

## Factors affecting time to adoption of dogs re-homed by a charity in the UK

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### Abstract

The objective of this retrospective cohort study was to determine the factors affecting the time until adoption of dogs re-homed by Dogs Trust, a UK charity. There were 13,338 records included in the study, representing 11,663 dogs. Data were extracted from the Dogs Trust's database between February 2001 and June 2004 representing all re-homing centres in the UK using the database during this time period. A survival analysis was conducted using Kaplan-Meier plots and multivariable Cox regression. The results of the study showed that the median time till adoption for all dogs was 28 days (95% CI 28–29 days). The variables which affected the time till adoption were breed, purebred status, size, sex, neuter status on arrival at a centre, age, coat colour, veterinary history and re-homing centre. It was suggested that temperament could be an important risk factor but this variable had to be excluded from the multivariable analysis. Dogs from the gundog and utility breed groups and purebred dogs were re-homed at the fastest rate.

**Keywords:** adoption, animal welfare, Cox regression, dog, re-homing, shelter

### Introduction

In 2002 it was estimated that there were 6.1 million dogs in the United Kingdom within 4.8 million households (cited 09/07/2004, [www.pfma.com/petownership-stats.htm](http://www.pfma.com/petownership-stats.htm)).

Dogs Trust is the largest UK dog welfare charity, re-homing over 9,000 dogs per year. Dogs Trust carried out a survey from 2003 to 2004 which estimated that there were 106,000 strays during this period. This was a 5% decrease in numbers from the previous study carried out from 2002 to 2003. Of these dogs, 49% were reunited with their owners, 22% were passed onto animal welfare organisations and 9% were euthanased (cited 27/07/2004, [www.dogstrust.org.uk/main](http://www.dogstrust.org.uk/main)).

Most studies examining re-homing and adoption of pets have been carried out in Australia and the USA. Studies looking at factors involved in relinquishment and adoption of pets are important in order to improve the welfare of pets. Marston *et al* (2004) carried out a study in Australia which showed 83.8% of all dogs admitted to animal welfare centres were strays, while in the USA, it was estimated that 52% were strays (Patronek *et al* 1995). By contrast, it is estimated that only 6% of all dogs handled by the Blue Cross and 12% of dogs in the Wood Green Animal Shelters (both animal welfare centres in the UK) are strays (Bailey 1992). This suggests an apparent difference in culture or attitude to animal welfare centres and dogs between these countries.

A study in the USA found that most owners who relinquished their dogs still thought their dog to be healthy and well-adjusted, in order for it to be adopted (Kass *et al* 2001).

Wells and Hepper (1992) asked people what factors influenced them in the choice of dog they bought from a dog welfare centre in Ireland and found that people preferred relinquished dogs compared to strays. They also found that the presence of a dog's toy in its cage, even if the dog was ignoring the toy, increased the public's preference for the dog, and behaviour was classified as more important than physical appearance. It was also found that dogs that came to the front of the cage and were not barking were preferred.

A study carried out in California examined the effect of factors on whether dogs were adopted or not within a specified time period. They showed that the important factors were age, sex, coat colour, reason for relinquishment, breed and injury status (Lepper *et al* 2002). The researchers also showed that neutered dogs were more likely to be adopted than intact females, which were in turn more likely to be adopted than intact males. This study pointed out that the centre was only studied for 9 months, excluding the summer months, therefore if any of these factors were seasonal then the results could not be generalised and applied to the entire year. This study showed that black and tan coat colour was unpopular, as did Wells and Hepper (1992) and Lepper *et al* (2002).

In Australia, Marston *et al* (2004) found that on average dogs spent 5.7 days in the centre, but almost half of all dogs spent two days or less in the centre (this was mostly due to dogs being reclaimed). Almost 50% of all dogs admitted to the shelters were reclaimed; of which 75% were reclaimed within 2 days. Of all strays, 68.4% found homes within 1 week of being available for re-homing while only one third of relinquished dogs were re-homed within the first

week. This contradicts what has been shown in other studies (Marston *et al* 2004). This may be due to a difference in public perceptions in Australia compared to the USA, as was indicated earlier by the difference in percentages of strays admitted to animal welfare centres. Clevenger and Kass (2003) used a proportional hazards model to show dogs that had been neutered spent 15 to 16 days in a centre before re-homing; in comparison, intact canine group spent 11 to 12 days in a centre before re-homing. They also found that once the dogs had been neutered they were adopted at a faster rate than those that were not.

