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Effects of Phenotypic Characteristics on the Length of Stay of Dogs at Two No Kill Animal Shelters

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Adoption records from 2 no kill shelters in New York State were examined to determine how age, sex, size, breed group, and coat color influenced the length of stay (LOS) of dogs at these shelters. Young puppies had the shortest length of stay; LOS among dogs increased linearly as age increased. Neither coat color nor sex influenced LOS. Considering only size classifications, medium-size dogs had the greatest LOS, and extra small dogs and puppies remained in shelters for the least amount of time. Considering only breed groupings, dogs in the guard group had the greatest LOS and those in the giant group had the shortest LOS. The lack of effect of coat color was not expected, nor was the shorter LOS among "fighting" breeds compared with other breed groups. Coat color and breed may have only local effects on LOS that do not generalize to all shelters, including traditional shelters. Understanding the traits of dogs in a specific shelter and the characteristics of these nonhuman animals desired by adopters are critical to improving the welfare of animals served by that shelter.

Keywords: animal shelter, dogs, length of stay, no kill shelter

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Millions of dogs enter nonhuman animal shelters in the United States each year (American Society for the Prevention of Cruelty to Animals [ASPCA], 2012). Sixty percent of these dogs are killed, 15 to 20% are returned to caregivers, and the remaining dogs are adopted into new homes (ASPCA, 2012; Wenstrup & Dowidchuk, 1999). The criteria for holding a dog for adoption in a shelter are subjective (Lepper, Kass, & Hart, 2002; Patronek, Glickman, & Moyer, 1995; Winograd, 2009) and include consideration of breed, age, sex, size, temperament, health, and appearance (Lepper et al., 2002; Patronek et al., 1995; Winograd, 2009).

Reportedly, animals at greater risk of being killed in a shelter include those of certain breeds, such as "fighting" breeds (Lepper et al., 2002); older or injured individuals (Lepper et al., 2002; Patronek et al., 1995); sexually intact individuals (Clevenger & Kass, 2003; Lepper et al., 2002); males of mixed breeds (Patronek et al., 1995); brindle, black, and black and tan dogs (Lepper et al., 2002; Wells & Hepper, 1992); and large individuals (Patronek et al., 1995). These characteristics may vary regionally and depend on the preferences of potential adopters (Normando et al., 2006) and temporal fluctuations in the availability of animals (Normando et al., 2006; Patronek et al., 1995). Age appears to be a common consideration of adopters. Puppies are preferred to adult dogs (Hart, Takayanagi, & Yamaguchi, 1998; Němcová & Novák, 2003), and the oldest dogs are more likely to be killed or remain in shelters for longer periods of time than the youngest animals (Lepper et al., 2002; Normando et al., 2006). Size is also important to adopters, but patterns are difficult to generalize because there may be legislative or housing restrictions on sizes of pets (Shore, Petersen, & Douglas, 2003) precluding some potential adopters from owning a large dog.

Few shelters in the United States are "no kill" facilities (Winograd, 2009), defined as shelters that euthanize animals only for reasons of critical illness or poor temperament (American Veterinary Medical Association, 2002). Once admitted to a no kill shelter, animals could remain for extended periods of time until they are adopted (Normando et al., 2006). Traditional shelters are defined here as those that kill animals due to space limitations in addition to other reasons (Winograd, 2009). Dogs presented for adoption in no kill shelters, which consider only health and temperament, might differ physically from those available in traditional shelters, and therefore different adoption patterns may occur in no kill shelters compared with traditional shelters.

We evaluated data from the Tompkins County Society for the Prevention of Cruelty to Animals (TCSPCA), one of the first no kill shelters in the United States (Winograd, 2009), and the Humane Society of Yates County (HSYC), also a no kill shelter. The effects of the physical characteristics of age, sex, size, breed group, coat color, and interactions among these variables on the length of stay (LOS) of dogs in these two shelters are presented here.

