

## **PRESENTATION SUMMARY & POWERPOINT**

---

### **Non-reproductive Effects of Spaying and Neutering on Behavior in Dogs**

Deborah L. Duffy, Ph.D., and James A. Serpell, Ph.D., Center for the Interaction of Animals and Society, School of Veterinary Medicine, University of Pennsylvania

Although there are scattered reports in the literature of apparently adverse effects of spaying and neutering on canine behavior, there are very few quantitative studies and most of these have employed behavioral measures of unknown reliability and validity.

The present study used the Canine Behavioral Assessment and Research Questionnaire (C-BARQ)<sup>®</sup> to investigate the impact of spaying/neutering in various dog populations, including (1) a random sample of 1,552 dogs belonging to 11 common breeds and (2) a convenience sample of over 6,000 dogs of various breeds recruited via an online survey. The C-BARQ is a reliable, standardized method for evaluating and screening dogs for the presence and severity of behavioral problems. It was developed by behavioral researchers at the University of Pennsylvania (Hsu and Serpell, 2003) and consists of a 101-item questionnaire that is simple to use, takes about 15 minutes to fill out, and can be completed by anyone who is reasonably familiar with the dog's typical responses to ordinary, day-to-day events and stimuli. The C-BARQ is currently the only existing behavioral assessment instrument of its kind to be thoroughly tested for reliability and validity on large samples of dogs of various breeds. This process has resulted in the identification of the following 13 distinct behavioral factors or traits that are common to the majority of dogs, regardless of breed, age, sex or neuter status:

1. **Stranger-directed aggression:** Dog shows threatening or aggressive responses to strangers approaching or invading the dog's or the owner's personal space, territory, or home range.
2. **Owner-directed aggression:** Dog shows threatening or aggressive responses to the owner or other members of the household when challenged, manhandled, stared at, stepped over, or when approached while in possession of food or objects.
3. **Dog-directed fear/aggression:** Dog shows fearful and/or aggressive responses when approached directly by unfamiliar dogs.
4. **Familiar dog aggression:** Threatening or aggressive responses during competition for resources with other (familiar) dog(s) in the household.
5. **Stranger-directed fear:** Fearful or wary responses when approached directly by strangers.

## Session I: Non-reproductive Effects of Spaying and Neutering

6. **Nonsocial fear:** Fearful or wary responses to sudden or loud noises, traffic, and unfamiliar objects and situations.
7. **Separation-related behavior:** Vocalizes and/or engages in destructive behavior when separated from the owner, often accompanied or preceded by behavioral and autonomic signs of anxiety, including restlessness, loss of appetite, trembling, and excessive salivation.
8. **Attachment and attention-seeking:** Maintains close proximity to the owner or other members of the household, solicits affection or attention, and becomes agitated when the owner gives attention to third parties.
9. **Trainability:** Shows willingness to attend to the owner, obeys simple commands, fetches objects, responds positively to correction, and ignores distracting stimuli.
10. **Chasing:** Pursues cats, birds, and other small animals, given the opportunity.
11. **Excitability:** Strong reaction to potentially exciting or arousing events, such as going for walks or car trips, doorbells, arrival of visitors, and the owner arriving home; difficulty settling down after such events.
12. **Touch sensitivity:** Fearful or wary responses to potentially painful procedures, including bathing, grooming, claw-clipping, and veterinary examinations.
13. **Energy level:** Highly energetic, boisterous, and/or playful behavior.

The results of the study suggest that spayed female dogs tend to be more aggressive toward their owners and to strangers than intact females, but that these effects of spaying on behavior appear to be highly breed-specific. Contrary to popular belief, the study found little evidence that castration was an effective treatment for aggressive behavior in male dogs, and may exacerbate other behavioral problems. Further research will be needed to clarify the relationship between age of spaying/neutering and these apparent effects on behavior.

### Reference

Hsu, Y., and Serpell, J.A. 2003. "Development and validation of a questionnaire for measuring behavior and temperament traits in pet dogs." *J. Amer. Vet. Med. Assoc.*, 223: 1293-1300.

## Session I: Non-reproductive Effects of Spaying and Neutering

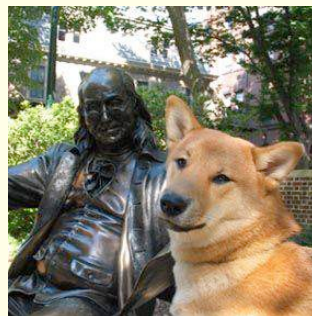
### Effects on Behavior

By Dr. Deborah Duffy

#### BEHAVIORAL EFFECTS OF SPAYING/NEUTERING IN DOMESTIC DOGS

Deborah L. Duffy, Ph.D.  
James A. Serpell, Ph.D.

Center for the Interaction of Animals &  
Society  
School of Veterinary Medicine  
University of Pennsylvania



#### OFTEN CITED BEHAVIORAL REASONS TO SPAY/NEUTER A PET:

(from websites of veterinary clinics, humane societies, trainers & animal shelters)

“Spaying and neutering makes  
pets better, more affectionate  
companions.”

“Female dogs, like males, have  
an increased risk of aggression if  
left intact.”

“It is true that unneutered dogs are often more aggressive and  
territorial (urine marking, fighting), but these traits should not be  
confused with loyalty and protection of their home and family.”

“The only behavior changes that  
are observed after neutering  
relate to behaviors influenced by  
male hormones.”

“..any (behavioral) change would be for the better.  
Altered pets are less aggressive toward other dogs and  
cats, are less likely to urine mark and wander, and  
generally have better personalities.”