It has been shown that keeping animals for long periods of time, in small uninteresting cages or environments, can induce behavioural problems, while enrichment of the environment has been successful in reducing such problems (Beaver 1989). A study in Ireland showed that short-term stays (less than 2 weeks) in kennels did not adversely affect dogs' behaviour (Wells & Hepper 1992). Animals are often housed individually in shelters to prevent disease transmission. However, a study showed that dogs housed in a group were more active, exhibited fewer behavioural problems and vocalised less than individually housed dogs (Mertens & Unshelm 1996).

The aim of the current study was to determine the factors which affect the time taken for a dog to be adopted.

## Materials and methods

### Data extraction and cleaning

A retrospective cohort study was conducted using data extracted from the database used by Dogs Trust re-homing centres. Data were collected from all Dogs Trust re-homing centres throughout the UK from the time that their record systems were computerised. Therefore, the time period of data collection for each centre varied from 3 months to 3 years. On the database there were 18,037 records, of which 13,338 were eligible for inclusion in the analysis.

All dogs that were at the re-homing centre Q (492 dogs) had to be excluded from the study as there was no method of determining which dogs had been transferred to Dogs Trust Sanctuary for non re-homable dogs or which dogs were from the re-homing section of the centre. Other dogs were excluded due to there being incomplete information (4,207 dogs).

A missing value analysis was conducted using the software SPSS for Windows version 11 to determine which variables were suitable for inclusion in the study. Three variables were excluded due to the high number of missing values: coat type (3,607 missing values), and two variables assessed on admission to the centre; body condition (7,655 missing values) and temperament (13,072 missing values).

### Variable recoding

All dogs which visit a re-homing centre are issued with a unique identification number. If a dog is brought back to a centre it can be identified because it is microchipped before being re-homed. The date of arrival and departure is recorded for every dog. All the staff are trained and experi-

enced at recognising breeds and estimating size. The staff generally rely on the veterinarian for an estimate of the age in order to standardise the recording of the data.

There were over 150 different breeds of dogs represented in the database and these were classified into breed groups according to the British Kennel Club classification system as shown in Table 1 ([www.the-kennel-club.org.uk/discover-dogs.htm](http://www.the-kennel-club.org.uk/discover-dogs.htm) 2004). The breed groups included hound, working dog, terrier, gundog, pastoral, utility, toy and unknown. Dogs were then sub-classified as being crossbred or purebred according to the staffs' assessment. All dogs were also classified according to size – small, medium and large, according to a subjective assessment carried out by staff at the various re-homing centres.

The sex and neuter status of each dog were recorded on arrival at the re-homing centre. It was also recorded whether intact females were pregnant. Due to the public concern over tail-docking (Bennett & Perini 2003) this characteristic was also recorded.

The age of dogs was recorded on arrival, and if the age was unknown the veterinarian at the centres made an estimate. Age was re-categorised into 2 broad categories, being less than 1 year and greater than 1 year.

Due to the many coat colours recorded in the dog population 8 categories were created: black, brown, white, grey, yellow, mixed, black & white and liver & white. The brown category included dogs with brown, brindle, liver, chocolate, and black and tan coats; the yellow category included yellow, golden and yellow and white; the mixed category included dogs with tri-coloured and mixed coats, and the grey category included grey, blue and merle.

All veterinary treatments that a dog receives whilst in the care of Dogs Trust are recorded in the veterinary diary. Veterinary treatments were reclassified as routine or non-routine. Routine treatments included health check, vaccination, worming, flea treatment, neutering and bathing. Surgery, diagnostic tests, antibiotics and anti-inflammatories are examples of non-routine treatments.

All recoding and cleaning of the data was carried out using Microsoft Excel, after which all files were joined using Microsoft Access for Windows and any import errors were checked and corrected.