METHODS

Description of Data Set

Adoption records were collected from two no kill animal shelters in New York State: the TCSPCA in Ithaca, New York, an open-admission no kill shelter, and the HSYC in Penn Yan, New York. Records from the TCSPCA included 1,063 dogs and puppies adopted between January 2008 and May 2011. A positive result from a formal temperament evaluation by trained shelter personnel was required before animals were available to the public for adoption, except for puppies. When possible, negative behaviors were modified and animals were reevaluated before they were available. For dogs with questionable temperament, a secondary evaluation was independently conducted by veterinarians associated with Cornell University's Animal Behavior Clinic. Animals with a temperament formally evaluated as unsuitable for adoption were euthanized. Records from the HSYC included 203 dogs and puppies adopted between January 2008 and February 2010. The temperament of dogs was informally evaluated by the shelter manager prior to availability for adoption; aggressive animals were euthanized. Each shelter discussed any known behavioral issues with potential adopters. Records from both shelters contained the intake date, adoption date, sex, estimated breed or indication of the most likely mix of breeds, coat color, and the approximate or known age of each dog.

Age Categories

Individuals were initially divided into three age categories using their estimated or known age at intake: puppies less than or equal to 6 months old, puppies greater than 6 months old but less than 12 months old, and adult dogs greater than or equal to 12 months old. The ages of adult dogs were estimated by shelter staff and/or veterinarians. These age categories are similar to those of Normando et al. (2006) and Lepper et al. (2002). Additionally, refined age categories (dogs aged 1–3 years, 3–6 years, 6–9 years, and >9 years) were examined for differences in LOS at the shelters and were used in analyses to evaluate interactions among phenotypic characteristics (see Statistical Analyses).

Size Categories

Each dog was placed into one of five size categories: extra small (XS), small (S), medium (M), large (L), and extra large (XL). If available, intake weight (sometimes provided as ancillary information with owner-surrendered dogs) was used to determine category placement. Most records did not contain intake weights, however, and the animal's breed standard weight (Fogle, 2000) was

used for categorization. For mixed breed dogs, the breed standard weight of the first breed indicated in the data was used to establish category placement. Puppies were placed in the size category of their breed at maturity. The XS category included dogs from 2 to 10 lb (1 to 4.5 kg), S dogs were those from >10 to 30 lb (4.5 to 13.5 kg), M dogs weighed >30 to 55 lb (13.5 to 25 kg), L dogs weighed >55 to 90 lb (25 to 41 kg), and XL dogs were those who weighed >90 lb (41 kg). These size categories were similar to those of Posage, Bartlett, and Thomas (1998), but the XS and XL categories were added to increase resolution of potential size effects.

Breed Groupings

Size categories may be confounded with breed. Therefore, all dogs were categorized into breed groups of common utilitarian purpose to determine if such groups influenced LOS at the shelters. Mixed breed dogs were categorized according to the first breed indicated in the data. Breed categorizations included Sporting, Hound, Guard, Terrier, Lap, Companion, Herding, Spitz, Bully, and Giant groups (Table 1). Breed categorization may not reflect heritage or the original intention of the breed but rather reflect the likely intended purpose of the dog by potential adopters and is similar to the groupings of Lepper et al. (2002).

Coat Color Definitions

Shelter dogs usually were described by primary coat color in recorded data and often with a secondary coat color. Colors used for descriptive purposes were not standardized, however, and 29 different colors (e.g., apricot, blonde, and butterscotch) were included in the records. These 29 colors were reduced to nine options: Brown, Brindle, Black, White, Tan, Red, Yellow, Gray, and Tri-Colored. Secondary coat colors were similarly grouped using nine options. To further generalize the color of each dog, primary and secondary coat colors were reduced to three shade categories: "light" (any combination of gray, white, and yellow coat colors in the primary and secondary coat colors provided), "medium" (combinations of any light color with any medium color of tan, red, brindle, tri-colored, or any combination of medium colors), and "dark" (combinations of any medium color with any dark color of black or brown or any combination of dark colors).