“Unsterilized animals often exhibit  
more behavior and temperament  
problems than do those who have  
been spayed or neutered.”

## Session I: Non-reproductive Effects of Spaying and Neutering

Effects on Behavior

By Dr. Deborah Duffy

### QUESTIONS:

- ❦ What effects does spaying/neutering have on non-reproductive behaviors?
- ❦ Sex differences?
- ❦ Breed differences?



## Canine Behavioral Assessment & Research Questionnaire (C-BARQ)

<http://www.vet.upenn.edu/cbarq/>

# Session I: Non-reproductive Effects of Spaying and Neutering

## Effects on Behavior

By Dr. Deborah Duffy

101 Questions:

- 🐾 5-point scale
- 🐾 mixture of severity scales and frequency scales

**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 circling or underlining a number on the following 5-point scales (0= No aggression, 4= Serious aggression), please indicate your own dog's recent tendency to display aggressive behavior in each of the following contexts.

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

No aggression No visible signs of aggression	Moderate aggression: growling/barking—baring teeth	Serious aggression: Snaps, bites or attempts to bite.
0.....1.....2.....3.....4		

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

No aggression No visible signs of aggression	Moderate aggression: growling/barking—baring teeth	Serious aggression: Snaps, bites or attempts to bite.
0.....1.....2.....3.....4		

**Canine Behavioral Assessment & Research Questionnaire (C-BARQ)**

The following questions are designed to allow you to describe how your dog has been behaving in the recent past (i.e. during the last few months).

Please try to answer all of the questions. Only leave a question blank if you cannot answer it for some reason (for instance, if you have never observed the dog in the situation described).

**SECTION 1: Training and obedience**

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

	Never	Seldom	Sometimes	Usually	Always
1. When off the leash, returns immediately when called.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Obeys the "sit" command immediately.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Obeys the "stay" command immediately.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Seems to attend/listen closely to everything you say or do.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Slow to respond to correction or punishment, "tact-sensitive".	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Slow to learn new tricks or tasks.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Easily distracted by interesting sights, sounds or smells.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Will "retrieve" or attempt to retrieve sticks, balls, or objects.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## The C-BARQ Factors or Traits

- |  |                                    |
|--|------------------------------------|
| <i>Stranger-directed aggression</i> (10 items) | <i>Trainability</i> (8 items)      |
| <i>Owner-directed aggression</i> (8 items)     | <i>Chasing</i> (4 items)           |
| <i>Dog-directed fear/aggression</i> (8 items)  | <i>Excitability</i> (6 items)      |
| <i>Dog rivalry</i> (4 items)                   | <i>Touch sensitivity</i> (4 items) |
| <i>Stranger-directed fear</i> (4 items)        | <i>Energy</i> (2 items)            |
| <i>Nonsocial fear</i> (6 items)                |                                    |
| <i>Separation-related behavior</i> (8 items)   |                                    |
| <i>Attachment/attention-seeking</i> (6 items)  |                                    |

## Session I: Non-reproductive Effects of Spaying and Neutering

### Effects on Behavior

By Dr. Deborah Duffy

#### Miscellaneous C-BARQ Items

Item 78: Escaping/roaming	Item 89: Separation urination
Item 79: Rolling in scent	Item 90: Separation defecation
Item 80: Coprophagia (eating feces)	Item 91: Hyperactivity
Item 81: Chewing objects	Item 94: Staring (obsessive)
Item 82: Mounting	Item 95: Snapping at flies (obsessive)
Item 83: Food begging	Item 96: Tail-chasing
Item 84: Food stealing	Item 97: Shadow/light-chasing
Item 85: Fear of stairs	Item 98: Barking
Item 86: Pulling on leash	Item 99: Autogrooming (self)
Item 87: Marking with urine	Item 100: Allogrooming (others)
Item 88: Submissive/emotional urination	Item 101: Other abnormal/stereotypic

#### Random Sample Survey

##### Respondents:

- \* 1,552 dog owners (breed club members)

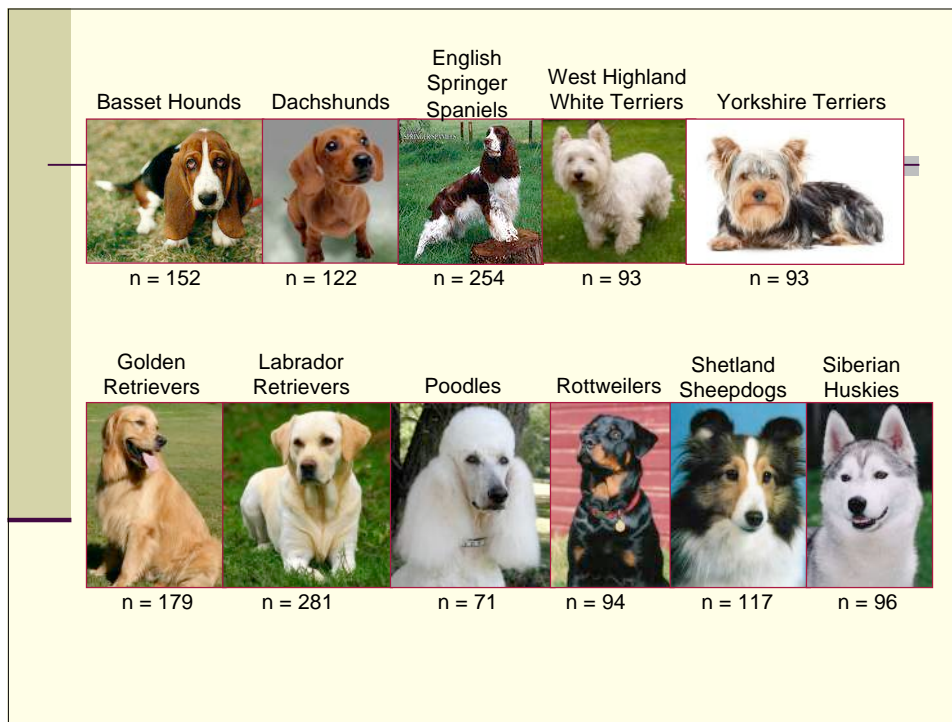
##### Dogs

- \* Age:  $\geq 1$  year old (mean 6 years, Std.dev. 3.2 yrs)
- \* Sex: Male:Female ratio = 1:1
- \* 40% Spayed/Neutered

