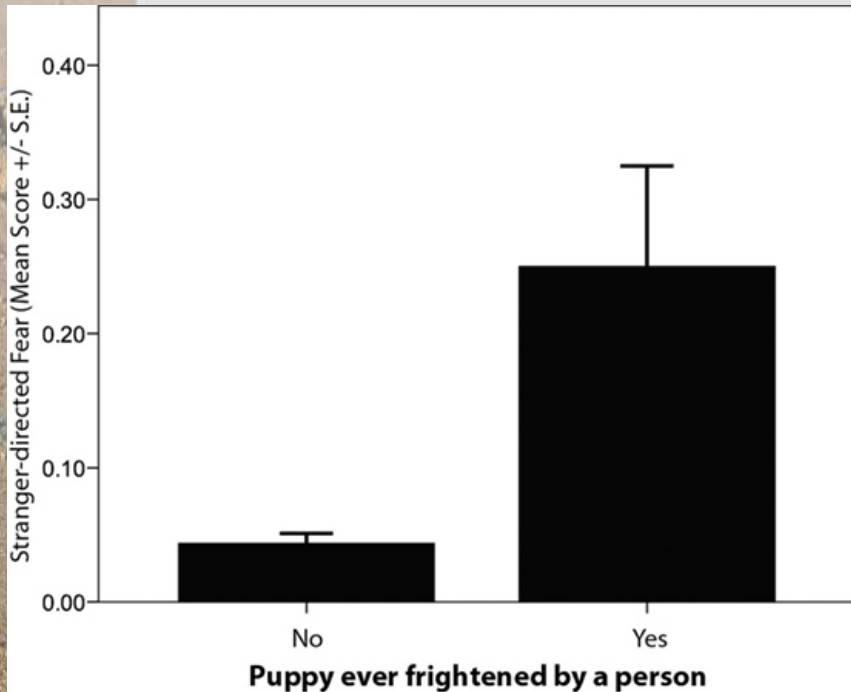
Puppies raised with other dogs in the household display lower levels of owner-directed aggression



Dogs Reared By More Experienced Puppy-Raisers Tend to Have Fewer Problems with Fear & Anxiety



Frightening Experiences During This Period Appeared to Have Long-term Effects on Behavior



Serpell, J.A. & Duffy, D.L. 2016. *Frontiers in Vet. Sci.*, doi: 10.3389/fvets.2016.00049

12-Month C-BARQ Evaluations Can Also Predict the Quality of the Owner's Working Relationship with the Dog up to 5 Years Later



ANOVA Results

Owner-directed aggression	$P < 0.005$
Separation problems	$P < 0.05$
Escaping/roaming	$P < 0.02$
Inappropriate chewing	$P < 0.03$
Pulling on harness	$P < 0.05$
Compulsive staring	$P < 0.02$
Compulsive fly-snapping	$P < 0.0001$
Persistent barking	$P < 0.01$
Compulsive licking	$P < 0.05$

Conclusions



- The C-BARQ has made it possible to quantify differences in behavior and temperament among dog breeds and between individual dogs, and propose novel theories regarding the origins of these differences.
- This work demonstrates that aspects of early environment, both before and after the traditional socialization period, can exert long-term effects on behavior.
- More than 60 different published studies using the C-BARQ have also investigated:
 - ✓ Phylogenetic relationships among dog breeds
 - ✓ Effects of dietary, pharmacological, and training interventions on dog behavior
 - ✓ Effects of owner personality and attitudes on dog behavior.
 - ✓ Genetic mapping of canine temperament traits.
 - ✓ Etc.



Feline Behavioral Assessment & Research Questionnaire

The FeBARQ is designed to provide cat owners and professionals with standardized evaluations of feline temperament and behavior.

New to FeBARQ?

Sign up to enter a cat and complete the FeBARQ.

[Sign Up Now](#)

Returning Users

Welcome back! Enter your user name and password below.

User Name

Password

[Sign In](#)

[Forget your password?](#)

What is the FeBARQ?

[Learn more](#) about the FeBARQ and what it measures.

Help support the FeBARQ and the University of Pennsylvania's Center for Interaction of Animals & Society by [donating to this project](#).

Veterinarians, researchers, trainers, shelters, breeders, and breed groups can [register with us to participate in the FeBARQ project](#).

©2016 [James A. Serpell](#) and the [University of Pennsylvania](#). All rights reserved.

Questions about this site? Need help? [Visit our contact form](#).



Created with the help of a grant from the Waltham Foundation.

ありがとうございました

Thank You!