### Statistical analysis

Initially, a descriptive analysis of the dataset was performed. This was followed by a univariate analysis of the time until adoption ('survival time') using Kaplan-Meier plots and univariate Cox regression. The median survival times were recorded for each category of every variable and log rank tests were used to determine if there were any significant differences between categories in each variable. From this analysis, it was decided which variables to include in the multivariable analysis based on a significant result at a value of  $P < 0.05$ .

The proportional hazards assumption was assessed for each variable using Schoenfeld's residuals. If the results gave a

**Table 1 Breeds recorded in the Dogs Trust database classified into breed groups according to the British Kennel Club classification.**

Breed group	Breeds
Hound	Afgan hound, Basenji, Basset Fauve de Bretagne, Basset Griffon Vendeen (Grand), Basset Griffon Vendeen (Petit), Basset hound, beagle, bloodhound, dachshund (long-haired), dachshund (miniature long-haired), dachshund (smooth-haired), dachshund (miniature smooth-haired), dachshund (wire-haired), dachshund (miniature wire-haired), deerhound, foxhound, greyhound, Irish wolfhound, otterhound, Pharaoh hound, Rhodesian ridgeback, saluki, whippet
Working	Alaskan malamute, Bouvier des Flandres, boxer, bull mastiff, Dobermann, Dogue de Bordeaux, giant Schnauzer, great Dane, mastiff, Neapolitan mastiff, Newfoundland, rottweiler, St Bernard, Siberian husky
Terrier	Airedale terrier, Bedlington terrier, border terrier, bull terrier, bull terrier (miniature), Cairn terrier, Dandie Dinmont terrier, fox terrier (smooth), fox terrier (wire), Irish terrier, Kerry blue terrier, Lakeland terrier, Manchester terrier, Norfolk terrier, Scottish terrier, Sealyham terrier, soft-coated Wheaten terrier, Staffordshire bull terrier, Welsh terrier, West Highland white terrier, Patterdale terrier, Jack Russell terrier
Gun dog	Brittany spaniel, English setter, German short-haired pointer, German wire-haired pointer, Gordon setter, Hungarian vizsla, Irish red and white setter, Irish setter, large Munsterlander pointer, retriever (curly-coated), retriever (flat-coated), retriever (golden), retriever (Labrador), small Munsterlander, spaniel (American cocker), spaniel (Clumber), spaniel (Cocker), Spaniel (English springer), spaniel (field), spaniel (Irish water), spaniel (Welsh springer), Weimaraner
Pastoral	Anatolian shepherd dog, Australian cattle dog, Australian shepherd, bearded collie, Belgian shepherd dog, border collie, Briard, collie (rough), collie (smooth), German shepherd dog (Alsation), Lancashire heeler, old English sheepdog, Pyrenean mountain dog, Samoyed, Shetland sheepdog, Welsh corgi (Cardigan), Welsh corgi (Pembroke)
Utility	Akita, bulldog, chow chow, Dalmation, French bulldog, German spitz, Japanese spitz, Lhasa apso, miniature Schnauzer, poodle (miniature), poodle (standard), poodle (toy), Scipperke, Schnauzer, Shar Pei, Shih Tzu, Tibetan spaniel, Tibetan terrier
Toy	Affenpinscher, Australian silky terrier, Bichon Frise, cavalier King Charles spaniel, chihuahua (long-coat), chihuahua (smooth-coat), Chinese crested, English toy terrier (black and tan), Griffon Bruxellios, Italian greyhound, Japanese chin, King Charles spaniel, Maltese, miniature Pinscher, Papillon, Pekinese, Pomeranian, pug, Yorkshire terrier

$P$ -value < 0.05, then it was decided that the proportional hazards assumption was violated.

Multivariable analysis was carried out using Cox regression based on a forward fitting procedure, assessing the significance of each variable using likelihood ratio tests. A frailty model was used to account for the correlation in the dataset due to the return of some dogs. In order to account for the non-proportionality of hazards assumption shown by some variables, they were treated as time-varying-covariates. All statistical analysis was carried out using Stata 9 for Windows (Stata Corporation).

