Shelter and rescue programmes associated with higher live release and lower return rates for dogs

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Abstract

Typically, animal shelters and rescues are judged on their live release rates. This research explores the relative impact that shelter traits and programmes have on positive outcomes for dogs. Using a survey of 370 animal shelters and rescues across the US, it concludes that eschewing the use of breed labels for all dogs that do not appear to be pure-bred, having a robust foster programme, and using a matching programme are correlated with higher live release and lower return rates. Resources are not wholly determinative of success — it is the programmes shelters and rescues implement, not simply their human and financial resources — that are associated with positive outcomes.

Keywords: animal welfare, breed labels, foster programmes, live release rates for dogs, matching programmes, transfer programmes

Introduction

There are many reasons for companion animals arriving at shelters and rescues: owner relinquishment, because they are lost or are otherwise stray, are born there, because they have been transferred from another shelter, or as part of a cruelty case. Due to economic stress on the parts of their owners some animals are simply abandoned on the streets or in derelict and abandoned buildings (Reese *et al* 2020). Owner relinquishment is a primary source of animals in shelters (Stavisky *et al* 2012); an average of 324,500 animals are relinquished to animal shelters in the US yearly by their guardians due to family disruption (divorce, death), foreclosure, economic problems, or minor behavioural issues.

Animal shelters and rescues are typically judged on their live release rates, ie the percentage of non-human animals that leave the organisation alive, either through being returned to their owners, adopted into a new home, or transferred to another shelter or rescue. Yet research on the types of programmes associated with higher live release rates and other positive outcomes tends to be fragmented, often limited to looking at single programmes in a small number of shelters. This leaves shelter managers and staff with little readily accessible guidance regarding programmes and policies that might lead to greater success (Reese 2018).

Live release of animals from shelters via adoption is a clear animal welfare goal. However, since there are only an estimated 13,600 community animal shelters in the US, euthanasia due to overcrowding is common; estimates of animals euthanased in shelters annually vary widely from four to 17 million (Bartlett *et al* 2005; American Society for the

Prevention of Cruelty to Animals [ASPCA] 2015). On the other hand, data indicate that euthanasia rates in US shelters have dropped consistently between 2016 and 2019 (from 9.2 to 6.9%) with a concomitant steady increase in adoption rates (from 52.4 to 53.5%) (Shelter Animals Count 2019). Understanding the programmes, policies, and assets of animal shelters and rescues that are likely to promote live release is critical to improving organisational practices and in enhancing the overall welfare of homeless companion animals. What goes on within shelters can drastically improve or hinder the chances of an animal having a live release (Reese 2018).

This research explores the relative impact that shelter traits (budgets, human resources, open versus limited intake) and four specific programmes/policies (breed labels and transfer, matching, and foster programmes) have on positive outcomes for dogs. These programmes were selected for study because they were target areas of concern for the funder. Additionally, extant research with a more limited sample suggested that these programmes could foster live release (Reese 2018).

The research weighs the relative impact of fixed attributes that are difficult to change (organisation traits) and more malleable variables such as internal programmes and policies, for a large number of animal welfare organisations across the US. It assesses the relationship between programmes such as transferring dogs from over-capacity shelters with low demand to areas with higher demand, foster care, removing breed labels, and careful matching of dogs to adopters and more positive animal welfare outcomes in terms of higher live release and lower return rates.

Attributes of shelters and rescues and outcomes

Shelter traits

There are a number of aspects of animal shelters and rescues that could impact outcomes for animals in their care. It seems reasonable to expect that greater resources in terms of budget, staffing, and numbers of volunteers would support efforts to increase live release rates potentially through greater programme effort. The nature of the organisation itself may also affect outcomes. Animal shelters and rescues can take a variety of forms. The nomenclature for animal welfare facilities recognises several definitions of terms for shelters based on their mission, function, and financing. The definitions may vary by state and even local context. Moulton *et al* (1991) identified three types of shelters: public shelters which they referred to as 'animal controls', private or non-profit shelters ('humane societies'), and private or non-profit agencies with public contracts to provide animal control services. As noted by Clancy and Rowan (2003; p 16): "the term shelter encompasses a wide range of entities, from an animal control facility that serves thousands of animals per year to the private citizen who rescues a few strays a year." Animal 'rescues' often have limited space for housing animals and tend to be reliant upon foster homes to care for animals. And rescues and shelters can be breed-specific, ie focusing on simply Boxers or smaller dogs, or can serve a variety of different types of dogs.

Animal shelters and rescues can be either open or limited intake. The former refers to an entity that admits all animals from a particular geographic service area, such as a county or a city. Limited intake organisations can pick and choose among the animals they admit based on space, nature of the animal (for example, breed), the adoption market for their area (whether small dogs are preferred or there is an aversion to or ordinances forbidding Pit Bulls), and health or age status (Clancy & Rowan 2003; Reese 2018).