## Session I: Non-reproductive Effects of Spaying and Neutering

### Effects on Behavior

By Dr. Deborah Duffy



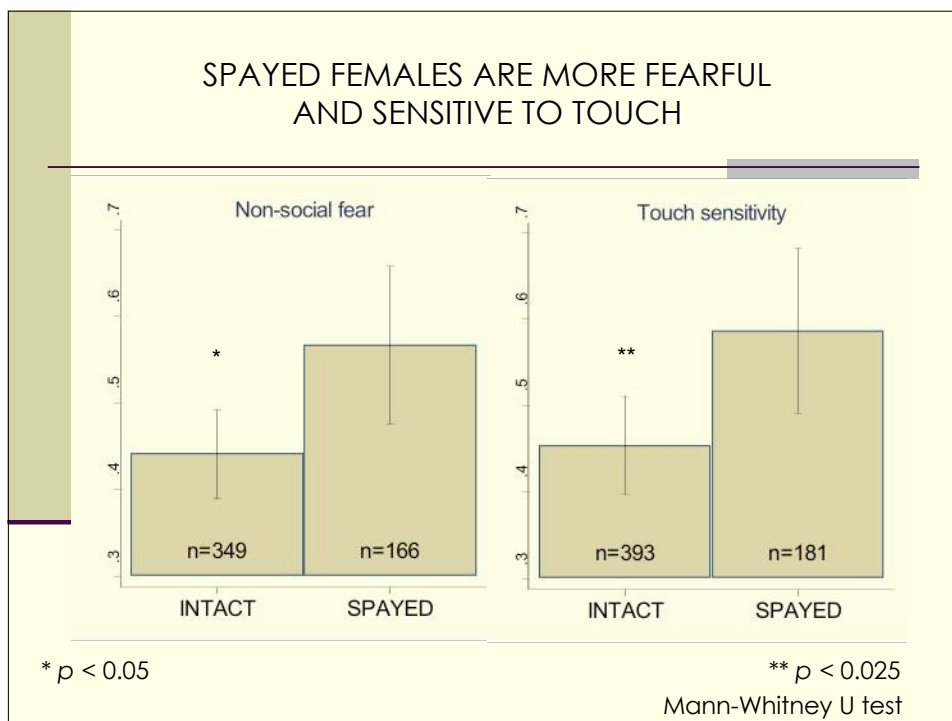
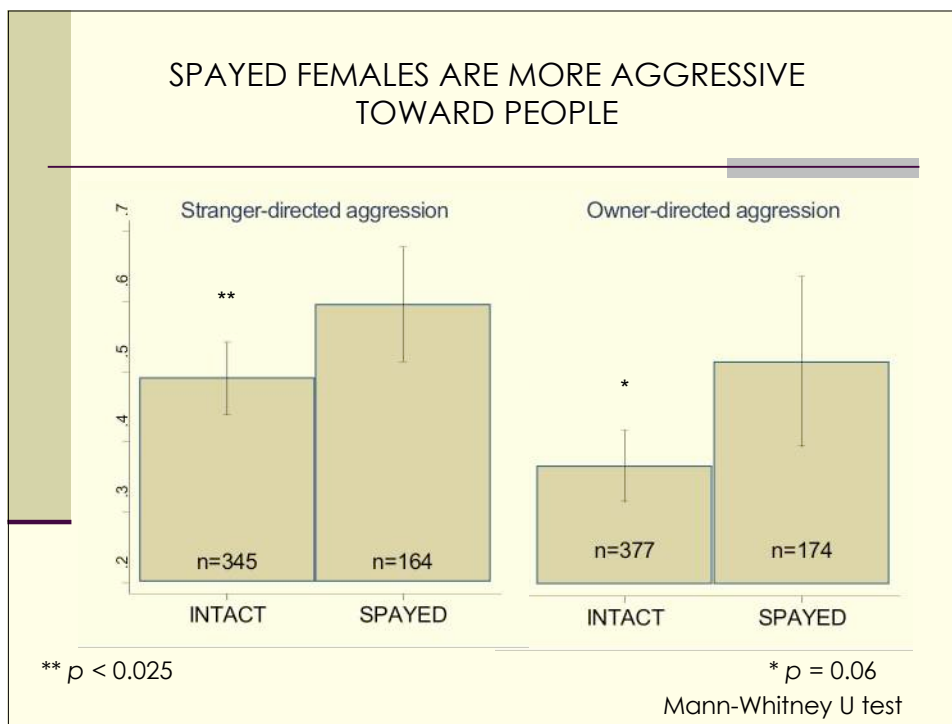
### Reasons for Spaying/Neutering:

	Percent
Birth Control	41.8
Required by Shelter/Breeder	2.2
Control/Prevent Behavior Problems	18.1
Control/Prevent Health Problems	31.4
Recommended by Veterinarian	.5
Other	6.0