Length of Stay Calculation

The length of stay (LOS), in days, was the difference between the intake date and the date adoption paperwork was signed. Any records that did not include

TABLE 1
Dog Breed Groupings

Group	Breeds and Breed Mixes	n
Bully (n = 155)	American bulldog	3
	American pit bull terrier	150
	American Staffordshire terrier	1
	Staffordshire bull terrier	1
Companion (n = 180)	American cocker spaniel	20
	Boxer	21
	Collie mixes	2
	Dalmatian	3
	English cocker spaniel	1
	Greyhound	1
	Husky mixes	3
	Poodle	6
	Shepherd mixes	106
	Shetland sheepdog	6
	Shiba Inu	2
	Welsh corgi	1
	Unspecified mix	8
Giant (n = 24)	Great Dane	1
	Great Pyrenees	5
	Irish wolfhound	2
	Mastiff	5
	Newfoundland	5
	Saint Bernard	6
Guard (n = 68)	Akita	3
	Chow chow	9
	Doberman pinscher	5
	German shepherd	22
	Rhodesian ridgeback	3
	Rottweiler	21
	Shar-Pei	5
Herding (n = 42)	Australian cattle dog	8
	Australian shepherd	8
	Bearded collie	2
	Border collie	18
	Smooth collie	6
Hound (n = 185)	All coonhounds	95
	American foxhound	1
	Basset hound	4
	Beagle	84
	Bloodhound	1

(continued)

TABLE 1
(*Continued*)

Group	Breeds and Breed Mixes	n
Lap (*n* = 156)	All toy terriers	8
	Bichon frise	4
	Boston terrier	1
	Chihuahua	46
	Chinese crested	1
	Dachshund	12
	English toy spaniel	1
	Japanese chin	1
	Lhasa apso	7
	Maltese	7
	Miniature pinscher	5
	Miniature poodle	11
	Miniature schnauzer	2
	Pekingese	2
	Pomeranian	15
	Pug	10
	Schipperke	1
	Shih Tzu	17
	Yorkshire terrier	5
Spitz (*n* = 36)	Alaskan malamute	3
	American Eskimo dog	3
	Keeshond	2
	Samoyed	3
	Siberian husky	25
Sporting (*n* = 348)	Brittany	2
	Catahoula leopard dog	12
	Chesapeake Bay retriever	1
	English setter	1
	English springer spaniel	1
	German shorthaired pointer	2
	Golden retriever	13
	Labrador retriever	308
	Pointer	8
Terrier (*n* = 72)	Airedale terrier	1
	Cairn terrier	2
	Dandie Dinmont terrier	1
	Fox terrier	1
	Jack Russell terrier	29
	Rat terrier	3
	Skye terrier	2
	Soft coated wheaten terrier	1
	West Highland white terrier	8
	Unspecified terrier	24

Note. Table reflects only breeds and breed mixes recorded at the Tompkins County Society for the Prevention of Cruelty to Animals and the Humane Society of Yates County and is not all-inclusive. Naming convention follows Fogle (2000).

an intake date and an adoption date were not considered here. Some dogs were adopted and returned one or more times ($n = 76$ individuals); there was an insufficient sample size to explore phenotypic differences in these animals compared with those who were not returned. The LOS for these cases was the difference between the intake date and first adoption date. Two dogs who remained in the shelters for more than 1.5 years before being adopted were considered outliers and were not included in analyses or results presented here.

Statistical Analyses

The distribution of the LOS variable was right-skewed (see Figure 1) and therefore LOS was log-transformed [$\log(x + 1)$] to normalize the data, which met the requirements for parametric statistical analysis. Because there was no difference in average LOS between the two shelters ($df = 243.6$, $t = 1.3$, $p = .20$), data from both shelters were merged ($n = 1,264$ total records). Statistical calculations of transformed data were determined with SAS software (SAS Institute, Inc., 2008). An alpha level of 0.05 was established to indicate significant results.