## Results

There were 11,663 dogs included in the study, of which 1,517 (13.0%) visited a re-homing centre more than once. Of all the dogs 93.6% were re-homed, of which 5.8% were re-homed under Dogs Trust foster scheme with the charity paying most of the veterinary bills, which allows dogs with long-term medical problems to be re-homed.

The results of the descriptive analysis showed that there was a high number of dogs in the pastoral (21.8%), terrier (19.7%) and unknown (29.3%) breed groups. There was a greater number of crossbreds (68.1%) than purebreds (31.9%).

Of those dogs that were re-homed, 3,521 dogs (28.2%) were small; only 187 dogs (21.9%), of those dogs not re-homed were small.

There was a greater number of male dogs in the study (55.8%). From Table 2 it can be seen that amongst those dogs that were re-homed 6,897 (55.3%) were male dogs compared to 543 male dogs (63.4%) out of those dogs not re-homed. Of the male dogs in the study, 5,357 (72.8%) were neutered on arrival at Dogs Trust compared to only 3,851 (65.3%) of female dogs. Of the intact female dogs only 10 (0.26%) were pregnant.

The estimated age of dogs in the study varied from 8 weeks to 18 years. There were 5,682 dogs (43.8%) aged less than 1 year and 7,656 dogs (57.4%) aged more than 1 year.

The results of the missing value analysis indicated that the variables temperament, condition and coat type had to be left out of the final analysis. However in the initial univariate analysis, the Kaplan-Meier plot of the variable temperament suggested that dogs that were classified as aggressive or unpredictable had a much slower rate of being re-homed as compared to the other categories. It was found that these dogs had a median time till adoption of 272 days (95% CI 208–484 days), significantly longer than the other variable categories.

Kaplan-Meier graphs were produced for each variable showing the difference in survival estimates for all variable categories. All graphs followed a negative exponential pattern as was found in the overall survival plot of all dogs shown in Figure 1.

**Table 2 Results of descriptive analysis showing total number of dogs within each category of each variable, percentages in brackets.**

Variable name	Variable value	Number of dogs re-homed (% in brackets)	Number of dogs not re-homed (% in brackets)	Total number of dogs (% in brackets)
Breed	Pastoral	2,665 (21.4)	236 (27.6)	2,901 (21.8)
	Terrier	2,468 (19.8)	153 (17.9)	2,621 (19.7)
	Gundog	1,626 (13.0)	111 (13.0)	1,737 (13.0)
	Hound	1,237 (9.9)	99 (11.6)	1,336 (10.0)
	Working dog	383 (3.0)	26 (3.0)	409 (3.0)
	Utility	282 (2.3)	13 (1.5)	295 (2.2)
	Toy	126 (1.0)	3 (0.4)	129 (1.0)
	Unknown	3,695 (29.6)	215 (25.0)	3,910 (29.3)
Cross	Crossbred	8,503 (68.1)	581 (67.9)	9,084 (68.1)
	Purebred	3,979 (31.9)	275 (32.1)	4,254 (31.9)
Size	Small	3,521 (28.2)	187 (21.9)	3,708 (27.8)
	Medium	6,919 (55.4)	471 (55.0)	7,390 (55.4)
	Large	2,042 (16.4)	198 (23.2)	2,240 (16.8)
Sex	Male	6,897 (55.3)	543 (63.4)	7,440 (55.8)
	Female	5,585 (44.7)	313 (36.6)	5,898 (44.2)
Neutered	Neutered	8,720 (69.9)	548 (64.0)	9,268 (69.5)
	Intact	3,654 (29.2)	291 (34.0)	3,945 (29.6)
	Unknown	108 (0.9)	17 (2.0)	125 (0.9)
Pregnant	Pregnant	10 (0.1)	0 (0)	10 (0.1)
	Not pregnant	12,472 (99.9)	856 (100)	13,328 (99.9)
Tail	Tail docked	119 (1.0)	14 (1.6)	133 (1.0)
	Tail present	12,363 (99.0)	842 (98.4)	13,205 (99.0)
Age	< 1 year	5,463 (43.8)	219 (25.6)	5,682 (42.6)
	> 1 year	7,019 (56.2)	637 (74.4)	7,656 (57.4)
Colour	Grey/Merle	3,582 (28.7)	254 (29.7)	3,836 (28.8)
	Brown/Brindle	2,078 (16.7)	172 (20.1)	2,250 (16.9)
	Tri/Mixed	2,088 (16.7)	132 (15.4)	2,220 (16.6)
	Black	1,551 (12.4)	124 (14.5)	1,675 (12.6)
	Liver & white	1,634 (13.1)	80 (9.4)	1,714 (12.9)
	Black & white	921 (7.4)	44 (5.1)	965 (7.2)
	Yellow	337 (2.7)	26 (3.0)	363 (2.7)
Treatment	White	291 (2.3)	24 (2.8)	315 (2.4)
	Routine	6,585 (52.8)	432 (50.5)	7,017 (52.6)
	Non-routine	5,897 (47.2)	424 (49.5)	6,321 (47.4)