## Session I: Non-reproductive Effects of Spaying and Neutering

### Effects on Behavior

By Dr. Deborah Duffy

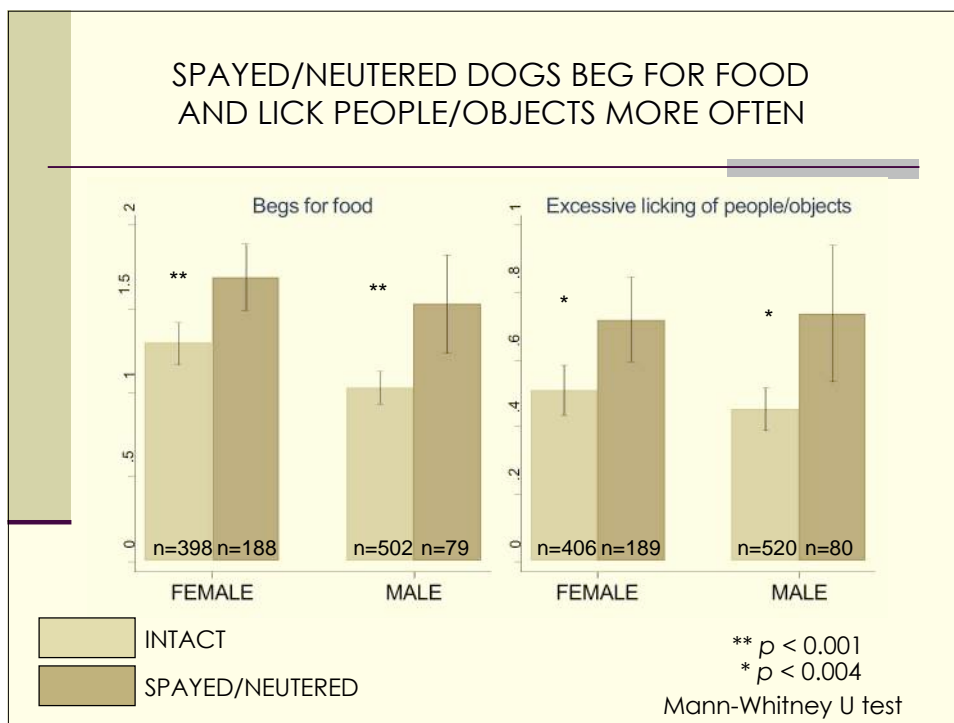
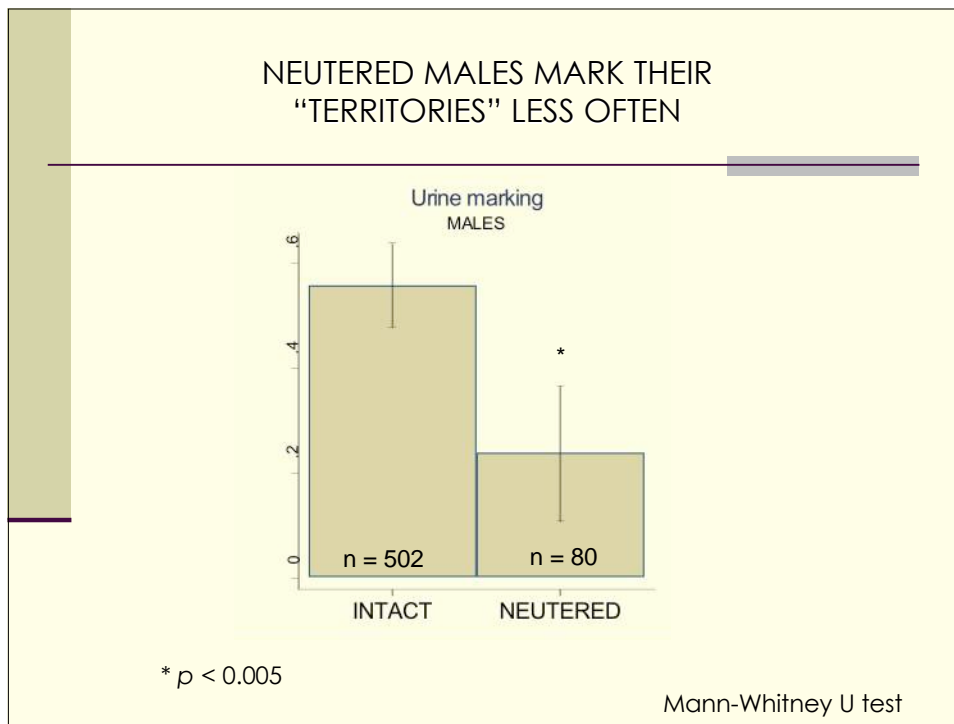