Several scholars have examined the nature of animals coming into municipal animal shelters versus humane societies and 'open' versus 'limited' intake shelters (Shore & Girrens 2001; Notaro 2004). Dogs appear to be more likely to go to animal controls while cats were more likely to arrive at a humane society (Shore & Girrens 2001). The large majority of animals at animal control facilities are brought in by an animal control officer. It has been suggested that the animals recovered by animal control officers (as opposed to those relinquished by owners or finders) tend to be more costly because they stay in the shelter longer and are more likely to be euthanased (Notaro 2004). This is potentially because they are less socialised and thus could not be recovered by a member of the public (this is particularly the case with cats which may have been trapped) or developed less desirable behaviours during their time on the street, or because of higher health expenses due to sickness, injury, or because they were unsterilised (Shore & Girrens 2001). These differences in the nature of the animal clientele may have an impact on live release rates.

There is a dearth of quantitative studies that compare shelter/rescue traits to outcome variables such as live release or return rates. A small number of studies have used more qualitative or subjective outcome indicators, such as perceived success as defined by shelter directors or shelter worker assessments of perceived animal quality of life (Maubach 2014). Based on 16 interviews, this research found that shelter directors identified the following activities or programmes as contributing to a reduction in euthanasia rates in their organisations: humane education, trap-neuter-return programmes (TNR), transfer programmes, dog enrichment, foster care, facility improvements, and marketing/social media. A recent study quantitatively examined the factors associated with live release rates at a single shelter, finding that even an open intake municipal shelter can be successful in terms of live release (Patronek & Crowe 2018). Yet other research has posited that humane societies typically have higher adoption rates and do not deal with mistreated animals making them a less 'melancholy' environment for staff and volunteers (Davis 2013).

Rowan (1992) suggested that because larger shelters admit more animals, they have higher euthanasia rates. Limited intake shelters which can control what kind and how many animals they accept, not operated by a municipality such as a city or county, have been found to have lower euthanasia rates (Reese 2018). Research has found correlations between the nature of the animal shelter (municipal versus non-profit, high versus low euthanasia rates), the extent of contact between staff and animals, and employee stress, burn-out, and turn-over rates (Rogelberg *et al* 2007; Andrukonis & Protopopova 2020; Andrukonis *et al* 2020).

Research is also notable for what has been found to be unrelated to save rates, however: numbers of staff and volunteers, budget, financial status, urban or rural location, and capacity (Lord *et al* 2006; Reese 2018). The mixed findings of extant research could be the result of several factors: studies have varied in their operational definitions of shelter/rescue type; research has tended to focus on single organisations as opposed to examining trends across a number and variety of organisations; and, the small number of studies may not be sufficient to identify consistent trends.

Human resources

Staff and volunteers are an important element of animal welfare in shelters and rescues because they provide the care and enrichment that can ease shelter stays and increase the chances of adoption. Formulae have been provided regarding optimal staffing for organisations that have physical shelters based on the human population of the service area, incoming animals per day, average daily number of animals in the shelter, and care times of 15 min per animal (nine for cleaning and six for feeding) (National Animal Care and Control Association [NACA] undated). But resources are often limited and thus volunteers are critical to the functioning of animal shelters and rescues as they allow organisations to provide more services and achieve their missions beyond the constraints imposed by paid staff resources (Davis 2013; Nonprofit Times 2018).

While limited finances were the most frequent barrier to the success of animal shelters noted by shelter directors in a Michigan study, the most important facilitator of success were volunteers closely followed by staff (Reese 2018).

Volunteers provide skills and abilities that are potentially lacking in the organisation, generating fresh ideas, and increasing the breadth of knowledge brought to the sheltering task (Ellis 2012; Sheptak & Menaker 2016). Research has also shown that volunteer roles are not created equally, ie some contribute more to higher live release rates than others, specifically those that involve hands-on interactions with animals (Reese 2018).

Recommended training for shelter personnel can be extensive and varies with the nature of specific organisations (for example, animal controls with cruelty and rescue responsibilities versus limited intake humane societies and other rescues) (Association of Shelter Veterinarians [ASV] 2010; Reese 2018). Training can include topics ranging from use of bite sticks, to scene assessment, to vehicle safety, to dog training and enrichment, and interacting with the public and volunteers. Training should also cover recognising stress, pain, suffering, and adaptation to the shelter (ASV 2010). The extent of training that both volunteers and staff receive has been found to be associated with positive outcomes such as higher live release rates and appears to increase the satisfaction of both groups thereby reducing turnover (ASV 2010; Rogers *et al* 2016; Saksida *et al* 2017; Reese 2018). Graduated training for volunteers was found to increase adoption rates for all dogs, but particularly for those that appeared to be Pit Bull mixes (Bright & Hadden 2017). Thus, the deployment and training of human resources has been found to impact outcomes for non-human animals.

Programmes and outcomes

The proceeding discussion summarises the research on the potential relationships between shelter type and staffing and positive outcomes. While such factors may set the frame for activities within the shelter, there are several specific programmes that may contribute as much or more to save rates: removal of breed labels, transfer programmes, matching programmes, and foster programmes.