It was found that the median time till adoption of all dogs in the study was 28 days (95% CI 28–29). The results of the univariate analysis and screening suggested that all variables except for pregnancy ( $P = 0.195$ ) were suitable for inclusion in the multivariable analysis.

The proportional hazards assumption was assessed for each variable using Schoenfeld's residuals, Kaplan-Meier plots and graphs plotting the log survival function against the log of analysis time. From these results, using a significance level of 0.05; size, neuter status, tail, age and centre all violated the proportional hazards assumption. Using the graphical assessment of the proportionality of hazards similar results were found. Thus, these variables were treated as time varying covariates in the multivariable analysis.

The results of the multivariable analysis showed that all variables except tail ( $P = 0.137$ ) affected the rate or hazard of re-homing (Table 3).

In the breed variable, the gundog (HR = 1.19, 95% CI 1.1–1.30) and utility breed (HR = 1.16, 95% CI 1.0–1.34) groups had a significantly higher rate of re-homing compared to the hound breed group. Purebreds were re-homed at a 7% higher hazard rate (HR = 1.07, 95% CI 1.02–1.12) than crossbreeds.

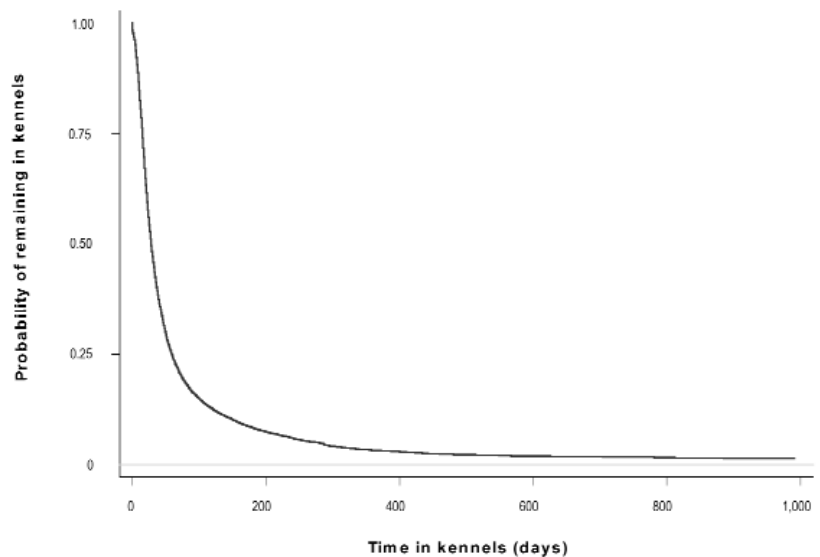
Medium (HR = 0.84, 95% CI 0.80–0.89) and large (HR = 0.75, 95% CI 0.69–0.80) sized dogs all had a significantly lower hazard of being re-homed compared to small-sized dogs. Female dogs had a significantly higher rate of re-homing (HR = 1.17, 95% CI 1.13–1.21) compared to males.

Those dogs aged over one year had a significantly lower hazard (HR = 0.64, 95% CI 0.61–0.67) of re-homing compared to dogs aged less than one year.

Dogs with grey or merle coat colour, yellow or golden coat colour and liver and white coat colour all had significantly

Figure 1

Kaplan-Meier plot of time until re-homing for all dogs included in the study.



higher rates of re-homing compared to dogs with black coat colour.

