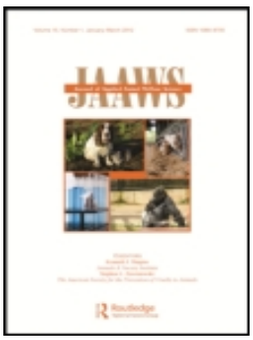

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Investigating Some of the Factors That Influence "Consumer" Choice When Adopting a Shelter Dog in the United Kingdom

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This study examined which characteristics of dogs available at a large rehoming organization in the United Kingdom influenced prospective adopters' choices. The revealed preference data used to model "consumer" choice were from the Dogs Trust rehoming web pages. The analysis of the probability of adoption involved a logistic regression model with multiple imputation. The factors that had a significant impact on the adopters' choices were age, size, pedigree status, coat length, behavior (e.g., fearfulness, adjustment issues), friendliness (toward children, dogs, and other pets), and training. This study offers a quantitative analysis of adopters' preferences that could prove to be useful for shelter personnel and researchers interested in the analysis of companion animal markets.

Keywords: *adoption, consumer choice, dog, shelter*

The United Kingdom has a reputation for being an "animal lover nation," indicated by the fact that almost half of its households report having a family companion animal (Pet Food Manufacturers Association [PFMA], 2012). The majority of these families consider their companion animals to be members of their family. The leading species is reported to be the dog, with 23% of households having at least one dog (PFMA, 2012). The PFMA reported that 32% of the dogs acquired in the 2008 sample survey conducted by TNS (http://www.tnsglobal.com) were from a rescue center, revealing that such shelters are an important outlet for acquiring a dog.

The overall population of dogs in rescue centers includes dogs from local authorities, dogs surrendered directly to the welfare charity by their previous caregivers, and dogs who were born in the shelter. In 2010, the estimated number of dogs who entered private shelter organizations from local authorities, after the end of their 7-day statutory period of being in their facilities, was 31,500 (Dogs Trust, 2011).

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To date, several studies have engaged in an empirical analysis of "consumer" preferences in choosing a companion animal. When examining the reasons and the backgrounds for adoptions in five U.S. shelters, Weiss, Miller, Mohan-Gibbons, and Vela (2012) found that the highest-ranked single most important factor was the dog's appearance. This was indicated as the leading factor for both puppies and adult dogs. Other factors important to adopters appeared to be the dog's social behavior and personality.

Posage, Bartlett, and Thomas (1998) found that characteristics of dogs that appeared to influence the adopter's choice included the size of the dog, with smaller dogs having a higher likelihood of being adopted; the coat color, with fair colors (white, grey, gold) coinciding with a higher probability of adoption; and the breed of the dog, with toy, terrier, hound, and nonsporting breeds appearing to be most attractive. Similarly, Lepper, Kass, and Hart (2002) presented results examining the factors that influenced the adoption of dogs in a California animal shelter. The characteristics that were identified as having a significant impact on a dog's adoption included the dog's age, coat color, breed, purebred status, and medical condition.

In a study focused specifically in the United Kingdom, Diesel, Smith, and Pfeiffer (2007) examined the time to adoption of each dog. The factors that were found to have significant impacts on the length of shelter stay included the breed, purebred status, size, sex, neuter status, age, and veterinary history of the dog. Using a univariate analysis, Diesel et al. (2007) also revealed that the coat color and temperament of the dog had an impact on the time to adoption.

In addition, the literature also includes a study that investigated the factors influencing the successful rehoming of dogs in the United Kingdom. Diesel, Pfeiffer, and Brodbelt (2008) provided an empirical approach through monitoring the placement of UK shelter dogs into new homes for 6 months. Their primary objective was to examine the determinants of the successful rehoming of dogs. Results revealed that among other factors, the characteristics of the dogs, namely size and behavior, were found to have significantly negative impacts. More specifically, larger dogs demonstrated a higher probability of being returned to the shelter, and dogs with reported behavioral problems were also found to have a higher likelihood of being surrendered to the shelter.

