

Characteristics of Shelter-Relinquished Animals and Their Owners Compared With Animals and Their Owners in U.S. Pet-Owning Households

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Animal shelters in the United States annually receive millions of relinquished dogs and cats, and risk factors for relinquishment are not fully understood. Investigators sponsored by the National Council on Pet Population Study and Policy interviewed people who relinquished dogs and cats at 12 shelters in four regions. We collected similar data from a sample of U.S. households with companion animals. Data col-

lected included nonhuman animal characteristics such as age, sex, and frequency of selected behaviors. We also obtained data on keepers' (owners') age, sex, and level of education as well as their general knowledge of pet care and behavior. We found that relinquishment was associated with physical and behavioral characteristics of the animals and owner characteristics and knowledge. Relinquished animals were more likely to be intact, younger, and mixed bred. People relinquishing animals were significantly more likely to be men and younger than 35 years. Duration of ownership was significantly shorter for relinquished animals.

Millions of dogs and cats are relinquished to animal shelters annually in the United States, and the factors associated with these relinquishments are not fully understood. Although good studies have been conducted on a local level, the two studies described in this article represent the first national attempt to quantify the role of multiple factors in the relinquishment of dogs and cats.

The Regional Shelter Relinquishment Survey (Shelter Survey) sponsored by the National Council on Pet Population Study and Policy (National Council) interviewed people relinquishing dogs and cats at 12 shelters in four regions of the United States over a 1-year period (Salman et al., 1998). Information was collected on the characteristics of the animals and the people who relinquished them, relative frequency of selected behaviors of the animals, and general animal knowledge of the people relinquishing the animals. As a comparison group, households in the United States that owned at least one dog or cat also were surveyed to collect the same information. In this article we compare the characteristics, selected behaviors of animals, and general knowledge of people in two populations: (a) animals relinquished to shelters and their relinquishers and (b) animals and owners from a sample of the U.S. pet-owning population.

MATERIALS AND METHODS

People Relinquishing Animals to Shelters

During the Shelter Survey, personal interviews were conducted with people who relinquished dogs and cats at 12 shelters in four regions of the United States. Interviews were conducted on randomly selected days for 1 year. The 12 shelters were located in the following states: California (3), Colorado (3), Tennessee (2), Kentucky (2), New Jersey (1), and New York (1).

Interviewers used a standardized questionnaire, and all interviewers received the same training. Participation was voluntary, and all interviews were conducted in a confidential manner (Salman et al., 1998). Data were collected on 2,631 dogs and puppies relinquished by 2,092 people, and 2,374 cats and kittens relinquished by 1,315 people. Data requested for all animals were sex, age, and breed. Addi-

tional data requested for adult dogs and cats (> 6 months of age) included neuter status, source, length of ownership, purchase cost, and relative frequency of 10 selected behaviors. In addition, people who relinquished animals were asked to respond to eight general questions on companion animal care and behavior.

Pet-Owning Households

The National Pet-Owning Household Survey (Household Survey) was a mail survey focusing on the general pet-owning population in the United States as a comparison group. This survey was divided into two phases. The American Veterinary Medical Association conducted Phase 1, a survey that queried 80,000 pet-owning and non-pet-owning households (American Veterinary Medical Association, 1997). These households were obtained from a commercial company¹ that maintained a panel of households selected to provide a representative listing of U.S. households based on demographic variables such as (a) size of household, (b) age of male or female head of household, (c) household income, and (d) geographic location.

From respondents to the Phase 1 mail survey, 7,399 households were selected for the Phase 2 survey. These households included at least one dog or cat during 1996 and were divided almost equally between dog- and cat-owning households, a small proportion of which housed both species. Approximately half of the households were selected because they reported that at least one dog or cat had left the household during the previous year. This accomplished one objective of the Household Survey: to explore the reasons why pets leave households other than being relinquished to shelters. These data are the focus of a subsequent article. Of dog-owning households that reported a dog left during the previous year and indicated the disposition, 29.4% (507 of 1,726) had a dog that died or was killed, 26.5% (458) had a dog that was euthanized, 12.5% (215) gave a dog away, 6.0% (103) had a dog that disappeared, 4.4% (76) relinquished a dog to a shelter or animal control, and 2.5% (44) sold a dog. For cat-owning households, 32.3% (508 of 1,573) reported a cat had died or was killed, 19.1% (301) had a cat euthanized, 12.7% (200) gave a cat away, 17.4% (274) had a cat that disappeared, 3.8% (59) relinquished a cat to a shelter or animal control, and 0.4% (6) sold a cat.

The remainder of the households selected for the Phase 2 survey reported adding one or more animals or having no change in the number of animals during the previous year. With the exception of source of animals, the Phase 2 questionnaires (one for dog owners and one for cat owners; available from John C. New, Jr.) requested the same information on the animals that the Shelter Survey collected. In the Household Survey, we requested information on the source of any animals

¹National Family Opinion Research, Inc.

added to the household during the previous year but not for those already present. The questionnaires also duplicated questions on frequency of selected behaviors and general knowledge. In multiple-animal households, owners were asked to answer the selected behavior questions about the animal in the household who exhibited the stated behavior most frequently.