Breed labels

The use of breed labels for dogs in shelters and rescues has been the subject of debate and research (Patronek *et al* 1995; Weaver 2013; Gunter *et al* 2018; Reese 2018; Guenther 2020). To some extent, the odds of euthanasia are related to aspects of the animal itself: health, sterilisation status, and extent of socialisation (Patronek *et al* 1995). How an animal is perceived by shelter staff (breed stereotypes or preferences, behaviours, relinquishment information, age, medical status) can also affect the chances of euthanasia. Mixed breed dogs appear more likely to be euthanased than pure-bred dogs which are more likely to be reclaimed by their owners after showing up as strays (Patronek *et al* 1995). In particular, the breed label of 'Pit Bull' brings up negative media connotations of the dog as being associated with gang and drug lifestyles, dog fighting, and fears about aggression that create a stigma

for Pit Bull-type dogs which can reduce their adoption rate or lengthen their stay in the shelter (Weaver 2013; Gunter *et al* 2018; Reese 2018; Guenther 2020). Dogs identified as Pit Bulls can have more difficulty in finding adoptive homes because of these stigmas (Dickey 2016; Guenther 2020).

Research has indicated that breed labels for dogs in shelters and rescues can be problematic because they have little predictive value with respect to behaviour and are wrong in many cases, particularly when several 'breeds' are involved (Patronek & Bradley 2016; Gunter *et al* 2018). Even those individuals in animal-related professions are notoriously poor at estimating dog breeds in part because crossbreeds tend not to be acknowledged and similar breeds may be reported as a single breed (Mills & Levine 2006; Webster & Farnworth 2018). Given that the majority of dogs in animal shelters are composed of at least three breeds, this is an important concern (Gunter *et al* 2018).

There is mounting evidence that removing breed labels is associated with lower euthanasia rates and higher adoptions for all dogs, particularly suspected Pit Bull mixes because it lessens breed biases among potential adopters and focuses on behaviours rather than 'breed' (Reese 2018; Gunter *et al* 2018; Cohen *et al* 2020).

Transfer programmes

Transferring animals between shelters and rescues is done for a variety of reasons. Partnerships among shelters and rescues to transfer animals can address capacity issues and move animals from low to high demand areas reducing euthanasia rates (Weiss *et al* 2013; Hawes *et al* 2018). Animals may have medical needs that are beyond the resources of large open intake shelters to address but which can be met by specialised rescues. Neonatal kittens and puppies and/or nursing mothers need more intensive care than most shelters can provide and may be transferred to rescues or other shelters for placement in foster homes for that purpose.

Research has indicated that having a transfer programme to send animals to other shelters when at capacity or to assist other shelters by receiving animals is related to higher live release rates (Simmons & Hoffman 2016; Patronek & Crowe 2018; Reese 2018; Hawes *et al* 2019). Transfer programmes can have negative effects, however. Transferring animals between shelters/rescues across regions of the country increases the possibility of disease transmission as ailments such as heartworm and parvovirus tend to be higher in warmer climates. Insufficient time in isolation when dogs are being transferred in can lead to the spread of disease which can result in euthanasia (Reese 2018). Guidelines suggest that all animals entering a shelter be evaluated and observed for health issues and be kept isolated from the current population; some guidelines recommend that 10% of the facility's animal housing capacity be devoted to isolation with separate air circulation from the rest of the shelter (New Zealand 1993; ASV 2010). For shelters that receive transferred animals, euthanasia rates have been found to be higher if there are no medical protocols in place to assess intakes before they come into contact with other animals in the shelter (Reese 2018).

Matching programmes

Matching programmes typically involve the typing of dogs based on one or more behavioural attribute(s) such as: activity levels, child safety, interest in and safety with other dogs, and medical and behavioural needs. Size and age of the dog are also often included in the basic profile. When potential adopters arrive at a shelter or rescue, a staff member or volunteer either has a detailed conversation with them about their lifestyle, family members both human and non, and their preferences, or alternatively may be asked to fill out a form to elicit the information. Adopters will then be directed toward specific dogs that most closely match their desires. Another dimension of matching programmes is limiting the animals that a potential adopter can see or interact with. Shelters may vary in whether or not they restrict the animals that can be viewed to those that are a good 'match' and whether adopters are allowed to choose an animal that is not a good match (Reese 2020).

Matching programmes are implemented to reduce the chances a dog will be returned after adoption by assuring the best possible 'match' between adopter needs, wants, and lifestyles and the nature of the dog (Curb *et al* 2013). While anecdotal information among shelters and rescues using matching programmes suggests that return rates have been reduced, there is a dearth of empirical studies that have assessed the relationship between matching programmes and outcomes such as return rates and length of shelter stays for a large sample of organisations (Balcom & Arluke 2001; Marder & Duxbury 2008; Curb *et al* 2013; for an exception see Reese 2020).