The aim of the present study was to advance the UK literature by using an econometric analysis of consumer preferences for rescue dogs in the United Kingdom and to identify the main factors that influence consumers' dog choice. Thus, we examined which characteristics of the dogs available at one of the largest rehoming organizations in the United Kingdom, Dogs Trust, had significant impacts on the prospective adopters' choices. Our main objective was to evaluate the likelihood of a dog being adopted based on the dog's advertised characteristics, both innate (e.g., size, coat color) and developed (e.g., behavior, training levels).

MATERIALS AND METHODS

The Model

The underlying conceptual framework adopted for this study was based on the Lancaster model of consumer demand (Lancaster, 1966). According to this theory, a good can be described as a bundle of its characteristics on which a consumer's demand is based. Dependent upon the consumer's preferences for the characteristics, each bundle offers the consumer a different level

of utility (Lancaster, 1966). Given that consumers are assumed to be rational, each of them will choose the set of characteristics that maximizes their utility.

Applying this theory to the shelter companion animal market, we hypothesized that the choice of which shelter dog to adopt is influenced by the consumer's preferences for the characteristics of the dog. These characteristics could be both innate and developed traits. The innate characteristics include those obtained at birth, such as sex, size, coat length, coat color, and pedigree status, and also include age and level of activity. The developed characteristics include those that have developed through the dog's lifetime socializing, such as whether they are friendly toward children, other dogs, or other nonhuman animals; whether they have behavioral problems; whether they need further training; whether they have medical conditions; and whether they had previous caregivers or were found as strays.

The model predicting the probability of a dog being adopted was constructed using a logistic regression analysis. This method allowed us to obtain a clear indication of which factors have a significant impact on the adopter's choice, as it examines the impact the characteristics of a dog have on the binary result of whether the dog has been rehomed or not. The model is based upon various prior beliefs we have about preferences regarding the UK companion animal market, as informed by the literature.

More specifically, the primary model developed for this analysis is that:

$$P = f\ (A, B, C, D, E, F, G, H)$$

Where P denotes the probability of a dog being chosen; A denotes the age, which is categorized into five levels from puppy to older dog; B denotes the coat length, which ranges between three levels (short, medium, and long); C denotes whether the dog is of purebred or cross/mixed-breed status; D denotes the coat color, which is divided into six types from fair to black; E denotes the size of the dog and is categorized into four levels (small, medium, big, and large); F denotes friendliness (toward dogs, children, and other companion animals); G denotes behavioral issues and is categorized into three levels (no behavioral issues, mild behavioral issues, and reported behavioral issues); and H denotes the need for further training.

According to Petplan's Pet Census (2011), 57% of dog purchases were from breeders, indicating that one out of two dogs purchased were puppies. Similarly, the PFMA (2012) reported that 47% of consumers obtaining a dog turned to agents who reputedly sell puppies (breeders, private ads, Internet, and pet shops). Studies have also revealed that age is an important factor when choosing a dog, and younger dogs are chosen at a faster rate than adult dogs (Diesel et al., 2007; Normando et al., 2006). As a consequence, we expected the probability of a dog being chosen to be negatively correlated with age.

The most popular breed in the United Kingdom for at least 4 consecutive years has been the Labrador Retriever (C. Sealy, The Kennel Club, personal communication, February 24, 2011). Given that the most popular breed is a short-coated breed, combined with the fact that the top three breeds reported by the PFMA (2013) are also short-coated (Labrador Retriever, Jack Russell Terrier, and Staffordshire Bull Terrier) and it is assumed that there would be a desire for less grooming care, we expected the probability of being chosen to be negatively correlated with coat length.

Regarding pedigree status, Diesel et al. (2007) revealed that purebred dogs had a faster rate of adoption. In addition, the statistics given by the PFMA (2012) reveal that 75.3% of the UK

dog population is of purebred status (5.5 million dogs). Therefore, we expected purebred dogs to have a higher probability of being adopted in comparison with crossbreeds and mixed breeds.

In terms of coat color, we expected the probability of being chosen to be higher for fair-colored dogs based on the findings of relevant studies undertaken for the U.S. companion animal market. For example, Posage et al. (1998) found a significant link between adoptions and a fair-colored coat. In the UK literature, Diesel et al. (2007) found that dogs with black coats had a slower rate of adoption compared with dogs with fairer coats.