We analyzed frequencies and descriptive statistics with the BMDP Statistical Software (Dixon, 1992) and Microsoft Access 2000 (Microsoft Corporation, 2000). We used Epi Info (Dean et al., 1994) to calculate odds ratios with 95% confidence limits to compare the characteristics of animals, selected behaviors of animals, and selected demographic variables of the relinquishing people or owners. An odds ratio is the odds of animals in the Shelter Survey having a characteristic or exhibiting a behavior divided by the odds of an animal of the same species in the Household Survey having the same characteristic or exhibiting the same behavior. An odds ratio of 1.0 represents no difference between the two populations. The higher the odds ratio, as long as the confidence limits do not include 1.0, the stronger the difference. We tested the significance of the differences in frequencies (proportions) of responses to the general knowledge questions by using a two-tailed hypothesis test with a null hypothesis that the two proportions were equal. Because samples were large, the test statistic (Z value) was considered to be distributed normally. We used a weighted average of the two sample proportions as an estimator of the common hypothesized proportion (Milton & Arnold, 1990). The level of significance was set a priori at $p < .05$.

RESULTS

During the Shelter Survey, information was collected on 2,631 dogs (2,116 dogs > 6 months of age and 515 puppies \leq 6 months of age) and 2,374 cats (1,372 cats > 6 months of age and 1,002 kittens \leq 6 months of age) by personal interview with 2,092 people relinquishing dogs and 1,315 people relinquishing cats. In the Household Survey, there was a 75% response rate to the Phase 1 survey and an 89% response rate to the Phase 2 survey. During the Household Survey, information was collected on 5,807 dogs (5,267 dogs > 6 months of age and 540 puppies \leq 6 months of age) and 7,138 cats (6,372 cats > 6 months of age and 766 kittens \leq 6 months of age) by mail survey of 3,434 dog-owning households and 3,465 cat-owning households. Data from people contacted in shelters or their households regarding sex, age, and breed characteristics for dogs and cats are presented in Table 1. Table 2 summarizes information on neuter status stratified by sex, source, length of ownership, purchase cost for dogs and cats (> 6 months of age), and whether the animal had bitten anyone.

Although dogs from both populations were distributed almost equally by sex, relinquished males, compared with dogs in households, were at a slightly increased

TABLE 1
 Characteristics of Dogs, Puppies, Cats, and Kittens Relinquished to Animal Shelters
 or Present in Pet-Ownning Households (1995–1996)

Characteristic	Dogs and Puppies						Cats and Kittens					
	Shelters			Households			Shelters			Households		
	n	%	Odds Ratio ^a (95% CL)	n	%	Odds Ratio ^a (95% CL)	n	%	n	%	Odds Ratio ^a (95% CL)	
Sex												
Female	1,299	49.4	1.0 (N/A)	3,061	52.7	1.0 (N/A)	1,168	49.2	3,791	53.1	— ^b	— ^b
Male	1,269	48.2	1.1* (1.01–1.22)	2,703	46.5	1.1*	895	37.7	3,240	45.4	— ^b	— ^b
Age												
15 years +	105	4.0	1.0 (N/A)	256	4.4	1.0 (N/A)	63	2.7	421	5.9	1.0 (N/A)	1.0 (N/A)
10 to < 15 years	219	8.3	0.5* (0.4–0.7)	1,054	18.2	0.5* (0.4–0.7)	104	4.4	1,053	14.8	0.7* (0.5–0.9)	0.7* (0.5–0.9)
5 to < 10 years	258	9.8	0.4* (0.3–0.5)	1,603	27.6	0.4* (0.3–0.5)	216	9.1	1,774	24.9	0.8 (0.6–1.1)	0.8 (0.6–1.1)
4 to < 5 years	90	3.4	0.5* (0.4–0.7)	419	7.2	0.5* (0.4–0.7)	66	2.8	494	6.9	0.9 (0.6–1.3)	0.9 (0.6–1.3)
3 to < 4 years	139	5.3	0.7* (0.5–1.0)	469	8.1	0.7* (0.5–1.0)	112	4.7	612	8.6	1.2 (0.9–1.7)	1.2 (0.9–1.7)
2 to < 3 years	205	7.8	0.9 (0.7–1.2)	537	9.3	0.9 (0.7–1.2)	160	6.7	769	10.8	1.4* (1.0–1.9)	1.4* (1.0–1.9)
1 to < 2 years	410	15.6	1.8* (1.4–2.3)	566	9.8	1.8* (1.4–2.3)	270	11.4	732	10.3	2.5* (1.8–3.4)	2.5* (1.8–3.4)
9 to < 12 months	182	6.9	3.1* (2.2–4.3)	145	2.5	3.1* (2.2–4.3)	56	2.4	233	3.3	1.6* (1.1–2.4)	1.6* (1.1–2.4)
6 to < 9 months	235	8.9	2.6* (1.9–3.6)	218	3.8	2.6* (1.9–3.6)	153	6.5	284	4.0	3.6* (2.6–5.1)	3.6* (2.6–5.1)
3 to < 6 months	257	9.8	6.1* (4.4–8.5)	103	1.8	6.1* (4.4–8.5)	215	9.1	111	1.6	12.9*	12.9*
< 3 months	500	19.0	36.9* (23.8–57.5)	33	0.6	36.9*	905	38.1	31	0.4	(9.0–18.7) 195.1*	(9.0–18.7) 195.1*
Breed												
Pure	636	24.2	1.0 (N/A)	2,905	50.0	1.0 (N/A)	74	3.1	544	7.6	1.0 (N/A)	1.0 (N/A)

(Continued)

TABLE 1 (Continued)

Characteristic	Dogs and Puppies				Cats and Kittens				
	Shelters		Households		Shelters		Households		
	n	%	n	%	n	%	n	%	
Mixed	1,894	72.0	2,827	48.7	2,197	92.5	6,421	90.0	Odds Ratio ^a (95% CL) 2.5* (2.0-3.3)
									3.1* (2.8-3.4)

Note. CL = confidence limit.