Foster programmes

Foster care programmes appear to be another critical part of animal sheltering and rescue because of the many benefits they provide: helping to address capacity issues for organisations that have shelters; obtaining additional information about behavioural traits of the animal particularly involving child, dog and cat compatibility; allowing sick or injured animals time to heal; nurturing puppies and kittens too young to be adopted; and, providing shelter breaks to allow dogs to reduce stress levels (Taylor & Mills 2007; Reese 2018; Patronek & Crowe 2018; Gunter *et al* 2019). Foster care is often the best method to ensure that very young animals are adequately socialised (McMillan 2002; Griffin & Hume 2006; Society of Animal Welfare Administrators [SAWA] 2017).

Research has suggested that shelters and rescues that make greater use of foster programmes have lower euthanasia rates (Maubach 2014; Patronek & Crowe 2018), particularly those that make more use of volunteers for fostering (Reese 2018). Such outcomes are not only the result of freeing up capacity in shelters but of allowing animals to avoid the stress of shelters that can lead to behavioural issues, providing socialisation, and increasing information about an animal which can be used to promote adoption (Falconer 2019).

Summary

While the research cited points to a number of potential factors that can impact positive outcomes in terms of live release and return rates, work has tended to focus on a single component at a time or at a single animal shelter and has not examined the relative effects of more fixed variables, such as staffing, intake, and the nature of the shelter and the more malleable programmes implemented within shelters. Are shelters and rescues inherently limited by their resources? Can the implementation of transfer, matching and foster programmes and the removal of breed labels assist shelters and rescues in achieving better outcomes? This research addresses these questions by employing survey data from 370 shelters and rescues across the US to compare the relative effects of shelter traits and programmes on positive outcomes for dogs.

Materials and methods

Study participants

In February 2020, an online survey using the Qualtrics platform was sent to 898 shelters and rescues that had submitted grant applications to the PEDIGREE Foundation during the previous six years. A link to the survey was sent to the contact person listed on the grant application. In cases where the email bounced back because this person was no longer with the organisation, websites were examined to identify the executive director and the link resent. While organisations could have submitted grant applications in more than one year, all such duplicates were removed from the email list so that each organisation responded to the survey only once. The survey was distributed in mid-February and closed out in mid-March 2020. As a result of this timing, the results were in before many shelters began to shut down due to the COVID pandemic.

Organisations received one reminder notice via email. All aspects of the project were approved by the Human Research Protection Program at Michigan State University. Three hundred and seventy organisations responded to the survey giving a response rate of 41%. Some responses had missing data; the number of responses for various items are indicated in the tables where appropriate. It should be noted that PEDIGREE Foundation grants are only awarded to non-profit as opposed to municipal shelters and rescues, however, non-profits with municipal contracts for service provision are included in the sample.

Measures

The survey was developed in consultation with the PEDIGREE Foundation. It contained 169 questions (mostly in a matrix response format for ease of responding) focusing on the use of three types of programmes — matching (five questions), transfer (seven questions), and foster (three questions) — as well as the use of breed labels (four questions). The foster programme elements were combined into an index variable in further analyses based on f-scores generated from a factor analysis. An additive index was not

appropriate in this case because of variation in the measurement units for the component variables. Variables and factor loadings are foster co-ordinator (0.62), home visits for fosters (0.83), and percent dogs in foster homes (0.67). Human resource questions focused on the roles volunteers play within the organisation (18 questions) and the extent of training of staff and volunteers (12 questions). Several questions asked about basic organisational traits. Those employed in this paper include type of organisation (eight response options), annual budget, total number of staff and volunteers, average dog intake, and average ratio of dog intake to staff. It should be noted that because of missing data for budget, that variable was not included in further analysis. The questions employed by topic are detailed (in Table 1).

Outcome variables included return rates from 2011–2018 (drawn from the survey because they are not required in the grant applications) and live release rates from 2011–2018 (drawn from the grant applications). Because the PEDIGREE Foundation focuses on increasing the adoption of dogs, the survey and analysis asked about programmes and outcomes only in terms of canines.

Data analysis

Several data reduction methods were used to create indexes in order to simplify the analysis and correct for multicollinearity in the regression models to follow. Outcomes for dogs were measured via an index combining average annual return rates and live release rates. Live release rates (LRR) were calculated for each year that an organisation applied for a grant. Live release for the purposes of this study is the total of dogs adopted, transferred, and returned to owners, divided by dog intake. Live release rates of over 100% are possible if dogs with the organisation at the end of the previous year had a live release outcome in the year the grant was applied for. For the purposes of analysis, a global live release rate was created; the global LRR is a summary measure calculated as the total number of dogs with a live outcome over the time-period divided by the total dog intake over the time-period. Higher global live release rates were significantly and negatively correlated with return rates. Using f-scores derived from factor analysis, an index variable was created to represent positive outcomes: higher global live release rates and higher non-return rates (100-return rate).