Several U.S. companion animal market studies have also shown a higher probability of smaller dogs being adopted (Posage et al., 1998). In the UK, Diesel et al. (2007) found that small-sized dogs have a faster adoption rate compared with all other sizes. Therefore, we expected the probability of being chosen to be negatively correlated with the size of the dog.

Concerning the friendliness of a dog, we expected a higher probability of being chosen for dogs who were considered friendly with other dogs, other companion animals, and children. A study by Luescher and Medlock (2009) showed that dogs who are labeled as being good with other dogs have a higher probability of being chosen. In addition, in the same study, dogs labeled as being good with children were found to be statistically significant for being chosen on an individual level; however, they did not remain significant when they were inserted in their logistic regression.

The behavior of dogs as an indicator for their suitability as companion animals has been a subject widely researched (see De Palma et al., 2005; Taylor & Mills, 2006). Poulsen, Lisle, and Phillips (2010) discussed how a 10-year behavior assessment scheme (1995–2004) was developed to determine whether dogs from the Royal Society for the Prevention of Cruelty to Animals (RSPCA) in Fairfield, Brisbane, Australia, were eligible for rehoming. Their results revealed that even though dogs had passed the behavior test, they did exhibit issues in their new homes. However, this did not provoke the majority of adopters to return the dogs (a mere 5% return rate).

On the other hand, Patronek, Glickman, and Moyer (1995) in the United States and Wells and Hepper (2000) along with Diesel, Pfeiffer, and Brodbelt (2010) in the United Kingdom have found that the highest-ranked reason for dogs to be surrendered at a shelter is in fact behavioral issues. Taking these results into consideration along with findings from studies in the existing literature, such as those of Normando et al. (2006), which showed that dogs with behavioral problems are less likely to be adopted (indicated by their longer mean of stay in shelters), we hypothesized that dogs with no reported behavioral issues would be more likely to be adopted.

Lastly, in terms of training, we expected the probability of being chosen to be higher for dogs who were not in need of further training. A study conducted by Luescher and Medlock (2009) showed that training within the shelter increases the probability of dogs being chosen by potential adopters.

In summary, in conducting our analysis, we expected to reveal negative effects for the following explanatory variables of our model: age, coat length, behavioral issues, and further training. On the other hand, we expected the traits of fair-colored coat, friendliness, and a purebred pedigree status to have positive effects on the likelihood of a dog being adopted.

A description of all variables included in the model—including those relating to medical condition, level of activity, whether the dog's were muzzled in public, and stray status—is given in Table 1.

