Biologia Futura

https://akademiai.com/loi/019

Shelter-housed versus re-homed dogs: Adjustment, behavior, and adoption outcomes

Nitzan Reem

Companion Animal Behavior Analysis and Counseling, American College of Applied Science, Crescent City, FL, USA

DOI: 10.1556/019.70.2019.19

Introduction: The study aimed to determine whether re-homing dogs decreased the expression of unwanted behaviors and thereby increasing adoption success. The study looked at adoptions' outcome regarding house training, prevalence of behaviors indicative of separation anxiety, and the dogs' adjustment to their new homes. *Methods:* Owners of 27 dogs that were adopted directly from their previous family into a new home and owners of 25 dogs adopted from a shelter completed a questionnaire through a telephone interview. Owners were asked to report the dog's behavior as they recalled it, about a week from adoption and at the time of the interview. *Results:* A significant difference between the two groups was apparent only in the house-training parameter during the interview. No significant differences were found between the two groups in the prevalence of behaviors associated with separation anxiety. Re-homed dogs seemed less likely to exhibit behaviors indicative of separation anxiety and at a lower frequency level, but these differences were not significant. A dog's behavior did not necessarily predict the owner's perception of the dog's adjustment to its new home. Receiving information about the dog, being an experienced owner, and counseling with professional help, did not affect the owners' rating of their dogs' adjustment as well. *Discussion:* The difference between the two groups in the house-training parameter during the interview was expected, since the re-homed group had lived in homes with people and the shelter group had lived in a shelter prior to adoption. The causation and manifestation of separation anxiety are complex and could be affected by many variables, such as age, gender, the dog's history, owner's behavior, environment, owner's lifestyle, the dog–owner relationship, and advice during adoption. This complexity might account for the lack of differences between the two groups. Perhaps, the best explanation for the results regarding adjustment to the new home variable is that this factor is subjective and is associated with owner expectation and perception of the ideal dog versus the actual behavior of the dog.

Original Article

Cite this article: Reem N. 2019. Shelter-housed versus re-homed dogs: Adjustment, behavior, and adoption outcomes. *Biol. Fut. 70*, 149–155.

Received: 22 September 2018
Accepted: 4 March 2019

Keywords:
dog, shelter, re-homing, adoption, separation anxiety, house training

Author for correspondence:
Nitzan Reem
e-mail: nitzan.reem@gmail.com

Electronic supplementary material is available online at www.akademiai.com/doi/suppl/10.1556/019.70.2019.19.

INTRODUCTION

The fate of a pet dog is determined by its owner; the fate of dogs (*Canis familaris*) as a species is decided by society.

Millions of dogs are relinquished around the world every year; most of them are brought to local shelters (Bollen & Horowitz, 2008). Gathering dogs in shelters and subsequently euthanizing many of them are a welfare concern. Shelter overcrowding leads to euthanasia of animals that are admitted to a shelter as healthy and adoptable dogs, but subsequently become ill (Protopopova, 2016) or develop behavior problems while staying in the shelter. A number of studies suggest that dogs acquired from rescue shelters have a greater likelihood of exhibiting behavior problems than do dogs obtained from private breeders or other sources (Salman et al., 2000; Wells & Hepper, 2000).

While re-homing is not an option for every abandoned dog, it may nevertheless help reduce the number of dogs ending up in shelters, thus maintaining the dog in a potentially less stressful environment.

The Israeli SOS Animal Organization provides an alternative to the current shelter system by employing a method of re-homing dogs instead of collecting them at a shelter. Pet owners wishing to relinquish their dog are suggested to keep them at their own homes until a new home is found for their pet. People are invited to bring their dogs to well-advertised adoption days, which take place every weekend. They leave their dog with the volunteers, who try to find the dog a new home. If not adopted, the owners simply collect their dog at the end of the adoption day.

Due to the popularity of the adoption day program, volunteers from other local animal shelters also bring their shelter dogs (SHs) to the adoption days in order to find new homes for them. This situation provides a unique opportunity to examine the behavior and adjustment of dogs adopted from the same venue but housed in two different living conditions – namely, dogs living in a family home, with a relatively stable environment and a high level of human contact, and dogs living in a shelter, which can be a stressful environment with limited human contact.

The study aimed to determine whether the re-homing method could improve adjustment to the new home. The study also examined whether re-homed dogs (RHs) differ from SH in their rate of expression of a variety of behavior problems; namely, house-soiling and behavior that is potentially indicative of separation anxiety.