Differences in LOS among age categories were determined with analysis of variance (ANOVA). Records not containing an estimated age were not included in this analysis ($n = 12$). Additionally, LOS was regressed on the specific or
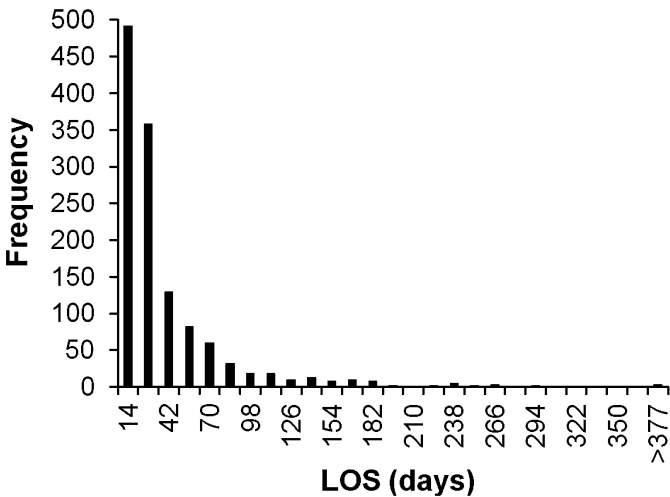

FIGURE 1   The length of stay (LOS) of all dogs and puppies adopted from the Tompkins County Society for the Prevention of Cruelty to Animals and the Humane Society of Yates County between 2008 and 2011.

estimated age of individual dogs ≥12 months old to determine if the oldest animals remained in shelters for a greater amount of time than younger animals.

The difference in LOS between the sexes was evaluated with a *t*-test. The effect of size on LOS was evaluated separately for dogs and puppies (<12 months old) using ANOVA. Size could not be determined for eight dogs described simply as "mix," and these individuals were not included in analyses evaluating size effects.

Differences in LOS among breed groups, primary coat color, and shade of coat color were determined with ANOVA. Interactions of breed group with sex, primary coat color, coat shade, and refined age categories also were examined with ANOVA. Similar analyses were completed for puppies, except for age effects.

RESULTS

Most dogs and puppies remained at the TCSPCA and the HSYC for less than 1 month, but some animals stayed much longer than that; five animals remained at the shelters for over 1 year (Figure 1). The average LOS for all dogs and puppies was 34.6 days ($n = 1,264$, $SD = 48.7$), the average LOS for dogs ≥12 months old was 42.7 days ($n = 706$, $SD = 54.8$), and the average LOS for puppies <12 months old was 23.9 days ($n = 546$, $SD = 36.8$). LOS differed among age categories. The LOS for puppies ages 0 to 6 months was 22.8 days ($n = 445$), LOS for puppies ages >6 to <12 months was 32.9 days ($n = 113$), and LOS for dogs ≥12 months was 42.4 days ($n = 706$, $F_{2,1261} = 22.9$, $p < .0001$; Figure 2). For adult dogs, LOS increased linearly with increasing age, but age explained <1% of the variability in LOS ($n = 706$, LOS $= 6.1 *$ Age $+ 26.3$, $F_{1,704} = 7.6$, $p = .006$, $R^2 = 0.01$; Figure 3).

The average LOS for female dogs ($n = 341$) was 41.5 days and 43.2 days for male dogs ($n = 365$). Female puppies (<12 months; $n = 291$) had an average LOS of 22.2 days whereas male puppies ($n = 267$) had an average LOS of 27.7 days. No difference in LOS between the sexes of adult dogs was evident ($df = 704$, $t = 1.4$, $p = .17$), nor was there a difference in LOS between the sexes for puppies ($df = 556$, $t = 1.0$, $p = .31$).