The analyses were conducted using IBM SPSS Statistics 25 and proceeded through several steps. First, descriptive statistics (frequencies) regarding the responding organisations are presented. Second, a Pearson correlation analysis was run between the variables noted above and the index variable measuring positive outcomes: higher live release and non-return rates. Chi-squares were calculated for nominal level variables where indicated. Two multiple linear regression models were then run with the outcome index as the dependent variable: one with the more fixed shelter traits as independent variables, the other with more malleable programmes to assess relative explanatory power of the two

sets of variables. Finally, a best-fitting model for positive outcomes is then presented. For all of the regressions, diagnostics — normality, linearity, homoscedasticity, and absence of multicollinearity — indicated that the assumptions of linear regression were met and thus it was used in all of the models (full diagnostics are available from the author on request).

Results

Responding organisation traits

The majority of organisations responding to the survey (64%) were non-profits that did not have contracts to provide services for a municipality such as a county or city; 23% of the non-profits did have such a contract and thus served as the municipal animal shelter. Likely because of the lack of municipal contracts, the plurality of organisations (21%) was limited intake which means they have control over the types and numbers of animals they admit. Seventeen percent were open intake meaning that they must accept all animals from their service area. These questions were asked on the survey with the organisations requested to 'check all that apply.' For this reason, the numbers do not add up to 100%.

The grant applications asked that the organisation identify their operating model. The largest group of responding organisations was breed-specific animal shelters (44%), followed by rescues (27%), and general-purpose shelters (20%). Eight percent of the responding organisations operated on a 'friends of' model which means that a non-profit worked in co-operation with a municipal shelter to run the organisation. Typically, under these arrangements, the non-profit (ie the friends) raised funds and ran volunteer programming for the municipal shelter.

There was a great deal of variation in annual organisational budgets among respondents ranging from US$5,000 to US$6,415,516. The mean annual budget of those reporting was US$651,794 (Table 2). The modal response to the question asking about annual revenue from all sources was US$5,000, however. There was also significant variation in human resources available among the responding organisations. For example, while the average number of staff was 18, it ranged from zero to 979. Responding organisations included individual shelters and rescues but also those with national operations accounting for the high number of staff at one organisation.

Variation in the number of volunteers was even greater, ranging from one to 3,700 with a mean of 203. On average, the organisations had 18 volunteers for every staff member. Dog intake also differed widely among responding organisations; 306 dogs arrived annually per staff member, on average. Average annual return rates were 2% for puppies and 6% for dogs. Overall, the responding organisations had very high live release and low euthanasia rates. Indeed, the mean live release rate was over 90% for all years under analysis.

Table 1 Survey questions used for analysis.

Topic	Question	
1 Organisational traits	a Human resources (number of volunteers, number of staff)	
	b Open versus limited shelter intake	
	c Shelter type (non-profit, non-profit with municipal contract, rescue, friends of model)	
	d Ratio of annual dog intake to staff	
2 Volunteer roles and training	a Total extent of hands-on animal care allowed to volunteers (items measured on a Likert scale)	i Foster care
		ii Cat interaction, playing with cats
		iii Dog walking
		iv Dog training
		v Grooming, cleaning animals
		vi Dog behaviour testing
		vii Dog behaviour plans to address behavioural concerns
	b Total extent of support roles allowed to volunteers (items measured on a Likert scale)	i Shelter cleaning
		ii Fundraising
		iii Community events, adoption events
		iv Clinic staff functions, filing, answering phones
		v Post-operative monitoring, checking on animals post-surgery
		vi Adoption counselling, providing information to prospective adopters
		vii Adoption decisions, determining whether an adopter can have an animal
		viii Train other volunteers
		ix Euthanasia decisions
	c Total extent of volunteer training (items measured on a Likert scale)	i Orientation, general introduction to the shelter
		ii Apprentice time, supervised performance of roles
		iii Additional training for specific roles, special training for higher skill jobs
		iv Training updates
	d Total extent of staff training (items measured on a Likert scale)	i How to recognise pain
		ii Assess shelter adjustment, stress in shelter
		iii Assess signs of medical or behavioural distress
		iv How to interact with public
		v How to interact with volunteers
		vi Dog handling
		vii Dog training
3 Transfer programmes	a Have a transfer programme	
	b Number of puppies and dogs transferred out annually	
	c Number of puppies and dogs transferred in annually	
	d Days from arrival to being offered for adoption	
	e Total extent of medical processes upon transfer (items measured on a Likert scale)	i Full medical assessment
		ii Full behavioural assessment
		iii Sterilisation
		iv Vaccinations
4 Breed labels	a Labels not used for	i Any dog
		ii Mixed breed dogs
		iii Bully-mix dogs
	b Have not used labels for several years (large, moderate and minor extent agreements)	
5 Matching programmes	a Total extent of programme elements (items measured on a Likert scale)	i Formal programme
		ii Meet your match programme, use of ASPCA programme
		iii Matching conversations with adopters prior to seeing dogs
		iv Allowing adopters to see only those dogs that are a good match
		v Choice of dog limited to staff recommendations
6 Foster programme	a Percent of dogs in foster homes annually	
	b Home visits required for fosters to determine suitability	
	c Have a full-time foster co-ordinator	
	d Total extent of foster programme elements (have programme, co-ordinator, home visits, percent in foster)	