^aOdds ratio of an animal with this characteristic being relinquished to a shelter (Cornfield 95% CL). ^bBecause the sex of 13.1% of kittens relinquished to shelters was unknown, odds ratio cannot be calculated reliably.

*Statistically significant, $p < .05$.

TABLE 2
 Characteristics of Dogs and Cats Relinquished to Animal Shelters
 or Present in Pet-Ownning Households (1995–1996)

Characteristic	Dogs						Cats					
	Shelters			Households			Shelters			Households		
	n	%	Odds Ratio ^a (95% CL)	n	%	Odds Ratio ^a (95% CL)	n	%	n	%	Odds Ratio ^a (95% CL)	
Neuter status												
Altered	891	42.1	1.0 (N/A)	3,153	59.9	1.0 (N/A)	692	50.4	4,924	77.3	1.0 (N/A)	
Intact	1,153	54.4	2.0* (1.8–2.2)	2,052	39.0	2.0* (1.8–2.2)	632	46.1	1,382	21.7	3.3* (2.9–3.7)	
Males												
Altered	404	38.5	1.0 (N/A)	1,184	48.4	1.0 (N/A)	305	54.7	2,258	77.9	1.0 (N/A)	
Intact	617	58.9	1.5* (1.3–1.7)	1,230	50.3	1.5* (1.3–1.7)	239	42.8	618	21.3	2.9* (2.4–3.5)	
Females												
Altered	486	46.1	1.0 (N/A)	1,964	70.3	1.0 (N/A)	384	48.1	2,656	77.4	1.0 (N/A)	
Intact	534	50.6	2.6* (2.3–3.1)	820	29.3	2.6* (2.3–3.1)	389	48.7	750	21.8	3.6* (3.0–4.2)	
Source												
Gift	62	2.9	1.0 (N/A)	31	4.5	1.0 (N/A)	45	3.3	45	4.5	1.0 (N/A)	
Offspring	127	6.0	0.7 (0.4–1.3)	86	12.6	0.7 (0.4–1.3)	122	8.9	195	19.3	0.6 (0.4–1.0)	
Pet shop	82	3.9	2.1* (1.0–4.2)	20	2.9	2.1* (1.0–4.2)	64	4.7	26	2.6	2.5* (1.3–4.8)	
Breeder	225	10.6	0.8 (0.5–1.3)	144	21.1	0.8 (0.5–1.3)	46	3.4	19	1.9	2.4* (1.2–5.0)	
Shelter	475	22.5	3.1* (1.9–5.3)	76	11.1	3.1* (1.9–5.3)	192	14.0	116	11.5	1.7* (1.0–2.7)	
Veterinarian	5	0.2	0.3 (0.1–1.2) ^b	8	1.2	0.3 (0.1–1.2) ^b	12	0.9	5	0.5	2.4 (0.7–9.4) ^b	
Friend	652	30.8	2.8* (1.7–4.6)	117	17.2	2.8* (1.7–4.6)	445	32.4	143	14.1	3.1* (1.9–5.0)	
Stranger	219	10.4	1.0 (0.6–1.7)	110	16.1	1.0 (0.6–1.7)	70	5.1	85	8.4	0.8 (0.5–1.4)	
Stray	197	9.3	2.3* (1.3–4.1)	43	6.3	2.3* (1.3–4.1)	311	22.7	209	20.7	1.5 (0.9–2.4)	

(Continued)

TABLE 2 (Continued)

Characteristic	Dogs						Cats						
	Shelters			Households			Shelters			Households			
	n	%	Odds Ratio ^a (95% CL)	n	%	Odds Ratio ^a (95% CL)	n	%	Odds Ratio ^a (95% CL)	n	%	Odds Ratio ^a (95% CL)	
Length of ownership													
15 years +	84	4.0	1.0 (N/A)	192	3.6	1.0 (N/A)	48	3.5	1.0 (N/A)	339	5.3	1.0 (N/A)	
10 to < 15 years	186	8.8	0.5* (0.3–0.6)	905	17.2	0.5* (0.3–0.6)	87	6.3	0.6*	958	15.0	0.6*	(0.4–0.95)
5 to < 10 years	202	9.5	0.3* (0.2–0.4)	1,448	27.5	0.3* (0.2–0.4)	172	12.5	0.7 (0.5–1.1)	1,646	25.8	0.7 (0.5–1.1)	
4 to < 5 years	71	3.4	0.4* (0.3–0.6)	421	8.0	0.4* (0.3–0.6)	47	3.4	0.7 (0.4–1.1)	486	7.6	0.7 (0.4–1.1)	
3 to < 4 years	90	4.3	0.5* (0.3–0.6)	459	8.7	0.5* (0.3–0.6)	76	5.5	0.9 (0.6–1.3)	609	9.6	0.9 (0.6–1.3)	
2 to < 3 years	148	7.0	0.6* (0.4–0.8)	574	10.9	0.6* (0.4–0.8)	111	8.1	1.1 (0.8–1.6)	711	11.2	1.1 (0.8–1.6)	
1 to < 2 years	284	13.4	1.1 (0.8–1.5)	600	11.4	1.1 (0.8–1.5)	247	18.0	2.1* (1.5–3.0)	825	12.9	2.1* (1.5–3.0)	
9 to < 12 months	119	5.6	1.9* (1.3–2.7)	145	2.8	1.9* (1.3–2.7)	57	4.2	1.7* (1.1–2.7)	232	3.6	1.7* (1.1–2.7)	
6 to < 9 months	229	10.8	1.7* (1.3–2.4)	305	5.8	1.7* (1.3–2.4)	139	10.1	2.6* (1.8–3.8)	378	5.9	2.6* (1.8–3.8)	
3 to < 6 months	213	10.1	3.5* (2.5–5.0)	139	2.6	3.5* (2.5–5.0)	150	10.9	8.8*	120	1.9	8.8*	(5.9–13.2)
< 3 months	461	21.8	18.2* (12.3–27.0)	58	1.1	18.2* (12.3–27.0)	206	15.0	28.5*	51	0.8	28.5*	(18.2–45.0)