The LOS of dogs was influenced by size ($F_{4,693} = 3.9$, $p = .004$; Figure 4, Table 2). The XS dogs remained in the shelters for the least amount of time, averaging 33.4 days. The LOS for S dogs was 35.0 days. The L and XL dogs remained at the shelters for 43.7 and 44.9 days, respectively, and M dogs had the greatest LOS of 48.9 days. Post hoc tests revealed no difference in LOS between XS and S dogs and no difference in LOS between M and L dogs ($p > .1$ based on pairwise comparisons of least squares means). However, dogs in each of the two smaller size categories tended to have a shorter LOS than dogs
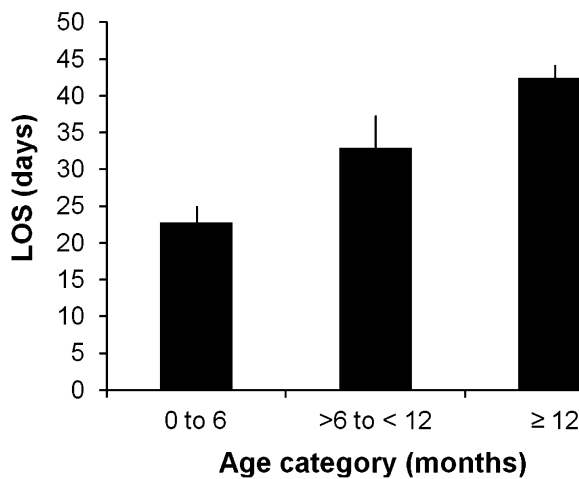
FIGURE 2   The length of stay (LOS) of three age categories of dogs and puppies. Error bars represent one standard error.

in the M and L categories ($p < .10$ based on pairwise comparisons of least squares means; Figure 4). The LOS for XL dogs did not differ from the LOS for any other size category; the variability in LOS for this group was relatively large (Figure 4). The LOS for puppies was not influenced by size categories of purported puppy breeds at adulthood ($F_{4,553} = 1.1$, $p = .35$; Table 2).
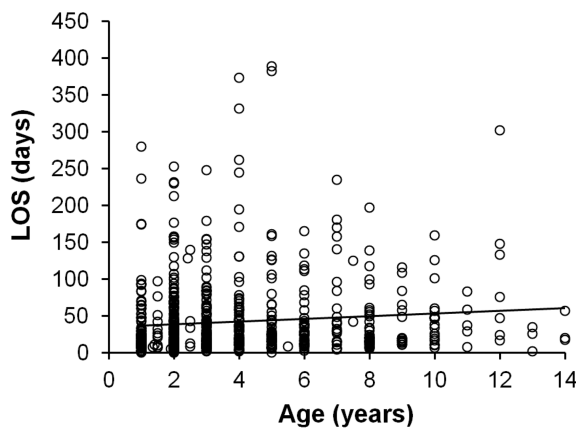

FIGURE 3   Length of stay (LOS) of dogs in two no kill animal shelters as related to age.
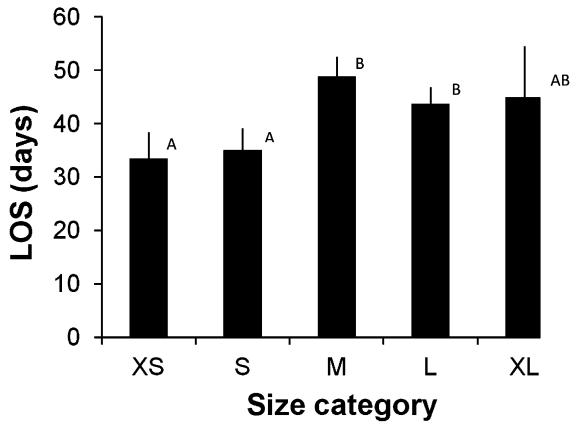
FIGURE 4   Size of dogs ($\geq$12 months of age) influenced length of stay (LOS). Size categories include extra small (XS), small (S), medium (M), large (L), and extra large (XL) dogs as defined in the text. Columns labeled with the same letter are not significantly different from each other. Error bars represent one standard error.