Correlation analysis

Bivariate correlations and Chi-squares (depending on the levels at which the independent variables were measured) were run between the variables measuring the nature of the shelter/rescue, programmes, and positive outcomes (Table 3). While the correlations overall are modest, there are a number of significant relationships. Five of the organisation traits showed a tendency to correlate negatively with outcomes. There were insufficient cases in some of the cells to be able to calculate a Chi-square for limited access shelters, non-profits without contracts, and for organisations with a 'friends-of' model. Tendencies ($P < 0.10$) are noted since this research is the first to explore these programmes across shelters. Missing potential relationships was deemed more serious than a Type 1 error for this reason. Non-profit organisations with municipal contracts, those with more staff and volunteers, with higher intake to staff ratios, and that use volunteers for animal care to a greater extent, all have lower live release and non-return rates. On the other hand, organisations that are rescues, keep dogs off the adoption floor for longer periods of times after transfer, do not use breed labels for mixed breed dogs, and have more robust matching and foster programmes have significantly better outcomes. Higher numbers of dogs transferred out are significantly and negatively correlated with desired outcomes.

Shelter traits and positive outcomes

The first regression explores the relationship between those traits of the shelter or rescue that were significantly correlated with live release and return rates in bivariate analysis to assess the overall explanatory power of shelter/rescue traits. To this end the following equation was tested:

$$y = a + bx1 + bx2 + bx3 + bx4 + e$$

Where y = positive outcomes; $bx1$ = human resources; $bx2$ = non-profit with municipal contract; $bx3$ = intake/staff ratio; $bx4$ = rescue.

Table 4 presents the results of this regression. Overall, the explanatory power of organisational traits is quite weak, accounting for only 6% of the variation in outcomes. Two variables are significantly correlated with more positive outcomes, having a lower intake to staff ratio, and having fewer volunteers and staff. This latter finding is counterintuitive and will be considered more fully in the *Discussion*.

Shelter programmes and positive outcomes

In the following equation, programmes and policies are regressed on positive outcomes. Again, the model includes only those variables correlated with outcomes either significantly or at the $P < 0.10$ level in bivariate analysis.

$$y = a + bx1 + bx2 + bx3 + bx4 + bx5 + e$$

Where y = positive outcomes; $bx1$ = days from intake to adoptable; $bx2$ = no breed labels for mixed dogs; $bx3$ = foster programme; $bx4$ = adult dogs transferred out; $bx5$ = matching programme.

Shelter/rescue programmes do a slightly better job of accounting for variation in positive outcomes with an adjusted R^2 of 0.16 (Table 5). Longer time-periods from

Table 2   Organisational resources: Budget, human resources, intake to staff ratio.

	Replies (n) out of 370	Min–Max	Mean (± SD)
Budget	63	US$5,000–6,415,516	US$ 651,794 (± 1,206,627)
Total employees	270	0–979	19 (± 68.42)
Total volunteers	300	1–3,700	203 (± 425.22)
Volunteer to staff ratio	166	0.33–300	18 (± 32.21)
Intake to staff ratio	166	0–7,514	306 (± 623.59)

Table 3   Chi-squared tests and bivariate correlations between organisation traits, programmes and outcomes.

	Positive outcomes
	Chi-squares
Traits of the Organisation	
Open admission	1.66 (less positive outcomes)
Non-profit with contract	4.90[†] (less positive outcomes)
General shelter	4.95 (less positive outcomes)
Breed-specific shelter	0.10 (less positive outcomes)
Rescue	5.98[†] (more positive outcomes)
	Pearson correlations
Human resources	–0.28**
Intake to staff ratio	–0.18*
Hands-on volunteer roles	–0.11[†]
Support volunteer roles	0.05
Total volunteer training	0.00
Total staff training	–0.11
Programmes/policies	
Have a transfer programme	–0.01
#Puppies transferred out	–0.01
#Puppies transferred in	–0.07
#Dogs transferred out	–0.14*
#Dogs transferred in	0.08
Days from arrival to adoption floor	0.26**
Total medical processes	–0.02
No labels for any dog	–0.03
No labels for mixed breed dogs	0.12[†]
No labels for bully-mix dogs	0.00
Have not used labels for some time	0.08
Matching programme elements	0.18**
Foster programme elements	0.33**

** $P < 0.01$; * $P < 0.05$; [†] tendency at $P < 0.10$.

Table 4   Estimated parameters and associated statistics from the linear regression of organisation traits on positive outcomes.