Purchase cost													
\$400 +	61	2.9	321	6.1	1.0 (N/A)	5	0.4	20	0.3	1.0 (N/A)			
\$300 to	36	1.7	267	5.1	0.7 (0.4-1.1)	1	0.1	29	0.5	0.1 (0.0-1.4)			
< \$400													
\$200 to	55	2.6	411	7.8	0.7 (0.5-1.1)	2	0.2	58	0.9	0.1* (0.0-1.0)			
< \$300													
\$100 to	101	4.8	427	8.1	1.2 (0.9-1.8)	7	0.5	62	1.0	0.5 (0.1-2.0) ^b			
< \$200													
\$0.01 to	564	26.7	829	15.7	3.6* (2.6-4.9)	240	17.5	742	11.7	1.3 (0.5-4.5) ^b			
< \$100													
0	1,215	57.4	2,821	53.6	2.3* (1.8-3.1)	1,053	76.8	5,211	81.8	0.8 (0.3-2.5)			
Bitten a person													
No	1,774	83.8	3,264	95.0	1.0 (N/A)	1,078	78.6	3,188	92.0	1.0 (N/A)			
Yes	246	11.6	154	4.5	2.9* (2.4-3.6)	105	7.7	261	7.5	1.2 (0.9-1.5)			

Note. CL = confidence limit.

^aOdds ratio of an animal with this characteristic being relinquished to a shelter (Cornfield 95% CL). ^bExact CL are used instead of Cornfield 95% CL.

*Statistically significant, $p < .05$.

risk of being relinquished to shelters. Regarding relinquished cats, 13.1 % (311 of 2,374) were reported to be of unknown sex. This was significantly higher compared with the cats of unknown sex in households (1.5%; 107 of 7,138). Most of the cats of unknown sex were younger than 3 months. Relinquished dogs and cats (animals > 6 months of age) of both sexes were significantly more likely to be intact.

Relinquished dogs and cats were significantly younger (dogs < 2 years of age and cats < 3 years of age). Furthermore, risk of relinquishment seemed to decrease with increasing age (from < 3 months to 2 or 3 years) and might have played a protective role regarding relinquishment of dogs (but not as strongly for cats) as they got older. Mixed-breed animals were at increased risk of relinquishment. Dogs who came from an animal shelter, friend, or pet shop or who had been a stray were at increased risk of relinquishment compared with dogs who entered households as gifts. Cats were at increased risk of relinquishment if they came from a friend, pet shop, breeder, or animal shelter. Relinquished dogs and cats were significantly more likely to have been owned for a relatively short period of time, and the risk of relinquishment tended to decrease with increasing length of ownership (dogs < 1 year; cats < 2 years). As with age, length of ownership might have played a protective role regarding relinquishment of dogs. Dogs owned for 2 years or more were at decreased risk of relinquishment. This pattern was not apparent for cats. Dogs were at increased risk of relinquishment if they were obtained at no cost or if their purchase cost was less than \$100. Cost was not associated with relinquishment of cats, but relatively few cats in the relinquished population cost \$100 or more (1.1%; 15 of 1,372 cats). Dogs who had bitten a person were at increased risk of relinquishment, but the same was not true of cats. Information was also collected on selected behaviors (Table 3).

With few exceptions, people at both shelters and their households reported that during the prior month, the majority of dogs and cats rarely or never exhibited the 10 selected behaviors. In general, dogs were at increased risk of relinquishment the more frequently they soiled the house, damaged things, were overly active, or were reported as fearful. Cats also were at increased risk of relinquishment the more frequently they soiled the house, damaged things, or were reported as overly active. Information also was collected about selected aspects of general knowledge of pet care and behavior by people relinquishing animals and respondents from pet-owning households (Table 4).

Significantly fewer people relinquishing dogs knew that female dogs can come into heat about twice a year, and significantly fewer people relinquishing cats indicated they did not know whether a female cat could come into heat twice a year. Significantly more people relinquishing dogs and cats felt that a female dog or cat would be better off if she had one litter before being spayed. Significantly fewer people relinquishing cats knew that cats pounce, scratch, or bite as a form of play. Significantly fewer people relinquishing cats reported that they did not know whether cats

TABLE 3
 Responses to Questions on Selected Behaviors of Dogs and Cats the Month Prior
 to Relinquishment to Shelter or Previous Month in the Households (1995–1996)