Breed group influenced the LOS of dogs ($F_{9,696} = 2.7$, $p = .005$). Giant breeds had the shortest LOS (20.8 days) and guard breeds had the greatest LOS (59.8 days; Table 3). Breed group also influenced the average LOS of puppies ($F_{9,548} = 4.1$, $p < .0001$). Puppies in the terrier group stayed in the shelters an average of 67.3 days, and puppies in the lapdog group remained an average of 13.0 days, the shortest LOS among puppy groups (Table 3).

Primary coat color did not influence LOS for dogs ($F_{8,695} = 0.5$, $p = .82$) or puppies ($F_{8,543} = 1.0$, $p = .47$). Similarly, the shade of coat color (light, medium, or dark) did not affect LOS for dogs ($F_{2,701} = 0.3$, $p = .73$) or puppies ($F_{2,549} = 1.1$, $p = .32$).

Interactions between breed group and age category, primary coat color, and sex were examined separately for dogs and puppies. There was no interaction of breed group and the three basic age categories of dogs or with refined age categories (1–3 years old, >3–6 years old, >6–9 years old, and >9 years old) on LOS ($F_{24,669} = 0.5$, $p = .98$). There was no interaction of breed group and the coat color of dogs on LOS ($F_{68,635} = 0.92$, $p = .66$), nor was there an interaction of breed group and sex on LOS ($F_{9,684} = 0.6$, $p = .83$).

There was an interaction with breed group and primary coat color for puppies ($F_{58,493} = 1.7$, $p = .002$), but sample sizes were very small for some coat colors within breed groups and specific results were not interpretable due to the relatively large number of breed groups ($n = 10$) and coat colors ($n = 9$). In an attempt to generalize the interaction of puppy breed group and coat color,

TABLE 2
Average LOS for Size Categories of Dogs (≥12 Months of Age) and Puppies (<12 Months of Age)

| | Adult Dogs | | | | | Puppies | | | | |
Size Category	XS	S	M	L	XL	XS	S	M	L	XL
Average LOS (days)	33.4	35.0	48.8	43.7	44.9	13.0	32.4	22.9	24.3	29.9
SE	3.7	3.3	4.4	3.4	8.5	2.1	7.0	2.3	2.7	6.8
n	118	146	180	243	27	16	75	168	281	18
Range	1–175	2–170	0–383	0–389	1–165	0–32	1–401	0–262	1–535	2–102

Note. Size categories include extra small (XS), small (S), medium (M), large (L), and extra large (XL) dogs as defined in the text. LOS = length of stay.

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TABLE 3
Differences in LOS Among Breed Groupings of Dogs and Puppies Adopted From
TCSPCA and HSYC

		Dogs			*Puppies*	
		LOS			*LOS*	
Group	(n)	*(Days)*	SD	(n)	*(Days)*	SD
Bully	80	49.3	49.7	75	27.5	27.3
Companion	99	42.7	57.3	81	24.7	37.9
Giant	13	20.8	16.4	11	22.2	12.9
Guard	42	59.8	64.0	24	37.1	61.3
Herding	28	27.7	23.9	14	14.0	6.3
Hound	91	49.8	60.9	94	23.2	32.4
Lap	130	34.5	38.9	26	13.0	13.4
Spitz	16	32.2	36.7	20	15.6	18.0
Sporting	152	42.9	58.1	196	22.9	47.4
Terrier	55	38.6	42.2	17	67.3	97.9

Note. HSYC = Humane Society of Yates County; LOS = length of stay; TCSPCA = Tompkins County Society for the Prevention of Cruelty to Animals.

the interaction of breed group and shade of coat color (light, medium, and dark) was examined. There was no interaction of puppy breed group and shade of coat color ($F_{18,522} = 0.9$, $p = .55$). There was no effect of the interaction of breed group and sex on the LOS of puppies ($F_{9,538} = 0.6$, $p = .82$). The effect of reported phenotypic characters on LOS in other no kill shelters and traditional shelters is summarized in Table 4.