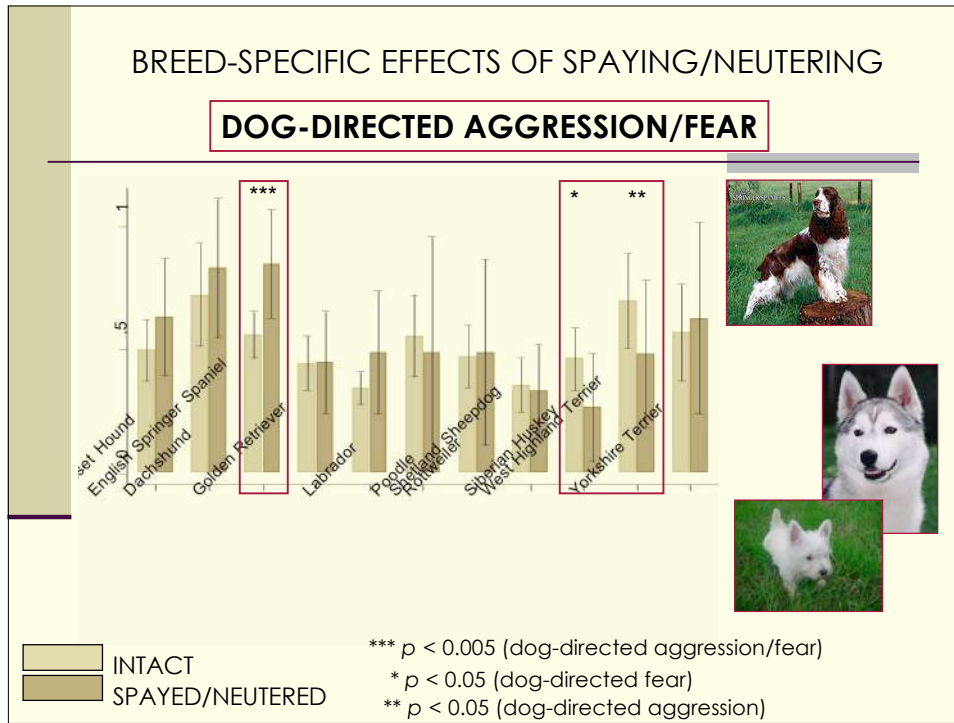
# Session I: Non-reproductive Effects of Spaying and Neutering

## Effects on Behavior

By Dr. Deborah Duffy



**Session I: Non-reproductive Effects of Spaying and Neutering**  
**Effects on Behavior**  
 By Dr. Deborah Duffy



## Convenience Sample Survey

**Respondents:**

- ❖ 3,593 dog owners (open-access to C-BARQ website)
- ❖ Only 1 dog per owner

**Dogs:**

- ❖ Age: 6 months – 23 years (mean 4.8 years, Std.dev. 3.2 yrs)
- ❖ Sex: Male:Female ratio = 1:1
- ❖ 76% Spayed/Neutered
- ❖ 17 breeds (plus mixed breeds) with sample size of  $\geq 50$  dogs each

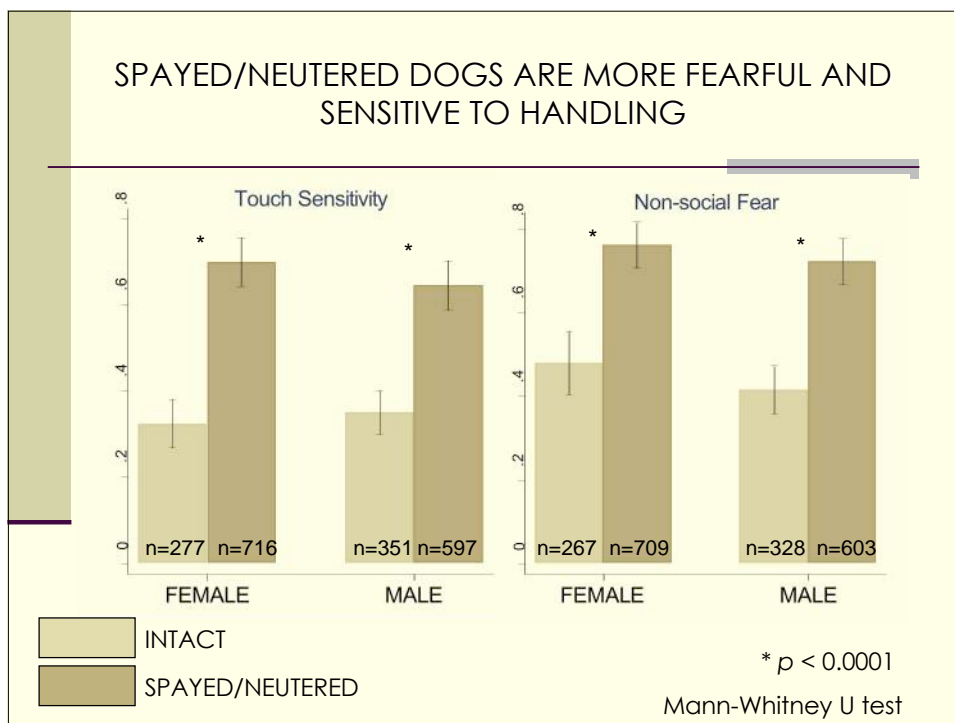
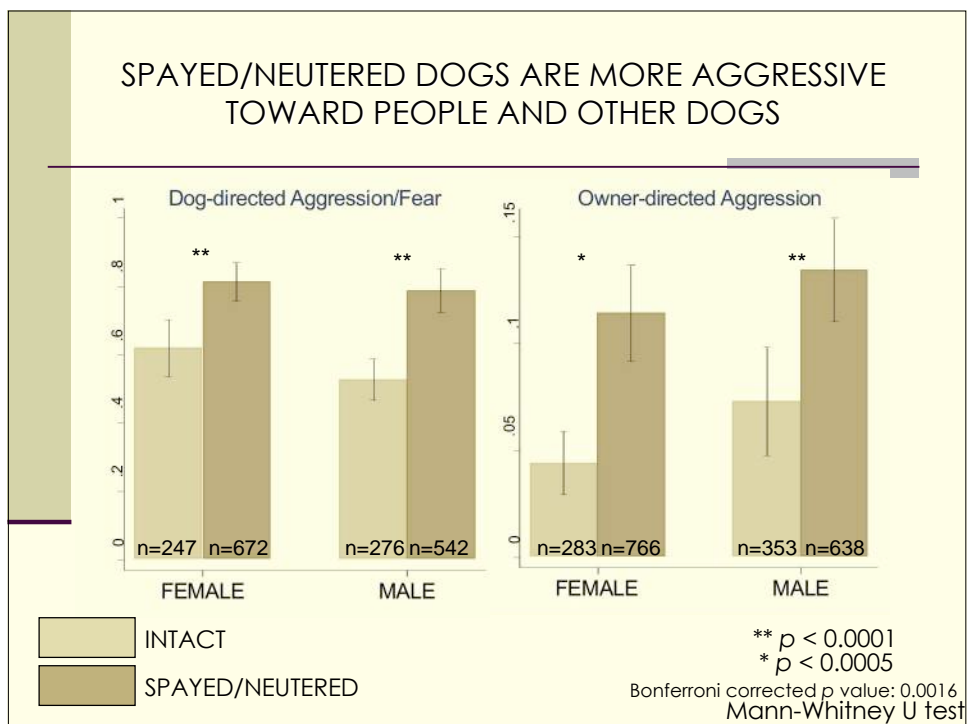
**Reasons for spaying/neutering:**