Responses	Dogs						Cats					
	Shelters			Households			Shelters			Households		
	n	%	Odds Ratio ^a (95% CL)	n	%	Odds Ratio ^a (95% CL)	n	%	Odds Ratio ^a (95% CL)	n	%	Odds Ratio ^a (95% CL)
How often did the animal soil in the house?												
Always/almost always	147	7.0	3.7* (2.7–4.9)	73	2.1	2.7*	57	4.2	2.0*	75	2.2	2.0* (1.4–2.8)
Most of the time	131	6.2	2.7*	87	2.5	2.2*	72	5.3	2.2*	84	2.4	2.2* (1.6–3.1)
Some of the time	373	17.6	1.2*	547	15.9	1.1	176	12.8	0.9	514	14.8	0.9 (0.7–1.1)
Rarely/never	1,381	65.3	1 (N/A)	2,509	73.1	1 (N/A)	999	72.8	1 (N/A)	2,584	74.6	1 (N/A)
How often did the animal damage things, either in- side or outside?												
Always/almost always	144	6.8	2.7*	94	2.7	2.7*	25	1.8	1.9*	31	0.9	1.9* (1.1–3.4)
Most of the time	150	7.1	2.2*	119	3.5	2.2*	60	4.4	1.9*	74	2.1	1.9* (1.3–2.8)
Some of the time	439	20.8	1.1	718	20.9	1.1	227	16.6	0.7*	772	22.3	0.7* (0.6–0.8)
Rarely/never	1,300	61.4	1 (N/A)	2,256	65.7	1 (N/A)	993	72.4	1 (N/A)	2,362	68.2	1 (N/A)
How often do you think the animal was overly active (hyper)?												
Always/almost always	298	14.1	3.2* (2.6–3.9)	164	4.8	3.2*	64	4.7	4.1*	37	1.1	4.1* (2.7–6.3)

(Continued)

TABLE 3 (Continued)

Responses	Dogs						Cats					
	Shelters			Households			Shelters			Households		
	n	%	Odds Ratio ^a (95% CL)	n	%	Odds Ratio ^a (95% CL)	n	%	Odds Ratio ^a (95% CL)	n	%	Odds Ratio ^a (95% CL)
Most of the time	309	14.6	1.7*	313	9.1	1.7*	116	8.5	1.7*	133	3.8	2.1*
Some of the time	483	22.8	(1.5-2.1)	1,060	30.9	(1.5-2.1)	253	18.4	(1.5-2.1)	964	27.8	(1.6-2.7)
Rarely/never	941	44.5	0.8*	1,652	48.1	0.8*	873	63.6	0.6*	2,076	59.9	0.6*
How often do you think the animal was too noisy?												
Always/almost always	101	4.6	1 (N/A)	121	3.5	1.3	31	2.3	1.3	61	1.8	1.2
Most of the time	184	8.7	(0.9-1.7)	229	6.7	(0.9-1.7)	68	5.0	(0.9-1.7)	127	3.7	(0.7-1.8)
Some of the time	591	27.9	1.2	1,088	31.7	1.2	245	17.9	1.2	826	23.8	1.2
Rarely/never	1,157	54.7	(1.0-1.5)	1,733	50.5	(1.0-1.5)	961	70.0	(1.0-1.5)	2,194	63.3	(0.9-1.7)
How often did the animal show fear (people/animals/noise/objects)?												
Always/almost always	96	4.5	0.8*	55	1.6	0.8*	79	5.8	0.8*	205	5.9	0.8*
Most of the time	123	5.8	(2.0-4.0)	103	3.0	(2.0-4.0)	130	9.5	(2.0-4.0)	381	11.0	(0.6-1.0)
Some of the time	404	19.1	1.9*	741	21.6	1.9*	357	26.0	1.9*	1,218	35.2	0.7*
Rarely/never	1,404	66.4	(1.5-2.5)	2,262	65.9	(1.5-2.5)	739	53.9	(1.5-2.5)	1,446	41.7	(0.5-0.8)
How often did the animal growl/hiss/snap/attempt to bite people?												
Always/almost always	29	1.4	1 (N/A)	40	1.2	1 (N/A)	10	0.7	1 (N/A)	23	0.7	1 (N/A)
			(0.8-1.0)			(0.8-1.0)			(0.8-1.0)			
			0.8			0.8			0.8			1.1
			(0.4-1.5)			(0.4-1.5)			(0.4-1.5)			(0.5-2.3)

Most of the time	62	2.9	66	1.9	1.5*	27	2.0	50	1.4	1.3 (0.8-2.2)
Some of the time	245	11.6	446	13.0	0.9 (0.7-1.0)	136	9.9	384	11.1	0.9 (0.7-1.1)
Rarely/never	1,695	80.1	2,611	76.0	1 (N/A)	1,136	82.8	2,758	79.6	1 (N/A)
How often did the animal growl/hiss/snap/attempt to bite other animals?										
Always/almost always	66	3.1	65	1.9	1.4*	27	2.0	64	1.8	0.8 (0.5-1.3)
Most of the time	65	3.1	153	4.5	(1.0-2.0) 0.6*	53	3.9	167	4.8	0.6* (0.4-0.9)
Some of the time	282	13.3	704	20.5	(0.4-0.8) 0.6*	196	14.3	1,023	29.5	0.4* (0.3-0.4)
Rarely/never	1,609	76.0	2,245	65.4	(0.5-0.7) 1 (N/A)	1,019	74.3	1,970	56.9	1 (N/A)
How often did the animal attack/start a fight with other animals?										
Always/almost always	21	1.0	36	1.0	0.9	8	0.6	28	0.8	0.6 (0.3-1.5)
Most of the time	47	2.2	55	1.6	(0.5-1.6) 1.3	26	2.0	74	2.1	0.8 (0.5-1.3)
Some of the time	156	7.4	299	8.7	(0.9-2.0) 0.8*	126	9.2	581	16.8	0.5* (0.4-0.6)
Rarely/never	1,800	85.1	2,757	80.3	(0.7-1.0) 1 (N/A)	1,130	82.4	2,541	73.3	1 (N/A)
How often did the animal escape from the house/yard?										
Always/almost always	76	3.6	114	3.3	0.9	23	1.7	100	2.9	0.5* (0.3-0.8)
Most of the time	90	4.3	126	3.7	(0.7-1.3) 1.0	25	1.8	111	3.2	0.5* (0.3-0.8)
Some of the time	269	12.7	762	22.2	(0.7-1.3) 0.5*	91	6.6	527	15.2	0.4* (0.3-0.5)
Rarely/never	1,577	74.5	2,185	63.6	(0.4-0.6) 1 (N/A)	1,144	83.4	2,467	71.2	1 (N/A)

Note. CL = confidence limit.