Dogs which had undergone any treatment other than routine treatments had significantly lower hazard (HR = 0.74, 95% CI 0.71–0.77) of re-homing compared to those which only had routine treatments.

With regards to the centre from which the dog was re-homed, it was found that dogs from all the centres had significantly slower rate of re-homing as compared to dogs from centre A except centre L ( $P = 0.65$ ) and centre N ( $P = 0.11$ ).

## Discussion

The results from this study identify a number of factors which affect the time until adoption of dogs. Other studies have shown that dog, prospective owner and animal welfare centre factors are involved in the final choice of dog to be adopted (Posage *et al* 1998; Neidhart & Boyd 2002; Marston & Bennett 2003). Due to the use of existing retrospective data in the current study, it was only possible to study a limited range of dog-associated variables.

Lepper *et al* (2002) found that age, sex, breed, coat colour and any injury affected the likelihood of re-homing of dogs. The results of the current study suggest that breed, purebred status, size, sex, age, coat colour and veterinary history are all important factors in the choice of dog made by potential adopters. It was found that dogs from the gundog and utility breed groups were re-homed at the fastest rate. In a study in the USA, Lepper *et al* (2002) found that lapdogs and terriers were more likely to be re-homed, whereas guarding and fighting breeds were less likely to be re-homed. The fighting breed group in that study contained predominantly dogs from the utility breed group (according to the Kennel Club classification) and therefore those results differ from the results of the current study. This may be due to differ-

ences in the popularity of certain breeds in the UK and in the USA.

The results of this study indicate that dogs of purebred status are re-homed at a slightly faster rate than crossbred dogs. A similar result was found by Lepper *et al* (2002). It should be noted that the staff make a subjective assessment as to whether the dog is purebred or crossbred based on the dogs appearance and this could result in mis-classification. Therefore, this variable's significance should be interpreted carefully and further studies with more accurate breed classification should be done. Similar to Posage *et al* (1998) and Marston *et al* (2004), it was found that large dogs are re-homed at a significantly slower rate than medium-sized dogs, which in turn are re-homed at a slower rate than small-sized dogs. The possible reasons for this could be due to a difference in space requirements, feeding and veterinary costs or perceived exercise requirements. It has also been shown that families with small children tend to adopt smaller dogs to reduce the possibility of the dog overpowering the children (Posage *et al* 1998).

Female dogs were re-homed at a faster rate than male dogs. It was impossible to study the effects of neutering on people's preferences because all dogs from Dogs Trust are neutered prior to re-homing, provided they are old enough. However, it was shown that those dogs that were intact on arrival at Dogs Trust spent slightly less time in the centre before being re-homed, an unusual finding as these dogs have to undergo surgery and a recovery phase before being re-homed – thus we would expect them to be in the centre longer before being re-homed. This is possibly because those dogs that have been neutered on arrival are more likely to be relinquished dogs, therefore a more complete history of the dog's background is available to potential adopters, including any history of medical or behavioural