DISCUSSION

Age, sex, size, breed group, coat color, interactions among these variables, and their effects on the LOS of dogs at the TCSPCA and the HSYC, both no kill shelters, were evaluated. Puppies remained at these shelters for less time than adult dogs, similar to results from other studies (see Table 4). Luescher and Medlock (2009) found that age did not affect the probability of being adopted, but there were no dogs older than 7 years of age in their study. Puppies are preferred to dogs (Hart et al., 1998; Lepper et al., 2002; Patronek et al., 1995; Previde, Custance, Spiezio, & Sabatini, 2003), and in our study, the LOS of puppies was not dependent on size, sex, or interactions of breed group with either of these variables.

Excluding puppies, the LOS of dogs increased approximately one day per year of age, on average, with the oldest dogs remaining in the shelters for

TABLE 4
Summary of Characteristics Examined in Studies of Traditional Shelters and
No Kill Shelters

Reference	Country	LOS (Days)	Age	Sex	Breed	Color	Size
Traditional shelters							
Clevenger & Kass (2003)	U.S.	11–16	+	−	+		
DeLeeuw (2010)	U.S.		+	−	+	+	+
Lepper et al. (2002)	U.S.		+	+	+	+	+
Luescher & Medlock (2009)	U.S.		−[a]	−	−		
Marston et al. (2004)	Australia	5.7		+			+
Patronek et al. (1995)	U.S.	0.9–9.3	+	+	+		+
Posage et al. (1998)	U.S.				+	+	+
Soto et al. (2005)	Brazil			+			
Wells & Hepper (1992)	Ireland	0–6		−	−		−
No kill shelters							
Diesel et al. (2007)	UK	28	+	+	+	+	+
Diesel et al. (2008)	UK		+	+	−	−	+
Mondelli et al. (2004)	Italy	10–25	+	+	+		
Němcová & Novák (2003)	Czech Republic	53–85	+	−	+	−	−
Normando et al. (2006)	Italy	180	+	−			
Current study	U.S.	34.6	+	−	+	−	+

Note. + = significant result; − = nonsignificant finding for a given trait; blank space = characteristic was not examined. LOS = length of stay.
[a]There were no dogs older than 7 years of age in this study.

2 weeks longer than 1-year-old dogs. Variability in this relationship was large, however (see Figure 4), with some younger dogs remaining for months whereas some of the oldest animals were adopted relatively quickly. Older dogs may be less desirable due to increased risk of health issues (Clancy & Rowan, 2003) and the cost of veterinary care.

The LOS of dogs and puppies in the shelters we studied did not differ between the sexes. The effect of sex on LOS from other studies was mixed (see Table 4) with no apparent differences between no kill and traditional shelters. This lack of difference may be confounded because no kill shelters usually offered only neutered males and spayed females for adoption in an attempt to help control pet populations (Winograd, 2009), whereas traditional shelters may offer intact males and females, too. In some studies, altered animals were adopted in preference to intact animals (Clevenger & Kass, 2003; Marston, Bennett, & Coleman, 2004). Females were preferred to males in many studies (Clevenger & Kass, 2003; Diesel, Smith, & Pfeiffer, 2007; Lepper et al., 2002; Marston et al., 2004; Mondelli et al., 2004; Patronek et al., 1995), perhaps for behavioral

reasons (Diesel et al., 2007). Males may stray more; exhibit more aggression, especially toward other male dogs; and be more independent than females (Wells & Hepper, 2000); females may be more fearful than males (Normando et al., 2006). Female preference, however, was not universal. Soto et al. (2005) found that males were more common in Brazilian households and were adopted in preference to female dogs. Based on a survey, reasons for partiality to males included "females may give birth to unwanted litters" and males were "easier" to care for than females (Soto et al., 2005). Differences in the demographics of people adopting dogs from shelters may also confound apparent sex preferences. Men adopted more male dogs from a no kill shelter in Italy than women did, but women adopted greater numbers of dogs from the shelter than men did (Normando et al., 2006).