Variable	b (slope)	Standard error	β***	t-statistic*	P-values	VIF**
Human resources	–0.33	0.14	–0.21	–2.36	0.02	1.01
Non-profit with contract	–0.02	0.16	–0.01	–0.13	0.89	1.10
Intake to staff ratio	–0.03	0.01	–0.21	–2.45	0.02	1.02
Rescue	0.26	0.20	0.11	1.28	0.20	1.11
Constant (a)	–0.11	0.11		–1.05	0.30	
Adjusted R^2 = 0.16						

* Slope divided by standard error; ** Variation Inflation Factor; *** β standardised regression coefficients (with variances equal to 1).

Table 5   Estimated parameters and associated statistics from the linear regression of programmes/policies on positive outcomes.

Variable	b (slope)	Standard error	β***	t-statistic*	P-values	VIF**
Days from arrival to adoption floor	0.01	0.01	0.17	2.13	0.04	1.19
No breed labels for mixed dogs	0.06	0.07	0.07	0.91	0.36	1.05
Foster programme elements	0.36	0.10	0.31	3.79	0.00	1.27
Number of adult dogs transferred out	0.00	0.00	–0.04	–0.47	0.64	1.05
Matching programme elements	0.00	0.03	0.01	0.16	0.87	1.16
Hands-on volunteer roles	–0.02	0.02	–0.07	–0.88	0.38	1.04
Constant (a)	–0.01	0.52		–0.01	0.99	
Adjusted R^2 = 0.16						

* Slope divided by standard error; ** Variation Inflation Factor; *** β standardised regression coefficients (with variances equal to 1).

arriving in the shelter to being made adoptable are significantly and positively related to better outcomes. Foster programmes are also associated with better outcomes.

Best fitting model

Finally, a best-fitting model was derived by including those organisational *and* programme variables that were more strongly associated with positive outcomes in correlation analysis and that resulted in the model with the highest explanatory power.

$$y = a + bx1 + bx2 + bx3 + bx4 + e$$

Where y = positive outcomes; $bx1$ = human resources; $bx2$ = no breed labels for mixed dogs; $bx3$ = matching programme; $bx4$ = foster programme.

This model accounts for 16% of the variation in positive outcomes (Table 6). Again, foster programmes are positively and significantly related to better outcomes while greater human resources, in terms of staff and volunteer numbers, are associated with poorer outcomes. Using a matching programme and eschewing the use of breed labels for mixed breed dogs showed a tendency to be associated with better outcomes.

Discussion

Overall, it appears that programmes are more strongly associated with positive outcomes in terms of higher live release and lower return rates than traits of the shelter or rescue. Only the total number of volunteers and staff was significantly correlated with outcomes, negatively. There are several possible explanations for this. First, there is a constellation of shelter/rescue traits that tend to go together. Organisations with municipal contracts typically must accept all animals from the geographic area covered by the contact. As a result, these shelters have higher intakes and likely must employ more staff. These relationships are evidenced by the results of a factor analysis showing intake, staffing, and municipal contracts to be part of a single concept. Thus, it is possible that the relationship between human resources and poorer outcomes is an artifact of the higher volumes of animals at open intake municipal shelters and non-profit shelters with municipal contracts necessitating more staff and volunteers. Second, there is a significant and negative correlation between human resources and foster programmes (Pearson correlation = –0.38; sig = 0.00). Organisations with more staff and volunteers may have more

Table 6   Estimated parameters and associated statistics from the best fitting linear regression model for positive outcomes.

Variable	b (slope)	Standard error	β***	t-statistic*	P-values	VIF**
Human resources	−0.39	0.16	−0.21	−2.48	0.01	1.20
No breed labels for mixed dogs	0.11	0.07	0.13	1.65	0.10	1.02
Matching programme elements	0.04	0.02	0.12	1.52	0.13	1.07
Foster programme elements	0.21	0.09	0.20	2.39	0.02	1.24
Constant (a)	−0.58	0.29		−1.98	0.05	
Adjusted R^2 = 0.16						

* Slope divided by standard error; ** Variation Inflation Factor; *** β standardised regression coefficients (with variances equal to 1).

capacity for animal care in the shelter and thus not perceive foster programmes as being as critical. However, given the association between fostering and positive outcomes this may ultimately represent a missed opportunity to boost live release rates and may be related to the negative relationship between human resources and desired outcomes.

Programmes and policies appear to make an important contribution to live release rates independent of staffing levels. Indeed, human resources are not significantly correlated with matching and transfer programmes or the removal of breed labels. Thus, not using breed labels for dogs not appearing pure-bred, having a robust foster programme, and using a matching programme are correlated with higher live release and lower return rates. Greater human resources lead directly to poorer outcomes, but they also appear to be related to less use of foster programmes thus missing the benefits of higher live release and lower returns rates that they bring. Human resources are not correlated with foster or matching programmes which are directly related to more positive outcomes.