*Odds ratio of an animal with this characteristic or frequency of behavior being relinquished to a shelter (Cornfield 95% CL).

*Statistically significant, $p < .05$.

TABLE 4
 Responses to Statements on General Knowledge of Pet Care and Behavior
 by People Relinquishing Dogs and Cats to Shelters and Dog- and
 Cat-Owning Households (1995–1996)

Statements	<i>Relinquishers/Owners</i>							
	<i>Dogs</i>			<i>Cats</i>				
	<i>Shelters</i>		<i>Households</i>	<i>Shelters</i>		<i>Households</i>		
<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	
Dogs/cats need shots or they can become seriously ill or even die.								
False	55	2.6	153	4.5	48	3.7	235	6.8
True	1,881	89.9*	3,166	92.2	1,157	88.0*	2,953	85.2
Don't know	22	1.1	100	2.9	23	1.8	262	7.6
In general, female dogs/cats can come into heat (season) about twice a year.								
False	134	6.4	145	4.2	282	21.5	556	16.0
True	1,172	56.0*	2,258	65.8	429	32.6	1,278	36.9
Don't know	648	31.0	1,008	29.4	514	39.1*	1,609	46.4
There are not many differences in behavior between breeds of dogs, even though they look different.								
False	1,620	77.4*	2,776	80.8	N/A	N/A	N/A	N/A
True	226	10.8	433	12.6	N/A	N/A	N/A	N/A
Don't know	107	5.1	208	6.1	N/A	N/A	N/A	N/A
Dogs/cats will misbehave to spite their owners.								
False	745	35.6	1,363	39.7	379	28.8	1,174	33.9

True	1,010	48.3*	1,522	44.3	726	55.2*	1,701	49.1
Don't know	197	9.4	513	14.9	122	9.3*	567	16.4
It is necessary to catch a dog/cat in the act of doing something wrong to correct them.								
False	289	13.8	575	16.7	180	13.7	480	13.9
True	1,585	75.8	2,632	76.6	975	74.2	2,480	71.6
Don't know	74	3.5	201	5.9	69	5.3*	490	14.1
When house training a dog, it is helpful to rub its nose in its mess when it soils in the house.								
False	1,043	49.9*	2,055	59.8	N/A		N/A	
True	666	31.8*	775	22.6	N/A		N/A	
Don't know	238	11.4	576	16.8	N/A		N/A	
A female dog/cat will be better off if she has one litter before being fixed.								
False	730	34.9*	1,656	48.2	538	40.9*	1,742	50.3
True	458	21.9*	528	15.4	279	21.2*	444	12.8
Don't know	756	36.1	1,230	35.8	407	31.0*	1,265	36.5
Cats don't mind how many other cats there are in the home.								
False	N/A		N/A		753	57.3	2,124	61.3
True	N/A		N/A		282	21.5	597	17.2
Don't know	N/A		N/A		184	14.0*	712	20.5
Cats may pounce or scratch or bite as a form of play.								
False	N/A		N/A		65	4.9	96	2.8
True	N/A		N/A		1,133	86.2*	3,235	93.4
Don't know	N/A		N/A		26	2.0	116	3.3
It will cost more than \$100 a year to keep a dog/cat as a pet.								

(Continued)

TABLE 4 (Continued)

<i>Statements</i>	<i>Relinquishers/Owners</i>											
	<i>Dogs</i>				<i>Cats</i>							
	<i>Shelters</i>		<i>Households</i>		<i>Shelters</i>		<i>Households</i>		<i>Shelters</i>		<i>Households</i>	
	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>
False	60	2.9	218	6.3	63	4.8*	524	15.1	1,113	84.6*	2,590	74.7
True	1,834	87.7	3,039	88.5	47	3.6	330	9.5				
Don't know	52	2.5	162	4.7								

*Statistically significant difference, $p < .05$ (Z test).

care how many other cats are in the home. Table 5 displays selected characteristics (sex, age, educational level) of pet owners and people relinquishing animals.

People relinquishing dogs and cats were significantly more likely to be men. Those relinquishing dogs were significantly more likely to be younger than 50, whereas those relinquishing cats were significantly more likely to be younger than 35. The risk of relinquishing an animal tended to decrease with increasing age, except for those younger than 20, where the risk was lower than the next oldest age category. People relinquishing animals were significantly more likely not to have reached an educational level beyond high school.