- ❖ Birth control (40%)
- ❖ Required by breeder/shelter (30%)

## Session I: Non-reproductive Effects of Spaying and Neutering

Effects on Behavior

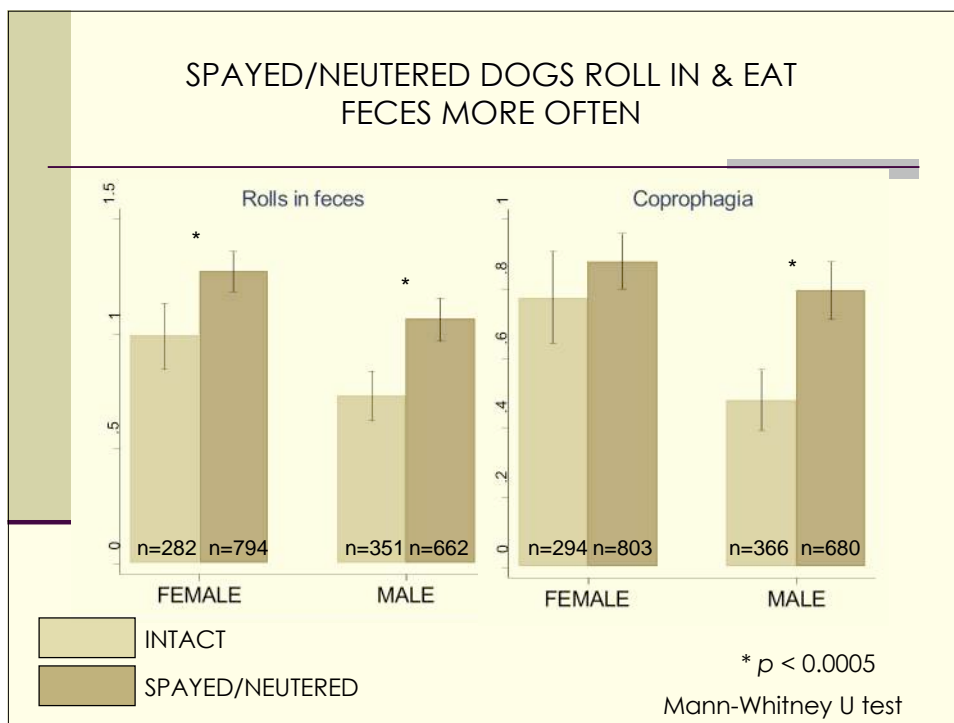
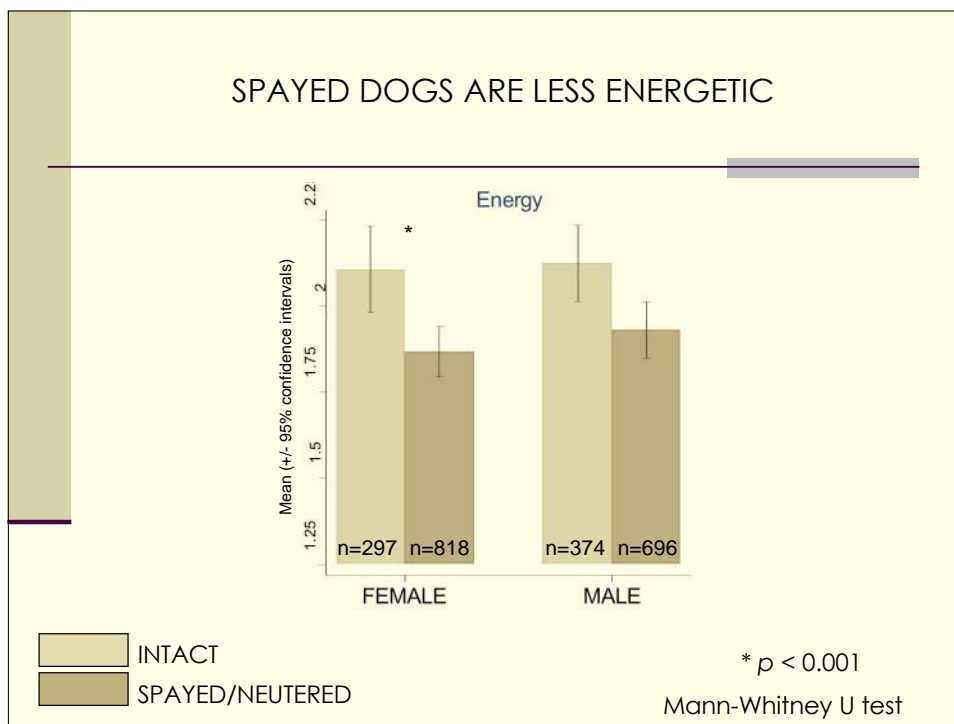
By Dr. Deborah Duffy