TABLE 1
Description of Explanatory Variables

Age	Age was collected as a categorical variable. It was based on the age range given by the organization defining whether a dog was a puppy (0–12 months old), a young dog (1–2 years old), a young adult (3–5 years old), an adult (5–7 years old), or an older dog (8 or more years old). For reasons of accuracy, the age range was not altered.
Size	The observations of the size variable were collected by both sources—the descriptive paragraph and uploaded photograph. There were four levels of this variable: small, medium, big, and large. In the descriptive paragraph, the organization only indicated if a dog was small or large. The additional medium and big ranges were determined by the picture posted and the breed type reported by the organization.
Coat color	This variable was solely based on the picture provided. All dogs were organized depending on the most predominant colors of their coats. Based on results of many studies (e.g., Lepper et al., 2002) and on the common "myth" that black dogs are least preferred, we focused on fair-colored and black coats. As a result, this category was constructed with six levels: fair, tricolor, black, black and white, brindle, and other (including all other colors and combinations of those colors).
Coat length	This variable was based on the picture provided. The dogs were given the label of short, medium, or long coat length depending on the length of their coat in the picture. If there was doubt, the length was based on the reported breed type's standard trait.
Behavioral issues	The documentation of the dog's behavior was solely based on the organization's description. The variable was categorized based on the intensity of the behavioral issues. The first level included all dogs who did not show any behavioral issues; the second level included dogs with mild behavioral issues such as nervousness, inability to be left alone, fearfulness, stress, anxiety, and adjustment issues (e.g., multiple visits prior to adoption, dog left to own devices to settle in new home); and the third level included dogs who were labeled by the organization as having behavioral problems.
Friendly toward children	The organization reported when a dog was not child-friendly. Therefore, a binary variable was constructed to represent whether dogs were child-friendly or not. When it was not explicitly indicated, we assumed that the dogs were child-friendly.
Friendly toward other dogs	This variable was constructed to examine whether the dog got along with other dogs or not; hence, it was constructed as a binary variable. When it was not explicitly indicated, we assumed that dogs were dog-friendly.
Friendly toward other companion animals	Similar to previous variables, this was constructed as a binary variable to examine whether the dog got along with other companion animals including cats, rabbits, and other furry animals. When it was not explicitly indicated, it was assumed that the dog could adjust to the presence of other companion animals.
Level of training	This explanatory variable was constructed as a binary variable to examine whether the dog was in need of further training. The two levels included "no need for further training" and "need for further training." If the organization did not specify the need for training, it was assumed that the level would be the same as new home adjustments, and therefore, there would be no need for further training.
Level of activity	This dummy variable was constructed to examine the level of activity the dog required. The lower level indicated normal levels of activity, while the second level indicated higher-than-average activity needed.
Medical condition	This binary variable was constructed to examine whether the dog was healthy or had a medical condition.
Sex	This dummy variable indicated whether the dog was a male or female.
Pedigree status	This dummy variable indicated whether the dog was a purebred or crossbreed/mixed breed.
Stray	This dummy variable indicated whether the dog was found as a stray or relinquished by a caregiver.
Muzzled	This explanatory variable was included in the data set as an individual variable of behavioral issues to capture a "visual" aspect of aggression and examine whether it was significant in influencing an adopter's choice. This binary variable indicated whether the dog needed to be muzzled in public.

The Data

Given that detailed data were required for this research, primary data had to be collected. After scouting several UK nonprofit organizations through their websites, the decision was made to focus on monitoring the intakes and outtakes of the Dogs Trust organization (http://www.dogstrust.org.uk).

Dogs Trust, founded in 1891, is the largest dog welfare charity in the United Kingdom. The organization's main objective is to rehome into "happy homes" thousands of stray and abandoned dogs. In 2010, Dogs Trust took 16,813 dogs into its care and successfully rehomed 14,590 dogs (Dogs Trust, 2011). What made Dogs Trust stand out was that it had a very well-organized (in terms of design and maintenance) website, particularly the rehoming page, compared with other organizations that also advertise dogs on the Internet (e.g., RSPCA, Battersea Dogs, and Cats Home).

The display of the dogs was straightforward and provided as much detail as possible regarding each dog's characteristics and rehoming status. The maintenance and update of this section of the website was done on a daily basis, which provided a reliable level of accuracy. The web design had an additional feature that was considered an advantage: Dogs Trust had enabled the option to view all dogs offered from each rehoming center on a single web page. Hence, monitoring each dog's adoption status became less time-consuming. The organization has since changed the design and layout of the web page.

The monitoring and collection of data were carried out on a daily basis to keep the database as accurate as possible. According to Dogs Trust, all adoptable dogs entering its shelters are listed on the rehoming web page (J. O'Beirne, media officer, personal communication, March 14, 2012). The data collected included information from all 17 Dogs Trust rehoming centers—namely Ballymena, Bridgend, Canterbury, Darlington, Evesham, Glasgow, Ilfracombe, Kenilworth, Leeds, London (Harefield), Merseyside, Newbury, Salisbury, Shoreham, Shrewsbury, Snetterton, and West Calder. The organization has since established an additional center in Loughborough.

The original total number of records collected included information for 2,037 dogs. Each individual record was identified and monitored by the dog's name and the rehoming center from which the dog was offered. The data collected were solely based on the information given by the organization's web page for each dog. As previously stated, through the dog's description, we were able to obtain the age (five levels), pedigree status, size (four levels), behavior (three levels), sex, and other characteristics such as whether they are friendly toward children, dogs, and other pets, their level of activity, their medical condition, whether they need to be muzzled in public, and whether they were apprehended as strays.