Inappropriate elimination is common in SH (Lord et al., 2008). In many shelters, dogs are confined to kennels with limited or no access to an outdoor area. In many instances, walks may be limited due to the lack of staff or availability of volunteers. Therefore, SHs learn to eliminate in their living area, something they ordinarily would not do.

Separation anxiety may also arise as a consequence of time spent in a shelter. The loss of the social bond with the caregiver followed by limited access to human social contact in a shelter can cause dogs to display excessive attachment to humans (Gácsi et al., 2001; Schwartz, 2003).

It is hypothesized that shelter-housed dogs will exhibit more behaviors indicative of separation anxiety and will be less house-trained than RHs after adoption. It is also predicted that dogs adopted through re-homing will adjust faster to their new home. These predictions are based on the findings, which show that by improving the quantity and quality of information about a dog up for adoption leads to better matching of that dog with a new family (Neidhart & Boyd, 2002). Furthermore, the new family is better equipped to deal with the dog's needs (Marder & Duxbury, 2008; Marder et al., 2005). The study expected that not only more information would be available for the RHs but also that it would be more accurate. It could also be suggested that the higher level of socialization with humans that dogs' experience when maintained in their original homes may increase their ability to better adjust to a new home (Pongrácz et al., 2005). The innate characteristics of a dog, such as responding to social human communication cues, are influenced by lifetime experiences (Udell et al., 2010). Therefore, it is hypothesized that staying in a familiar environment with familiar people eliminates the negative experiences that could be caused by a stressful shelter environment.

The null hypothesis is that no differences emerge between shelter and RHs in terms of adoption success and/or in frequency of behavior problems, possibly due to owners' failure to report behavior problems as the reason for seeking a new home for their pet. Another possibility is that the effect of the general advice about dog care commonly given to new owners at the time of adoption may diminish the initial differences caused by the different methods of adoption.

MATERIALS AND METHODS

The study comprised 52 owners who adopted a dog at the Israeli SOS Animal Organization adoption day events, which took place in Tel-Aviv and Hertzelia, from January 1 to October 30, 2010. The sample included a total of 25 SHs and 27 RHs that had remained with their new owners.

The two groups of dogs and their new owners were compared. The RH group consisted of dogs whose owners wished to find a new home for them, but stayed with their original families until new families adopted them. The reason for giving up the RHs was usually known at the time of adoption but was not available for the study. The SH group consisted of strays and relinquished dogs that lived in an animal shelter until they were adopted. Information on the origin of the dog and the length of stay at the shelter was not available. Dogs from both groups were of mix-breed. They varied in age ($M = 1$ year, $SD = 1.4$) and sex (SH males = 12, females = 13; RH males = 10, females = 17). The families who adopted them were similarly varied in their experience and living environment.

The SOS Animal Organization organizes adoption days that take place every weekend. All dogs are brought to the designated adoption site in the morning and returned to their homes or shelters at the end of the day if they are not adopted. The same adoption procedure is applied to both SHs and RHs, with trained volunteers interviewing potential adopting families.

The environment in which the dogs lived prior to their adoption determined each group. The RH group consisted of those dogs that remained in their original homes and so did not go through a change in environment or routine, remaining under the care of the same person. Dogs in the SH group were those that had moved to the unfamiliar environment of an animal shelter, which is potentially different from the home environment.

Procedure

Participant dog owners were recruited via a telephone call and were asked approximately 30 questions in a fixed order using a structured interview questionnaire (see "Supplementary Material"). Sixty-one owners were contacted (SH = 28; RH = 33). One owner adopted two SHs. Two shelter and six RHs were returned (behavior: SH = 1; RH = 2, allergy: SH = 1, other: RH = 4). Two people declined to participate in the study.

A full year was chosen in order to obtain a sufficient sample size. The phone interview was conducted within 2 and 11 months post-adoption. The time that elapsed between the adoption and interview did not seem to affect the results. A shorter time did not necessarily predict that the dog was not house-trained and there was no significant correlation between time elapsed from adoption to interview and the total separation anxiety score of the dogs [SH $r(40)$, $p = .65$; RH $r(52)$, $p = .24$].

Owners were asked to report the dog's behavior as they recalled it, about a week from adoption and at the time of the interview.