**Table 3** Table showing results of multivariable analysis.

Variable name	Variable value	Hazards ratio	95% confidence interval	P-value
Breed	Hound	1.00		
	Terrier	1.06	0.98-1.14	0.144
	Gundog	1.19	1.10-1.30	< 0.001
	Pastoral	0.92	0.86-0.99	0.021
	Working dog	0.99	0.89-1.12	0.943
	Utility	1.16	1.01-1.34	0.033
	Toy	1.15	0.95-1.39	0.151
	Unknown	0.99	0.93-1.07	0.853
Cross	Crossbred	1.00		
	Purebred	1.07	1.02-1.12	0.004
Size	Small	1.00		
	Medium	0.84	0.80-0.89	< 0.001
	Large	0.75	0.69-0.80	< 0.001
	Time	1.00	1.00-1.00	0.039
Sex	Male	1.00		
	Female	1.17	1.13-1.21	< 0.001
Neutered	Neutered	1.00		
	Intact	1.27	1.20-1.34	< 0.001
	Unknown	1.21	0.99-1.47	0.051
	Time	0.99	0.99-1.00	< 0.001
Tail	Tail docked	1.00		
	Tail present	1.17	0.95-1.43	0.137
	Time	1.00	1.00-1.00	0.099
Age	< 1 year	1.00		
	> 1 year	0.64	0.61-0.67	< 0.001
	Time	1.00	1.00-1.00	0.999
Colour	Black	1.00		
	Brown/Brindle	0.95	0.89-1.02	0.166
	Tri/Mixed	1.01	0.94-1.08	0.855
	Grey/Merle	1.13	1.06-1.21	< 0.001
	Liver & white	1.09	1.01-1.17	0.023
	Black & white	0.92	0.84-1.01	0.079
	Yellow/Golden	1.17	1.01-1.34	0.025
	White	0.96	0.83-1.11	0.602
Treatment	Routine	1.00		
	Non-routine	0.74	0.71-0.77	< 0.001
Centre	Centre A	1.00		
	Centre B	0.31	0.20-0.50	< 0.001
	Centre C	0.25	0.13-0.46	< 0.001
	Centre D	0.40	0.23-0.67	0.001
	Centre E	0.39	0.25-0.62	< 0.001
	Centre F	0.43	0.23-0.84	0.014
	Centre G	0.40	0.28-0.57	< 0.001
	Centre H	0.07	0.02-0.30	< 0.001
	Centre J	0.27	0.14-0.53	< 0.001
	Centre K	0.16	0.08-0.31	< 0.001
	Centre L	0.91	0.62-1.35	0.653
	Centre M	0.25	0.12-0.53	< 0.001
	Centre N	0.66	0.40-1.10	0.109
	Centre P	0.00	0.00-0.00	< 0.001
	Time	0.99	0.99-1.00	0.018

problems. Lepper *et al* (2002), Clevenger and Kass (2003) and Marston *et al* (2004) also found that females were more likely to be re-homed than males. This may be due to the fact that people consider behavioural problems to occur more frequently in male dogs (Griffiths 1975).

This study showed that whether a dog had a docked tail or not made no significant difference in their rate of being re-homed. This may be an indication of people's attitude towards tail docking. In recent years there has been a change towards not docking tails (Bennett & Perini 2003; Gardiner 2003).

As has been shown in other studies, dogs over the age of one year were re-homed at a slower rate than those dogs aged less than one year (Clevenger & Kass 2003). Lepper *et al* (2002) found that the likelihood of re-homing decreased with age. This is most likely due to the appeal of younger dogs and puppies in comparison to older dogs.

From the analysis it was suggested that dogs with grey, yellow, golden or liver and white coat colours were re-homed at a significantly faster rate than the other coat colours. Dogs with black and white coat colour appeared to be the most unpopular. These results are slightly different to those found in other studies. In the study carried out by Lepper *et al* (2002) in the USA, black or brindle dogs were the most unpopular. A similar observation was made by Posage *et al* (1998). Wells and Hepper (1992) showed that black and tan coat colour was most unpopular. The analysis of the data from Dogs Trust found no significant difference in the rate of re-homing of brindle or black and tan dogs as compared to black coat colour. These results may also highlight the differences between the different countries' preferences.

Dogs which had undergone any non-routine veterinary treatment were re-homed at a significantly lower rate than those which only underwent routine treatments. This is to be expected as those with non-routine treatments would have spent time undergoing the treatment and recovering before being re-homed. Lepper *et al* (2002) showed that injured dogs were less likely to be re-homed.

Overall, the main differences between this study and the studies carried out in the USA and Australia appear to be the breed and coat colour preferences. However, it should be noted that the study carried out by Lepper *et al* (2002) in USA was based on 4,813 dogs of which only 1,226 were adopted. The study conducted by Posage *et al* (1998) included 1,073 dogs of which 834 were re-homed. Therefore, both studies were based on much smaller sample sizes than the current study which may have led to some differences in results. However, the difference in results is most likely due to cultural differences between these countries and, as mentioned earlier, due to differences in the popularity of certain breeds.

In the results of the analysis some of the centres appeared to re-home dogs at a much faster rate than others. This may be due to slight procedural differences between the centres or it may be due to differences in the surrounding populations of people who adopt the dogs. This would be a useful area of further study because it may indicate if changes need to

be made in certain centres, or may give an indication where the ideal locations, in terms of surrounding human population, would be to build new re-homing centres.