In addition, through observing the pictures provided for each dog, information regarding coat length (three levels) and coat color (six levels) was collected. The rehoming status of each dog was also observed through the picture area of each dog. The web designer indicated on the picture area whether the dog was a "new" arrival, whether the dog was "reserved," and whether the dog had been "rehomed." This allowed for the collection of data for the dependent variable "rehomed or not." The monitoring was undertaken from May 17, 2011, through August 5, 2011, during which approximately 58% of the dogs were rehomed.

A limitation of our data collection is the fact that 32% of the data set includes missing values. This is due to information not being entered by the organization either because there were no descriptions or no pictures uploaded. To handle this issue, we employed the multiple imputation by chained equations technique, also known as fully conditional specification and sequential regression multivariate imputation (White, Royston, & Wood, 2011). It was first developed by Donald Rubin (1987) and has become popular over the years as a method for handling data sets with missing values (Sinharay, Stern, & Russell, 2001). This method allowed us to "fill in" the missing values with suitable values based on multiple predictions for each

TABLE 2
Variable Details of Data Set

Variable	*Units*	*Observations*	*Min*	*Max*
Rehomed	Dummy	2,037	0	1
Size	Categories	1,763	0	3
Pedigree status	Dummy	2,033	0	1
Sex	Dummy	2,037	0	1
Coat color	Categories	1,609	0	5
Coat length	Categories	1,434	0	2
Age	Categories	2,036	0	4
Child-friendly	Dummy	1,843	0	1
Other dogs	Dummy	1,842	0	1
Other pets	Dummy	1,842	0	1
Training	Dummy	1,838	0	1
Medical condition	Dummy	1,825	0	1
Stray	Dummy	1,821	0	1
Muzzled	Dummy	1,820	0	1
Activity	Dummy	1,823	0	1
Behavioral issues	Categories	1,823	0	2

one (see Azur, Stuart, Frangakis, & Leaf, 2011; White et al., 2011). The implementation of this approach permitted the use of the whole data set in our analysis. Variable details of the original data set are given in Table 2.

RESULTS

The factors found to have a significant impact (5% level or less) on the adopter's choice were size, pedigree status, coat length, age, friendliness (toward children, dogs, and other companion animals), level of training, and behavioral issues. The logistic regression results are summarized in Table 3.

Regarding the size of the dog, the reference group of "small" seemed to be preferred in comparison with the other size groups. This variable appears to have had a negative effect on adoption. This meant that when a dog was larger than the reference group, the probability of choosing him decreased. The odds ratio was 0.69 for medium-sized dogs, 0.53 for big-sized dogs, and 0.65 for large dogs. All levels were statistically significant at the 5% level of significance, with the figure for medium dogs being statistically significant at the 1% level. This analysis revealed that big dogs appear to be the least-preferred size group.

An important factor in an adopter's decision appears to be the pedigree status. The regression analysis revealed that the likelihood of being adopted increased if the dog was classified as a purebred, with an odds ratio of 1.67. This factor was found to be statistically significant at the 1% level of significance.

Coat length was also found to have a significant impact on the likelihood of being adopted at the 5% level of significance, with the reference group set as "short." The regression analysis revealed that the coat length had a positive effect on adoption, with positive coefficients.

TABLE 3
Logistic Regression Analysis of Probability of Dog Being Adopted Based on Adopter's Preference for Dog's Characteristics