It is interesting to note which variables were not significantly related to more positive outcomes. While previous research (Reese 2018) has suggested that using volunteers for hands-on animal care can boost live release rates as can training for staff and volunteers, these variables were not significantly correlated with positive outcomes among the survey respondents. This could be the case for several reasons. First, it is possible that finer distinctions among the volunteer activities as opposed to hands-on versus support roles may have revealed significant correlations. Second, the larger number of non-profit rescues among the survey respondents may have limited the amount of variation in volunteer roles. For example, foster-based rescues would have more limited volunteer options. From these findings it should not be concluded that the human elements of animal sheltering are unimportant in promoting positive outcomes. Programmes such as fostering and matching inherently involve the human/canine connection. While at a minimum, foster programmes allow shelters and rescues to expand their capacity, they also contribute to socialisation with humans, allow for assessment of what types of home the dogs might best fit, reduce stress for both humans and animals, and can prepare a dog for a stronger

human/animal bond upon adoption (Brooks *et al* 2018; Oliva & Johnston 2020). Matching programmes involve careful conversations between shelter staff and potential adopters to assist in identifying dogs that are a good fit with the adoptive home and to provide information on strategies to make the adjustment more successful.

In conclusion, programmes are more strongly associated with positive outcomes in terms of higher live release and lower return rates than traits of the shelter or rescue. Specifically, eschewing breed labels for dogs not appearing pure-bred, having a robust foster programme, and using a matching programme are associated with higher live release and lower return rates.

Animal welfare implications

Eschewing the use of breed labels for all dogs that do not appear to be pure-bred, having a robust foster programme, and using a matching programme are associated with higher live release and lower return rates. These programmes appear more important to positive outcomes than traits of shelters/rescues. In short, resources are not wholly determinative of success — it is the programmes shelters and rescues implement, not their human and financial resources, that appear to lead to better outcomes for the dogs in their care. And, although it did not maintain significance in the best fitting multiple regression model, keeping dogs off the adoption floor for a longer period of time after arrival also appears related to positive outcomes. Longer isolation times and days between intake and being made available for adoption are also associated with positive outcomes. This is likely the case because they ensure that any medical concerns are identified and addressed and allow staff and volunteers to get a better sense of the dogs' personality and needs allowing for better matching to adopters.

The programmes examined here are not mutually exclusive, shelters and rescues can and should be employing all of them. Removing breed labels may be the most cost-effective way to reap positive outcomes since it requires no resources — human or financial — to implement. Transfer programmes are relatively inexpensive as well. Personnel are required to seek and vet rescue partners, process the transfer paperwork, and create and maintain a system to

make partners aware of animals needing transfer. These activities could be done by volunteers, however. Matching programmes also require staff or volunteer time to conduct the conversations necessary to achieve the best fit between dog and adopter. In the long run, this time may well be counter-balanced by lower returns which also require staff time to process (Reese 2020). Finally, foster care programmes are perhaps the most labour intensive in that they require the recruitment and training of foster parents, home checks, identification of animals needing foster, matching of those animals to available foster homes, and supervision and support of foster parents. Because one of the elements in the foster programme index employed here is the presence of a foster co-ordinator it is likely that such a commitment of resources is necessary for optimal functioning of the programme. However, it is important to note that human resources were not significantly correlated with matching and transfer programmes and negatively correlated with foster programmes. Thus, shelters and rescues appear to be able to engage in these important programmes regardless of resource constraints.

None of the regression models account for a significant amount of variation in positive outcomes. Clearly there are other attributes of shelters and rescues that are related to positive outcomes but were not measured by the survey. Previous research has found that leadership within shelters is critical in fostering higher live release rates and also in creating greater satisfaction and retention among staff and volunteers (Reese 2018). Willingness to learn new practices and innovate are critically important to outcomes but were not captured in the survey. Positive outcomes for dogs are also impacted by the larger community and the interaction between the shelter/rescue and the environment. For example, active spay/neuter, humane education, and shelter diversion programmes can reduce intake and ease pressure on shelter resources ultimately contributing to community-wide animal welfare (Kass *et al* 2013; White *et al* 2010).

Limitations

This study has several limitations. Because the population consisted of organisations that had applied for grants from the PEDIGREE Foundation, findings from them may not be generalisable to other shelters/rescues. The respondents to the survey tended to have higher save rates and lower return rates than have been found in other studies that included both municipal and non-profit shelters (New *et al* 2000; Reese 2018; American Humane Association 2020). Given the high live release rates, it may be that more effective organisations were aware of and interested in applying for grants. There was a very high representation of breed-specific rescues among the respondents which may also skew the results. And, as noted earlier, PEDIGREE funding is not available for municipal shelters which can create selection bias. Because the survey focused only on dogs, the findings may not be applicable to cats. As in all surveys, respondents may not have accurately reported the use of programme elements or may have inflated their outcome measures in an effort to get a grant. Because forced choice

as opposed to open-ended, questions were employed, there could be variations in how the programme elements are applied that may be important but were not picked up on the survey. Future research, perhaps using site visits and face-to-face interviews, could delve into these issues more deeply. While the respondents are drawn from across the United States, it is possible that they may not be representative of shelters/rescues in other national contexts. Finally, because of the cross-sectional nature of the data, it is not possible to establish causal relationships.

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