The study looked at two common behavior problems: house-soiling and behaviors indicative of separation anxiety. The questionnaire aimed to focus on behaviors that were possibly indicative of separation anxiety but was designed so in order to minimize interpretation of the dog's behavior by its new owner. Questions about their dog's behavior were specific; for example, owners were not asked whether their dogs exhibited anxiety when they were left alone, but rather, they were asked specific questions regarding the dog's behavior (e.g., Does your dog whine when left alone?).

All questions were designed as yes/no questions or Likert-type scale questions (e.g., "Is your dog house-trained now? Yes/No;" "Does your dog vocalize when she is left alone? Never, seldom, sometimes, usually; and always"). Using these types of questions yielded quantitative data that could be statistically analyzed (Hsu & Serpell, 2003).

The Canine Behavioral Assessment and Research Questionnaire (C-BARQ) is considered a reliable tool for screening dogs for the presence and severity of behavioral problems (Hsu & Serpell, 2003) and has been used successfully in other studies (e.g., Duffy et al., 2008; Van den Berg et al., 2010; Van Rooy et al., 2018a). Six questions concerning separation anxiety were based on the C-BARQ questionnaire and modified for this study. Questions concerning house-soiling were designed specifically for this study.

The study's structured interview included items concerning the dog's behavior, adjustment to its new home, the environment, and accuracy of the information given at the time of adoption.

General questions were asked in an attempt to detect any variables that might have affected the results, such as the number of people in the household, an additional dog or a cat, the owner's experience with dogs, counseling with a canine professional, and whether the dog lived in an apartment or a house. These factors were balanced between the two groups (Fig. 1), allowing for a valid comparison.

The first part of the interview focused on house training. Owners were asked whether their dog was house-trained when adopted and whether it was house-trained at the time of the interview. Additional questions provided information about the living conditions of the dog, in order to exclude from the data dogs that were not house-trained due to non-behavioral reasons (e.g., how many times daily the dog was walked). Dogs less than 5 months old and dogs that lived exclusively outside were not included in the analysis of these data. A comparison between the two groups in the number of house-trained dogs (1-week post adoption and at the time of interview) was made using a χ^2 test with a criterion alpha level of .05.

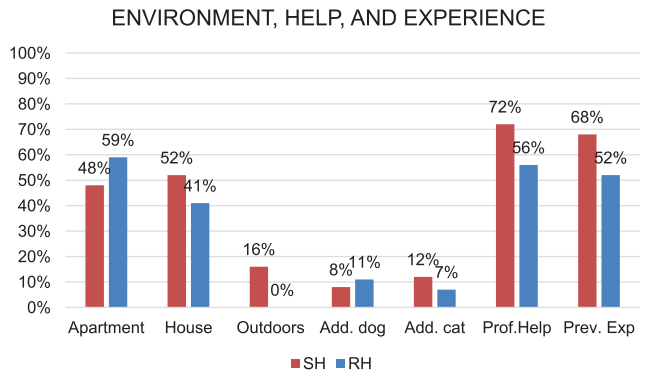

Fig. 1. Percentage of dogs (RH = blue, SH = red) living in an apartment, in a house, outdoor dogs; living with additional dog, and with additional cat. Percentage of owners (RH = blue, SH = red) that used canine professional help, and owners that have previous experience with dogs

Six questions focused on behaviors indicative of separation anxiety. The owners were asked whether the dog exhibited specific behavior commonly associated with separation anxiety and if so how often did this behavior occurred. Such behaviors included shaking, shivering, or trembling; excessive salivation; restlessness, agitation, or pacing; whining; barking; howling; and chewing or scratching at doors, floor, windows, all of which have been shown to occur at varying degrees in dogs with separation anxiety (Landsberg et al., 2003; Overall, 1997). The number of times such behaviors is exhibited and their intensity may vary with the severity of separation anxiety (Overall, 1997; Palestrini et al., 2010; Schwartz, 2003).

Each item of the six behavioral patterns used to assess separation anxiety was scored using the Likert scale, where a response that indicated greater anxiety was given a higher score. The scores for each item were summed for each dog, providing a total separation anxiety score for each dog. Separation anxiety scores for the two groups (RH and SH) were compared using the Student's *t*-test for independent groups, with a criterion alpha level of .05.

Since anxiety in dogs with separation anxiety typically starts when the owner prepares to leave (Landsberg et al., 2003; Overall, 1997), the behavior of the dog prior to the owner's departure was included in order to eliminate the possibility that the reported behavior was not due to problems other than separation anxiety, such as boredom or lack of exercise.