Variables	*Odds Ratio*	*95% Confidence Interval*	p *Value*
Size			
Small	1.00		
Medium	0.69**	[0.50, 0.95]	.02
Big	0.53***	[0.41, 0.69]	.00
Large	0.65**	[0.44, 0.98]	.04
Pedigree status	1.67***	[1.37, 2.04]	.00
Sex	0.89	[0.73, 1.08]	.24
Coat color			
Fair colors	1.00		
Tricolor	1.03	[0.64, 1.66]	.91
Black	1.19	[0.84, 1.69]	.33
Black and white	0.90	[0.68, 1.20]	.49
Brindle	0.84	[0.36, 1.94]	.69
Other	1.04	[0.77, 1.40]	.80
Coat length			
Short	1.00		
Medium	1.36**	[1.04, 1.79]	.03
Long	1.39**	[1.01, 1.91]	.04
Age			
0 to 12 months old	1.00		
1 to 2 years old	0.65**	[0.45, 0.92]	.01
3 to 5 years old	0.49***	[0.35, 0.68]	.00
5 to 7 years old	0.33***	[0.23, 0.47]	.00
8 years old or older	0.34***	[0.23, 0.45]	.00
Child-friendly	1.81***	[1.44, 2.27]	.00
Dog-friendly	1.67***	[1.20, 2.32]	.00
Other companion animals	1.36**	[1.02, 1.81]	.04
Training	0.66***	[0.51, 0.87]	.00
Medical condition	0.64*	[0.39, 1.05]	.09
Stray	1.47	[0.79, 2.71]	.22
Muzzled	0.43	[0.09, 2.05]	.29
Activity	0.66	[0.38, 1.14]	.14
Behavioral issues			
No behavioral issues	1.00		
Mild behavioral issues	0.48***	[0.34, 0.67]	.00
Reported behavioral issues	0.36**	[0.14, 0.94]	.04
Constant	1.48	[0.82, 2.66]	.19
Observations	2,037		

*$p < .1$. **$p < .05$. ***$p < .01$.

Medium coat length was preferred over the reference short length, with an odds ratio of 1.36. Also, dogs with long coat lengths appeared to have a higher probability of being adopted as compared with short-coated dogs, with an odds ratio of 1.39.

When examining the odds ratio of the dogs' age groups, the likelihood of being adopted appeared to decrease as age increased, with puppies aged up to 1 year old used as a reference group. The odds ratio was 0.65 for 1- to 2-year-olds, 0.49 for 3- to 5-year-olds, 0.33 for 5- to 7-year-olds, and 0.34 for dogs who were 8 years old or older. All age levels appeared to be statistically significant at the 1% level of significance, except for the group aged "1 to 2 years old," which was at the 5% level of significance.

Adopters' preferences were positively influenced if a dog was friendly toward children, other dogs, and other companion animals. The probability of being chosen increased if a dog was child-friendly, with an odds ratio of 1.81; if a dog socialized well with other dogs, with an odds ratio of 1.67; and if a dog socialized well with other companion animals, with an odds ratio of 1.36. The first two factors were statistically significant at the 1% level, and the latter factor was found to be statistically significant at the 5% level.

The level of training was found to have a significantly negative effect on the likelihood of a dog being chosen. Based on the negative coefficient, consumers were negatively influenced if the dog had a need for further training. The odds ratio of this factor was estimated at 0.66. This result is statistically significant at the 1% level of significance.

As expected from our primary hypothesis, the dog's behavior was found to be an important factor in influencing consumer preference in selecting a dog. In particular, the more severe the behavioral issues a dog had, the less people were inclined to adopt. The reference group indicated that a dog had "no behavioral issues." The regression analysis revealed that the first level, "mild behavioral issues," had an odds ratio of 0.48, and the second level, "reported behavioral issues," had an odds ratio of 0.36. These outcomes were statistically significant at the 1% and 5% levels of significance, respectively.

The remaining variables included in the model were found not to have a statistically significant effect on consumers' choice at the 5% level or less of significance. These variables included sex, coat color, medical condition, activity, whether the dog was apprehended as a stray, and whether the dog needed to be muzzled in public.

DISCUSSION

When people consider obtaining a dog, they may have a preconception of what kind of dog they want. Their criteria could mainly be based on the innate characteristics of dogs that are dictated by their specific breeds. However, dogs are living creatures whose dispositions, attitudes, and existence heavily rely on the environment and circumstances in which they are brought up and live. Stephen and Ledger (2007) reported that dogs react and express behavior differently in different circumstances, and Bradshaw and Goodwin (1998) identified some differences in traits when they compared purebred dogs of the same breed in the United States and the United Kingdom.