# Session I: Non-reproductive Effects of Spaying and Neutering

## Effects on Behavior

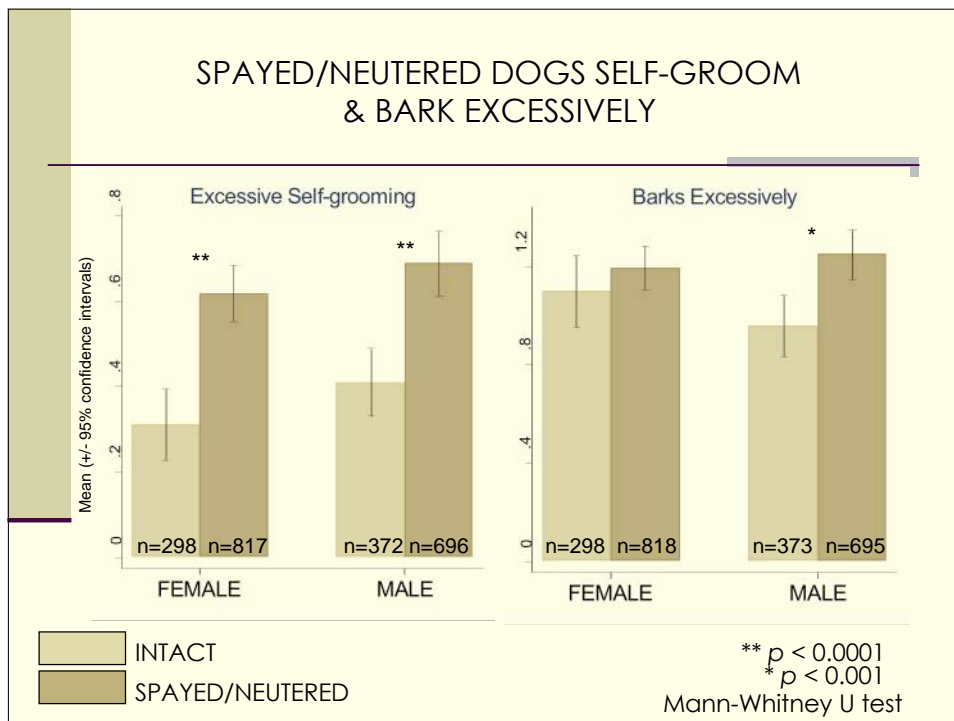
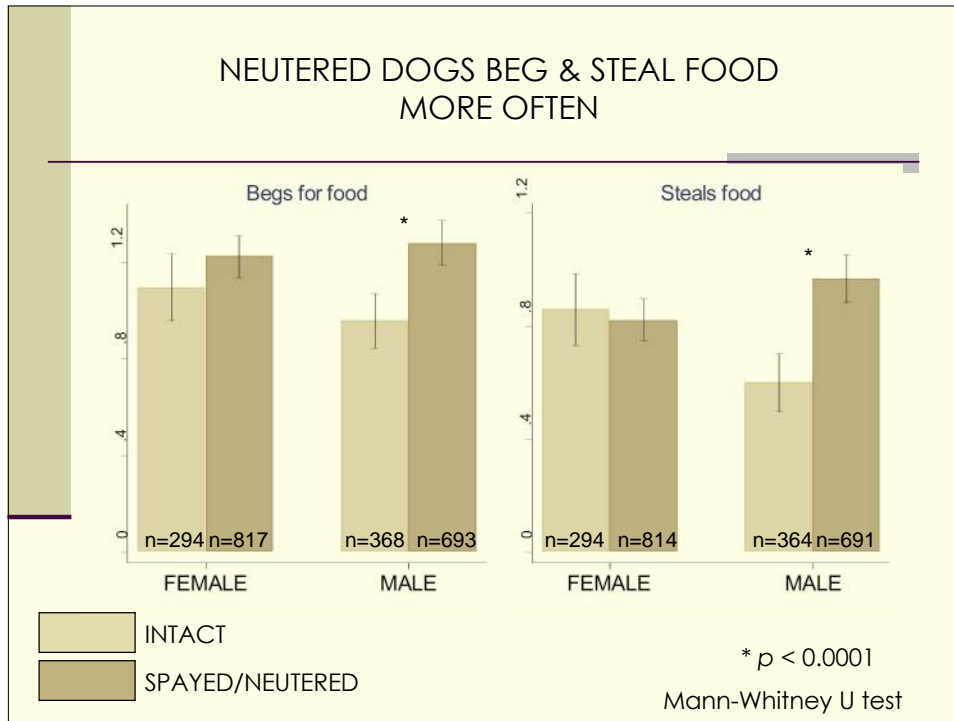
By Dr. Deborah Duffy