DISCUSSION AND CONCLUSIONS

People relinquish animals to shelters for a combination of reasons. Relinquishment is associated with the physical and behavioral characteristics of the animals as well as the characteristics, knowledge, experience, and expectations of the owners (Kidd, Kidd, & George, 1992; Miller, Staats, Partlo, & Rada, 1996; Patronek, Glickman, Beck, McCabe, & Ecker, 1996a, 1996b; Salman et al., 1998). To further complicate the study of relinquishment, external factors—changes in income, health issues (illness of owner), and housing changes (moving)—often beyond the control of the owner frequently are reported as contributing to relinquishment (DiGiacomo, Arluke, & Patronek, 1998; New et al., 1999; Scarlett, Salman, New, & Kass, 1999). This article deals only with selected physical and demographic characteristics and behaviors of the animals, and selected demographic characteristics of owners and their basic knowledge regarding dog and cat behavior and requirements.

The comparison population for this study is skewed toward households that had a pet leave the household during the year of the survey. Consequently, it might not represent the general population of pet-owning households. The potential effect of this must be considered when interpreting the findings.

Dogs and cats being relinquished to shelters were significantly younger and had been owned for a significantly shorter time than those in pet-owning households in the comparison population. Furthermore, intact animals; mixed-breed animals; and those obtained from friends, shelters, and pet stores were relinquished significantly more frequently. However, a relatively small number of animals were in the pet shop category in the Household Survey. To calculate the odds ratios for the animal sources, we chose the gift category as the standard for comparison because it is a method of acquisition, not a source. To explore differences further, we evaluated the source variable by using the *Z* statistic described earlier (Milton & Arnold, 1990), which compared the proportion of relinquished animals by source with the proportion of animals in households by source. Based on this test, the risk of relinquishment of dogs continued to be statistically significant if they came from a shelter or a friend, and the risk remained for cats if they came from a friend.

TABLE 5
 Selected Characteristics of People Relinquishing Dogs and Cats to Shelters and
 Owners in Households (1995–1996)

Characteristic	Dog						Cat					
	Relinquishers			Owners			Relinquishers			Owners		
	n	%	Odds Ratio ^a (95% CL)	n	%	Odds Ratio ^a (95% CL)	n	%	n	%	Odds Ratio ^a (95% CL)	
Sex												
Male	993	50.5		848	24.9		490	38.9	705	20.4		2.5* (2.2–2.9)
Female	972	49.5	1.0 (N/A)	2,558	74.1	1.0 (N/A)	769	61.1	2,746	79.6		1.0 (N/A)
Age												
<20	75	4.0	7.7* (4.6–13.0)	39	1.2	7.7* (4.6–13.0)	45	3.7	32	0.9		5.8* (3.2–10.5)
20–24	193	10.2	10.3* (6.9–15.8)	75	2.2	10.3* (6.9–15.8)	124	10.3	70	2.0		7.3* (4.7–11.5)
25–29	286	15.2	4.0* (2.8–5.6)	291	8.6	4.0* (2.8–5.6)	179	14.8	288	8.4		2.6* (1.8–3.8)
30–34	313	16.6	3.0* (2.1–4.3)	416	12.3	3.0* (2.1–4.3)	196	16.2	460	13.4		1.8* (1.2–2.6)
35–39	305	16.2	2.3* (1.7–3.3)	527	15.5	2.3* (1.7–3.3)	165	13.7	531	15.4		1.3 (0.9–1.9)
40–44	198	10.5	1.7* (1.2–2.5)	462	13.6	1.7* (1.2–2.5)	132	10.9	475	13.8		1.2 (0.8–1.7)
45–49	189	10.0	1.8* (1.2–2.5)	435	12.8	1.8* (1.2–2.5)	120	9.9	452	13.1		1.1 (0.8–1.6)
50–54	110	5.8	1.3 (0.9–1.9)	346	10.2	1.3 (0.9–1.9)	79	6.6	340	9.9		1.0 (0.6–1.5)
55–59	75	4.0	1.2 (0.8–1.8)	249	7.3	1.2 (0.8–1.8)	39	3.2	232	6.7		0.7 (0.4–1.1)
60–64	48	2.6	1.1 (0.7–1.7)	176	5.2	1.1 (0.7–1.7)	38	3.2	169	4.9		0.9 (0.6–1.5)
65–69	39	2.1	1.0 (0.6–1.6)	158	4.7	1.0 (0.6–1.6)	41	3.4	193	5.6		0.9 (0.5–1.4)
70 +	54	2.9	1.0 (N/A)	217	6.4	1.0 (N/A)	49	4.1	203	5.9		1.0 (N/A)

Education:										
Males										
High school or less	469	49.5	1,007	36.7	1.7* (1.5–2.0)	204	43.3	808	31.4	1.7* (1.4–2.1)
More than high school	478	50.5	1,738	63.3	1.0 (N/A)	267	56.7	1,767	68.6	1.0 (N/A)
Education:										
Females										
High school or less	410	44.7	1,153	37.1	1.4* (1.2–1.6)	324	44.5	938	30.2	1.9* (1.6–2.2)
More than high school	507	55.3	1,955	62.9	1.0 (N/A)	404	55.5	2,172	69.8	1.0 (N/A)

Note. CL = confidence limit.

^aOdds ratio of a person with this characteristic (Cornfield 95% CL).

*Statistically significant, $p < .05$.

Surgically altered animals of both sexes were relinquished significantly less often. However, because younger animals might be less likely to be surgically altered and relinquished animals are significantly younger, the neuter status association might be confounded by age. Consequently, we stratified sex and neuter status by age. The increased risk of intact animals being relinquished persisted in the stratified analysis for female dogs and both male and female cats, based on a Mantel–Haenszel weighted odds ratio (Dean et al., 1994). The association did not persist when neuter status of male dogs was stratified by age. Cost invested in surgically altering an animal might have a protective effect, or perhaps owners who have their pets altered are more attached or committed to their animals, making relinquishment less likely.