The results of this study have demonstrated that choosing a dog for adoption is influenced by many factors, with the adopter selecting his or her dog of choice based on both innate and developed characteristics. Our set of hypotheses for how each characteristic affects a dog's

likelihood of being adopted has not been fully validated. The results of our analysis revealed that the expected outcomes, based on the literature, include the negative effect of increasing dog size; the positive effect of a purebred status; the positive effect of being friendly toward children, other dogs, and other companion animals; the negative effect of the need for further training; and the negative effect of the exhibition of behavioral issues.

The variables of age and coat length showed some unexpected outcomes. Despite the fact that overall age had the expected negative impact on the likelihood of adoption, the logistic regression revealed that dogs in the last group, those 8 years old or older, were marginally preferred over dogs who were 5 to 7 years old. A possible explanation could lie in the adopter's personality and his or her reason for adopting a shelter dog. This result, though marginal, perhaps captures people's desire to go to shelters to "rescue" dogs, and therefore, when deciding between two dogs who belong to the aforementioned groups, people prefer to give homes to the older, less privileged dogs.

Regarding coat length, the regression revealed that this variable had a positive effect on the likelihood of adoption, contradicting our primary hypothesis of a negative effect. One explanation is that coat length gave the dogs the characteristic of being "cute," and therefore, dogs with longer coat lengths were preferred over the short-length reference group.

The outcome of the medical condition variable is also interesting. The analysis revealed that the presence of a medical condition did have a negative effect on the consumer's choice, but only at the 10% level of significance, with an odds ratio of 0.64. A possible explanation could be that Dogs Trust offers financial support to those who choose to adopt a dog with a medical problem, therefore eliminating the additional financial burden of choosing those dogs. Another possible explanation could be the adopters' personalities and how they perceive dogs with medical conditions—whether the illnesses are burdens or needs to which they should direct their attention.

In our primary hypothesis, we also hypothesized that dogs with fair coats would be preferred, but coat color was not found to be statistically significant. Hence, our initial set of hypotheses has not been fully validated.

It follows that the main source of this study's limitations is found in the data set used. By collating information about the dogs through the Dogs Trust rehoming web page, we were able to obtain the basic information for each dog. According to Weiss et al. (2012), an adopter's decision in selecting a shelter dog could be influenced by a number of different agents, namely by the staff of the shelter, the information on each dog's cage, the Internet, friends and family, and the dog. Their study revealed that adopters listed the information given by the staff of the shelter as the most important and the information through the Internet as the third most important. Hence, this study acknowledges that other determinants apart from the factors examined within this study could influence the consumer's decision.

CONCLUSION

This retrospective cohort study offers an empirical analysis of adopters' preferences for acquiring dogs from a rescue center. By conducting a logistic regression, we were able to examine the likelihood of a dog being chosen based on the dog's innate and developed characteristics. From the 2,037 dogs in the data set, approximately 58% were adopted. The analysis indicated

that the characteristics that significantly influenced consumer choice at the 5% level or less of significance included the dog's size, age, pedigree status, coat length, behavior, friendliness toward children, other dogs, and other companion animals, and the need for further training.

The findings of the present study could prove to be useful to shelter personnel and researchers interested in the in-depth investigation of companion animal markets. Shelter personnel could derive useful information regarding preferences for dog characteristics that could help in understanding some of the factors that influence the adopter's choice in selecting a dog. More specifically, this article provides quantitative evidence of what the shelter personnel may intuitively know.

This information could therefore serve as a guide for which dog characteristics to highlight when advertising dogs for adoption. Highlighting a preferred characteristic for each dog could potentially positively influence a possible adoption even if the dog has some "undesirable" traits. For researchers, the outcome of this study could become a point of reference for further analyzing the UK companion animal market using empirical research.

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REFERENCES

Azur, M. J., Stuart, E. A., Frangakis, C., & Leaf, P. J. (2011). Multiple imputation by chained equations: What is it and how does it work? *International Journal of Methods in Psychiatric Research*, *20*, 40–49.

Bradshaw, J. W. S., & Goodwin, D. (1998). Determination of behavioural traits of pure-bred dogs using factor analysis and cluster analysis; a comparison of studies in the USA and UK. *Research in Veterinary Science, 66*, 73–76.