Dogs living with a single person may be at a higher risk of experiencing separation anxiety (Flannigan & Dodman, 2001; Storengen et al., 2014). The total score for separation anxiety of dogs living with one person was spread (2 dogs = 0; 1 dog = 4; 1 dog = 10), all from the RH group. Moreover, a moderate positive correlation was found between the number of people in the household and the total separation anxiety score in the SH group [$r(40) = .41$, $p = .006$] and no significant correlation was found between the number of people in the household and the total separation anxiety score in the RH group [$r(52) = .16$, $p = .24$]. Therefore, the number of people in the household was ruled out as a variable that might have affected the results.

Another section of the questionnaire addressed the accuracy of the information (if any) received at the time of adoption. Owners were asked whether they received information about the dog's background, its characteristics (e.g., energy level, accustomed to living with children), and habits (e.g., used to sleeping in the owner's bed, play preferences). They were asked to rate the accuracy of the information that they may have received.

Owners were further asked to rate the dog's adjustment to its new home: right from the beginning; after 1–2 weeks; still working on it. The two groups (RH and SH) were compared using the Student's *t*-test for independent groups, with a criterion alpha level of .05. Although the answer to

this question is subjective, the owner's subjective opinion can ultimately determine the fate of the dog.

RESULTS

House training

Only dogs aged 5 months and older were included in the analysis of house training (SH = 13, RH = 17). It appeared that RHs were more likely to be house-trained within the first week of adoption than SHs (38.46% of SH, $n = 5$; 70.59% of RH, $n = 12$). This result came close to but did not reach statistical significance using a χ^2 at the level of 0.05 [$\chi^2(1, N = 17) = 3.10$, $p = .2$]. The difference between the two groups was significant [$\chi^2(1, N = 26) = 6.04$, $p = .04$] at the time of the interview: the majority of SHs (69.23% of SH, $n = 9$) were fully house-trained; all RHs ($n = 17$) were fully house-trained. Since two owners of RH group could not provide a definitive answer, they were excluded from this part of the study.

Separation anxiety

Dogs whose owners provided answers for all six behavioral parameters were included in the total score analysis (SH = 21; RH = 27). Only eight dogs (16%) did not exhibit any of the behavioral parameters indicative of separation anxiety: six in the RH group (22%) and two in the SH group (9.5%). There was no significant difference between the two groups in the total score [*t*-test for independent means $t(46) = 1.06$, $p = .2$].

Looking at each of the separation anxiety parameters, excessive salivation was not reported in dogs from either group and three owners (less than 1%) reported that their dogs exhibited shivering and trembling before leaving (SH = 2, seldom = 1, always = 1; RH = 1, sometimes).

There was no significant difference between the groups in the restlessness, agitation, and pacing parameter [*t*-test for independent means $t(47) = 0.62$, $p = .53$]. Seventeen dogs did not exhibit restlessness, agitation, or pacing (31.82% SH, $n = 7$; RH 37.04%, $n = 10$). Three SH dogs exhibited these behavior parameters sometimes (14%), four dogs usually (18%), and eight dogs always (36%). Two RH dogs seldom exhibited these behavior parameters (7%), two dogs sometimes (7%), five dogs usually (19%), and eight dogs always (30%).

Sixteen owners of SH dogs (67%) and 17 owners of RH dogs (63%) reported that their dogs never whined. The SH dogs were equally divided, with two dogs falling in each of the frequencies: seldom, sometimes, usually, and always (8% in each frequency). In the RH group, four dogs seldom whined (15%), four dogs sometimes whined (15%), and two dogs usually whined (7%). The two groups did not significantly differ in the whining parameter [*t*-test for independent means $t(49) = 0$, $p = .61$].

No significant difference was found between SH and RH dogs in the barking parameter [*t*-test for independent means $t(49) = 0.42$, $p = .72$]. Seventy-five percent of SH dogs ($n = 18$) and 70% ($n = 19$) of RH dogs did not bark. Regarding the barking parameter, three SH dog owners reported seldom (13%), two owners reported sometimes (8%), and one owner reported always (4%). In the RH group, three owners reported seldom (11%), three owners reported sometimes (11%), and two owners reported usually barking (7%).