Conversely, dogs obtained at no cost and with little effort are at increased risk of relinquishment. This might reflect a lack of value to the owner or a lower level of attachment or commitment. With the association of these factors, one easily can imagine the scenario of a person becoming a reluctant pet owner as a favor to a friend or as a result of a spur-of-the-moment decision when faced with the easy acquisition of a pet (Arkow & Dow, 1984). When the reality of their decision becomes apparent, especially when exacerbated by normal but irritating behaviors such as house soiling or destructive chewing, weakly attached or committed pet owners mentally are primed for disposal of the pet. Perhaps only the lucky animals end up being relinquished to a shelter.

Behavior Factors

The relative frequency of selected behaviors suggests that many owners who relinquish their dogs consider the dogs overly active. An alternative interpretation of this finding is that the attention-seeking activity of the dog or its general excitability has become an irritant—instead of an endearment—to the owner. The report of dogs being overly active could reflect a mismatch between the physical and psychological needs of the dog and the lifestyle of the owner.

In addition, relinquished dogs were reported as house soiling, destructive, and fearful more often than those in the comparison population and were significantly more likely to have bitten a person during the month before relinquishment. Data were not collected on the circumstances surrounding the frequency of these behaviors and on how the lifestyle of the owner affected these behaviors. For example, a naturally active dog who is left alone all day might have no choice but to soil the house and use chewing and other destructive behaviors for entertainment. An owner's response to such behavior easily can instill a sense of fear in the dog, which can escalate to a biting incident.

Although many dogs are relinquished for one or more behavioral reasons, these behaviors are not unique to relinquished dogs. That these behaviors are exhibited

to varying degrees by dogs who remain in households should be a concern to veterinarians, trained animal behaviorists, and anyone else concerned about the welfare of such companion animals. The dog with the annoying habit one day could be—for that very reason—the animal relinquished if the problem intensifies, other factors complicate the situation, or the owner's tolerance level decreases.

Although the owners were asked about the relative frequency of these selected behaviors, we did not try to measure how serious the owner considered the problem unless the behavior also was reported as one of the reasons for relinquishment. The owner's experience and expectations will impact the perception of the seriousness of the behavior. A certain frequency of a behavior might be acceptable to one owner, but the same level of frequency might be unacceptable to another owner.

In general, undesirable behaviors of relinquished cats seemed to play a smaller role than of relinquished dogs. The exceptions were significantly increased risk of relinquishment if the cat soiled the house, was destructive, or was perceived as overly active. Although the difference between relinquished and household cats statistically was not significantly different regarding a history of bites in the month before relinquishment, this finding must be considered equivocal because the biting history of 13.8% of relinquished cats was unknown.

Knowledge Deficit

When we examine the responses to general knowledge questions, it is disturbing to see that significantly more people relinquishing dogs and cats felt that the female animal would be better off if she had one litter before being spayed and that significantly fewer people relinquishing animals knew that this was false. Furthermore, approximately half of the owners in the Household Survey (51.2% of dog owners and 49.3% of cat owners) wrongly felt that this was a true statement or did not know the answer. Although scientific evidence does not support this belief, it might explain some of the difficulty experienced by many individuals and groups who try to encourage the spaying of family pets and documents a clear need for educational efforts aimed at this myth. To a lesser extent, people relinquishing dogs exhibited significant knowledge deficits regarding the estrous cycle of female dogs, the concept of spite as a motivating force behind some types of dog behavior, and appropriate methods of house training.

People relinquishing cats exhibited significant knowledge deficits regarding the estrous cycle of female cats; the concept of spite as a motivating force behind some types of cat behavior; the need for immediate correction when a cat behaves improperly; the behavioral problems that can occur as the number of cats in a household increases; and the tendency of cats to pounce, scratch, or bite as a form of play.

The knowledge deficits of people relinquishing dogs and cat might contribute to unrealistic expectations and inappropriate actions by owners in an attempt to

solve a problematic behavior. Focused educational efforts might raise the awareness of owners regarding the true motivations behind certain behaviors. Through understanding, more realistic expectations and interventions might salvage a human–animal bond before it reaches the breaking point. However, modification of animal behaviors and owner expectations still might be neutralized by one or more of the external factors that are beyond the owner’s control.

In general, sexually intact, young, mixed-breed dogs and cats obtained at very little or no cost or from a friend and owned for a relatively short time were overrepresented in the population of animals relinquished to shelters. Others who have focused on smaller geographic areas have reported these animal characteristics (Arkow & Dow, 1984; Miller et al., 1996; Patronek et al., 1996a, 1996b; Rowan & Williams, 1989). The statistically significant differences in this study corroborate the association of these factors, because characteristics of relinquished animals were compared with animals in households and the relinquishment data were obtained from 12 shelters in four very different regions of the country.

Neither survey attempted to quantify the level of owners’ attachment or commitment, and it is unknown to what extent external factors might have contributed to the relinquishment decision. However, it seems reasonable to assume that educational efforts aimed at generating more realistic expectations in pet owners is one way to reduce the number of animals who are relinquished and killed each year. Such efforts should include information on the basic reproductive biology of dogs and cats as well as knowledge that, with effort, many undesirable behaviors can be modified. Educational efforts could be based at veterinary clinics, animal shelters, and pet stores as well as with breeders. The efforts should be proactive in an attempt to prevent the development or escalation of problems. Our data also suggest that, based on relative length of ownership before relinquishment, the window of educational opportunity and intervention is narrow.

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