Dogs in the giant breed group, such as Saint Bernards and mastiffs, remained in the TCSPCA and HSYC shelters for less than half the time as those in the guard group, which represented dogs with the greatest LOS in these shelters. The preference of one group to another is not readily explained. Breeds in the giant group were easily recognizable and, in the shelters we studied, relatively unique, which might make them more desirable than those in other groups (DeLeeuw, 2010). The imposing appearance of guard breeds (Miklósi, 2007) might deter some potential adopters. Individuals in the hound group also remained longer in the shelters than most other groups, perhaps due to their lack of outward affection and trainability compared with some sporting breeds (Fogle, 2000). Posage et al. (1998), however, found that hound breeds were adopted more successfully than some other breeds. Our breed group results differed from those of Lepper et al. (2002), who demonstrated that "fighting breeds" were the least likely to be adopted from a California shelter, and lapdogs were the most likely to be adopted. Differences in the constitution of breed groupings may partly explain these differences. Lepper et al. did not categorize all breeds into groups—some breeds were analyzed individually—making comparisons difficult. There was general agreement with breeds in our lapdog categories, which had the shortest LOS in the shelters studied by Lepper et al., but lapdogs did not have the shortest LOS in the no kill shelters we studied (giant breeds did). Overall, these discrepancies suggest a regional difference in breed preference, breed availability, or both.

The effect of breed on length of stay in the shelters also may be confounded by the size of the animal. The smallest dogs in the TCSPCA and the HSYC, which tended to be lapdogs, had a shorter LOS than medium-size and larger dogs, similar to studies of traditional shelters (Marston, Bennett, & Coleman, 2005; Posage et al., 1998). Large dogs may not be considered by some potential adopters because of housing restrictions (Moorhead, 1998; Shore et al., 2003) or due to the concern that larger dogs could accidentally injure young children

(Chun, Berkelharner, & Herold, 1982) or other pets (Clancy & Rowan, 2003). Additionally, larger or more active dogs were more likely to be adopted from rural shelters compared with shelters located in more developed areas (Marston et al., 2005). Both of the shelters we studied were in rural to moderately developed areas. Regardless of specific reasons, such as preference or avoidance of dogs of a certain size, size was of general importance among studies that examined this characteristic (see Table 4).

Overall, coat color and coat shade did not influence a dog's LOS at the two no kill shelters we examined, and coat color was not relevant to the LOS of a specific breed group, sex, or age category. Results from other studies regarding the effect of coat color on LOS were equivocal (see Table 4). Lepper et al. (2002) indicated that black and brindled dogs were the least likely to be adopted (and this finding may also be confounded with breed, such as pit bulls), yet we did not find an effect of color on LOS for any breed group, and pit bulls were not in those groups that had the greatest LOS.

Despite the inconsistent ability of breed and color to predict LOS (see Table 4), these characteristics are considered in decisions by shelters regarding which animals to kill (Lepper et al., 2002; Patronek et al., 1995; Winograd, 2009). For example, 98% of pit bulls in a California shelter were killed (Lepper et al., 2002), yet they were not among those breeds with the greatest LOS in the two no kill shelters in our study.

Overall, the LOS of dogs in no kill shelters averaged nearly 8 times as long as the LOS of dogs in traditional shelters (see Table 4), but dogs in no kill shelters were adopted into new homes whereas 60% or more of the millions of dogs in traditional shelters were killed (ASPCA, 2012). In general, there was a preference for younger dogs over older ones among nearly all shelters, including the shelters in this study. In our study and a number of others cited, there was no consistent pattern of preference for dogs of a certain color, size, sex, or breed in the group of traditional shelters and the group of no kill shelters. Given the differences among reported findings, efforts should be made to understand the demographics of animals and their adopters at the local shelter level. Understanding these demographics could further improve the ability of shelters to serve animals in their care.

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