The median time to adoption for dogs in this study was 28 days. This is in contrast to findings from other studies carried out in the USA and Australia. An Australian study showed that dogs spent on average 5.7 days in a re-homing centre. This could be because the Australian study included dogs that were lost and reclaimed within a few days of going missing; almost 50% of the dogs in the study were reclaimed within 4 days (Marston *et al* 2004). Dogs Trust accepts stray dogs from the police or the dog warden service after dogs have already stayed the required 7 days in the dog wardens' kennels. Dogs Trust also allows each dog 3 days to adjust to their new surroundings before making them available for re-homing. Dogs in a study carried out by Clevenger and Kass (2003) spent an average of 15 days in the welfare centre if they were adopted and 24 days if they were euthanased (dogs were euthanased after 4 weeks if they had not been re-homed). The animal welfare centres included in the Australian study also had a euthanasia policy and therefore dogs were precluded from staying for long periods. Dogs Trust has a policy where they will not euthanase a healthy dog. Therefore some dogs may spend a long time in the care of Dogs Trust before being re-homed. This is likely to explain the significantly longer time period found in this study.

The transfer history of all dogs was incomplete and this may have resulted in biased 'survival' times of some dogs. Ideally, having the date at which each dog was available for re-homing, rather than the date of arrival at the centre would have been best, because some dogs undergo veterinary or behavioural treatment before being re-homed.

Many dogs had to be excluded from the analysis due to the high number of missing values. For this reason, the variables coat colour, temperament and condition were excluded from the multivariable analysis. These variables may have an important influence on re-homing or may have confounded the relationship of some of the other variables. A univariate analysis showed that the variable temperament produced the greatest variation in estimates of time to adoption for the different categories. This variable suggested that if a dog was categorised as aggressive it took much longer for it to be re-homed. This is to be expected, as when people are interested in adopting a particular dog, they are then informed of the behavioural assessment carried out by the staff at the centre and any records of previous incidents in relation to that dog. If they were told that the dog has aggressive or unpredictable tendencies, they would then have to reconsider adopting the dog and decide if they were still willing to adopt the dog despite these problems. Therefore it takes much longer to find a suitable owner for these dogs.

In situations where the age or breed was unknown, the staff at the re-homing centre would make a subjective assessment of these variables and this may have introduced misclassification bias.

If a behavioural problem was detected at the centre, there was no standardised method of recording this on the database. This may have affected the survival time results as some of these dogs may have been kept in the centre while they underwent behavioural therapy.

In the database there was no direct indication about which dogs were stray and which were relinquished. In some cases the source of the dog was recorded, or the police number, but this was not done in every case and therefore an estimate of the number of strays in comparison to the number of relinquished dogs was not possible. Other studies have shown that this is an important factor in people's choice of dog (Wells & Hepper 1992, 2000).

These problems indicate that the re-homing centres should try to keep more detailed records for all the dogs. This would enable further studies to be carried out to assess more characteristics which in turn may guide policy decisions in the re-homing centres to ensure that dogs are re-homed as quickly as possible to the most suitable home.

### Conclusion

The results of this study suggest that breed, purebred status, size, sex, neuter status on arrival at a re-homing centre, age, coat colour, veterinary treatments and location of re-homing centre all affect the time until adoption of dogs. The median time to adoption of all dogs re-homed by Dogs Trust was 28 days. Potentially important variables such as temperament and condition could not be included in the analysis, as they had too many missing values. This shows that further studies need to be carried out to investigate re-homing of dogs in more detail. The results of the current study can be used by Dogs Trust animal welfare charity in the UK to attempt to produce more similar adoption times by ensuring similar protocols are followed in all their re-homing centres and by educating and informing potential new owners of the needs of the various breeds and age groups of dogs in their centres. The results may be used to improve the staff recommendations and better inform the public, which could lead to a dog being re-homed sooner. This would be in the best interest of the dog in order to decrease the likelihood of developing behavioural or health related problems from remaining in kennels for extended periods of time. It would also free up kennel space to allow other unwanted or stray dogs to be cared for by the re-homing centres.

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