# Session I: Non-reproductive Effects of Spaying and Neutering

## Effects on Behavior

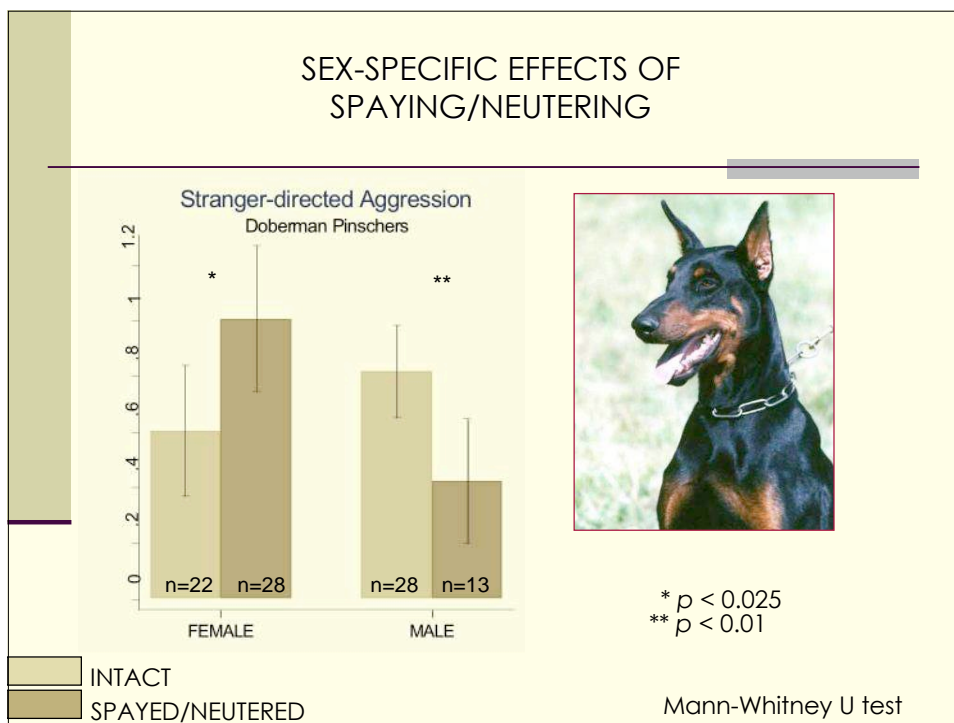
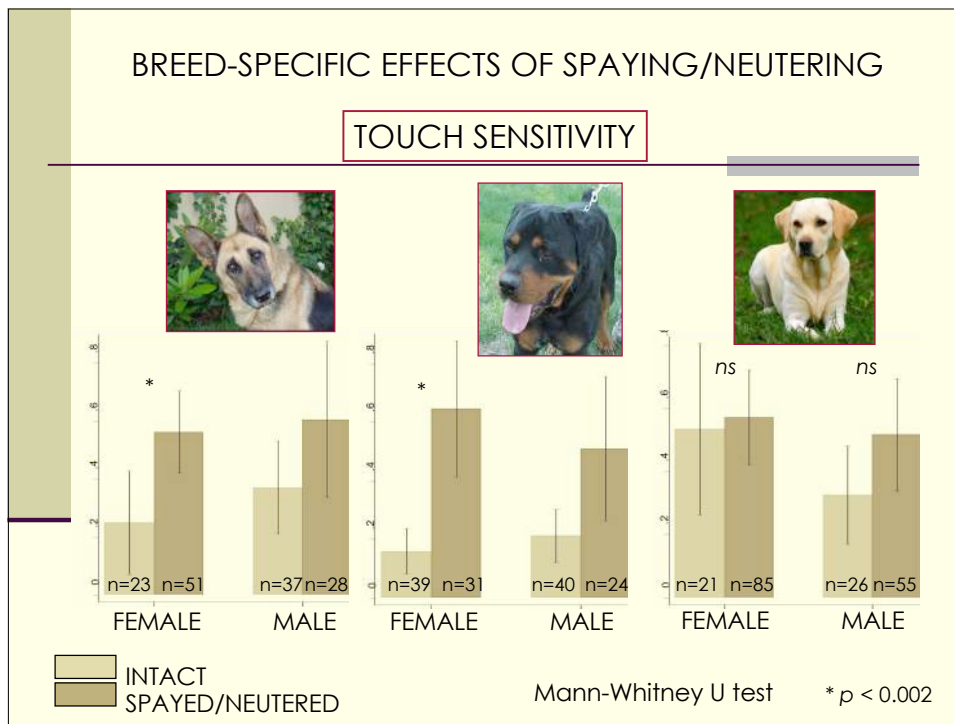
By Dr. Deborah Duffy



# Session I: Non-reproductive Effects of Spaying and Neutering

## Effects on Behavior

By Dr. Deborah Duffy



## Session I: Non-reproductive Effects of Spaying and Neutering

### Effects on Behavior

By Dr. Deborah Duffy

#### SUMMARY

---

- ❖ For most behaviors, spaying/neutering was associated with worse behavior, contrary to conventional wisdom.
- ❖ A few behaviors (e.g., energy level, urine marking) were reduced in spayed/neutered dogs.
- ❖ The effects of spaying/neutering are often specific to certain breeds and are not always equivalent between sexes.

#### CONCLUSIONS

---

- ❖ Significant differences in scores do not necessarily indicate severe behavioral problems.
- ❖ Neutering male dogs does not render them useless for protection or guarding.
- ❖ We need to investigate mechanisms for behavioral effects of spaying and develop alternatives.
- ❖ Dog owners need to receive accurate information to help them form realistic expectations.

## Session I: Non-reproductive Effects of Spaying and Neutering

### Effects on Behavior

By Dr. Deborah Duffy

#### ACKNOWLEDGEMENTS

---

- ✿ Dr. Yuying Hsu (Nat. Taiwan Normal University).
- ✿ Kathy Kruger (Univ. of Pennsylvania).
- ✿ The Arell Foundation, The Kenneth A. Scott Charitable Trust, The Pet Care Trust, The University of Pennsylvania Research Foundation, AKC Canine Health Foundation, and the Arthur L. "Bud" Johnson Foundation.
- ✿ Various breed clubs.
- ✿ All participants.