De Palma, C., Viggiano, E., Barillari, E., Palme, R., Dufour, A. B., Fantini, E., & Natoli, E. (2005). Evaluating the temperament in shelter dogs. *Behaviour*, *142*, 1307–1328.

Diesel, G., Pfeiffer, D. U., & Brodbelt, D. (2008). Factors affecting the success of rehoming dogs in the UK during 2005. *Preventive Veterinary Medicine*, *84*, 228–241.

Diesel, G., Pfeiffer, D. U., & Brodbelt, D. (2010). Characteristics of relinquished dogs and their owners at 14 rehoming centers in the UK. *Journal of Applied Animal Welfare Science*, *13*, 15–30.

Diesel, G., Smith, H., & Pfeiffer, D. U. (2007). Factors affecting time to adoption of dogs re-homed by a charity in the UK. *Animal Welfare*, *16*, 353–360.

Dogs Trust. (2011). *Annual report 2010.* Retrieved from http://www.dogstrust.org.uk/_resources/annualreview2010.pdf

Lancaster, K. J. (1966). A new approach to consumer theory. *Journal of Political Economy*, *74*, 132–157.

Lepper, M., Kass, P. H., & Hart, L. A. (2002). Prediction of adoption versus euthanasia among dogs and cats in a California animal shelter. *Journal of Applied Animal Welfare Science*, *5*, 29–42.

Luescher, A., & Medlock, R. T. (2009). The effects of training and environmental alterations on adoption success of shelter dogs. *Applied Animal Behaviour Science, 117*, 63–68.

Normando, S., Stefanini, C., Meers, L., Adamelli, S., Coultis, D., & Bono, G. (2006). Some factors influencing adoption of sheltered dogs. *Anthrozoos*, *19*, 211–224.

Patronek, G. J., Glickman, L. T., & Moyer, M. R. (1995). Population dynamics and the risk of euthanasia for dogs in an animal shelter. *Anthrozoos*, *8*, 31–43.

Pet Food Manufacturers Association. (2012). *Pet population 2008 to 2012.* Retrieved from http://www.pfma.org.uk/pet-population-2008-2012

Pet Food Manufacturers Association. (2013). *Dogs by breed.* Retrieved from http://www.pfma.org.uk/dogs-by-breed

Petplan. (2011). *Petplan pet census 2010.* Retrieved from http://www.petplan.co.uk/petcensus/censusinfo.pdf

Posage, J. M., Bartlett, P. C., & Thomas, D. K. (1998). Determining factors for successful adoption of dogs from an animal shelter. *Journal of the American Veterinary Medical Association*, *212*, 478–482.

Poulsen, A. H., Lisle, A. T., & Phillips, C. J. C. (2010). An evaluation of a behaviour assessment to determine the suitability of shelter dogs for rehoming. *Veterinary Medicine International, 2010*, Article 523781. Retrieved from http://www.hindawi.com/journals/vmi/2010/523781

Rubin, D. B. (1987). *Multiple imputation for nonresponse in surveys.* New York, NY: Wiley Series in Probability and Statistics.

Sinharay, S., Stern, H. S., & Russell, D. (2001). The use of multiple imputation for the analysis of missing data. *Psychological Methods*, *6*, 317.

Stephen, J., & Ledger, R. (2007). Relinquishing dog owners' ability to predict behavioural problems in shelter dogs post adoption. *Applied Animal Behaviour Science*, *107*, 88–99.

Taylor, K. D., & Mills, D. S. (2006). The development and assessment of temperament tests for adult companion dogs. *Journal of Veterinary Behavior*, *1*, 94–108.

Weiss, E., Miller, K., Mohan-Gibbons, H., & Vela, C. (2012). Why did you choose this pet? Adopters and pet selection preferences in five animal shelters in the United States. *Animals*, *2*, 144–159.

Wells, D. L., & Hepper, P. G. (2000). Prevalence of behaviour problems reported by owners of dogs purchased from an animal rescue shelter. *Applied Animal Behaviour Science, 69*, 55–65.

White, I. R., Royston, P., & Wood, A. M. (2011). Multiple imputation using chained equations: Issues and guidance for practice. *Statistics in Medicine*, *30*, 377–399.