Chewing and scratching were not frequently observed in either the shelter or RHs. No chewing and scratching was reported in 65% of the SHs ($n = 15$) and 74% of the RHs ($n = 20$). The frequency of this behavior was reported as follows: three SH owners indicated seldom (13%), one indicated sometimes (4%), one indicated usually (4%), and three indicated always (13%); whereas one RH owner indicated seldom (4%), five indicated sometimes (19%), and one indicated usually (4%). No significant difference was found between the SH and RH groups [*t*-test for independent means $t(48) = 1.03$, $p = .3$].

Information

The majority of owners reported that they received information on the dog during adoption (60% of the SH, $n = 15$; 89% of the RH = 24). Of these owners most reported that the information provided was highly accurate (47% of the SH, $n = 7$; 42% of the RH, $n = 10$) or somewhat accurate (33% of the SH, $n = 5$; 29% of the RH, $n = 7$). Seven owners reported that the information was inaccurate (20% of the SH, $n = 3$; 17% of the RH, $n = 4$). Three RH owners did not rate the information. There was no significant difference between the two groups in terms of information accuracy [*t*-test for independent means $t(14) = -0.07$, $p = .9$].

Dogs' adjustment to new home

The majority of owners in both groups reported that the dog adjusted to their homes right from the beginning (60% of the SH, $n = 15$; 56% of the RH, $n = 15$). Twenty-eight percent of SH owners ($n = 7$) and 37% of RH owners ($n = 10$) reported that their dogs adjusted within 1–2 weeks. Five owners reported that they are still working on it (12% of the SH, $n = 3$; 7% of the RH, $n = 2$). No significant difference was found between the two groups [*t*-test for independent means $t(50) = 0.01$, $p = .99$].

When strictly focusing on owners who had received information on the dog at the time of adoption (60% of SH, $n = 15$; 88.9% of RH, $n = 24$), regardless of the accuracy of the information, no significant differences were found between the two groups in terms of adjustment to their new home [*t*-test for independent means $t(37) = -0.88$, $p = .38$]. No significant difference was found between owners who did and did not receive information regarding the adjustment rating within the SH group [*t*-test for independent means $t(23) = -1.22$, $p = .2$]. No comparison could be made for the RH group since only three owners reported that they did not receive information about the dog.

A moderate positive correlation was found between the owners' rating of information accuracy and the rating of the dogs' adjustment [$r(28) = .40$, $p = .02$] in the SH group. However, no significant correlation was found between the owners' rating of information accuracy and the rating of the dogs' adjustment [$r(40) = -.04$, $p = .86$] in the RH group.

No significant difference was found in the adjustment rating between the two groups when looking at owners who received professional help of any kind [*t*-test for independent means $t(31) = 0.08$, $p = .92$]. No significant difference emerged between the rating of adjustment between owners who did and did not used professional help in both the SH group and the RH group [*t*-test for independent means $t(23) = 1.32$, $p = .4$; $t(25) = 0.68$, $p = .6$].

DISCUSSION

Dogs from both groups appeared to be similarly distributed among different housing types (apartment vs. house) and among similar social environments (presence of another dog and number of people in the household). It was assumed that such similarities limit the effect of the environment that is known to influence a dog's behavior (e.g., number of people; Flannigan & Dodman, 2001).

Overall, more RH dogs were house-trained and in line with the study hypothesis, the two groups differed significantly in the degree of house training at the time of the interview. This was expected, however, since dogs from the RH group had lived in homes prior to adoption. On the other hand, dogs from the SH group were not regularly walked due to a lack of volunteers. Furthermore, some of the SH dogs might be strays that were not owned previously at all – therefore they did not have a priori house training either. These results concurred with other studies, which indeed showed that house training is one of the behavior problems among dogs adopted from shelters (Lord et al., 2008; Scott et al., 2018).

The relationship of dogs with humans and the amount of socialization they experience have a strong effect on their cognitive performance (Pongrácz et al., 2005; Schoon & Berntsen, 2011), which is even more pronounced during the sensitive period of development. All RH dogs between 5 and 12 months of age were successfully house-trained at the time of the interview, while 44% of SH dogs were not. It could be that learning was easier for the RH dogs since they lived in a home with people prior to adoption.

Living accommodation was ruled out as a factor since three out of four of the SH dogs (5 months and older) that were not house-trained at the time of the interview, lived in a house with access to a yard.

Contrary to expectations, no significant differences were found between the two groups in the prevalence of behaviors associated with separation anxiety. While RHs seemed less likely to exhibit such behaviors and at a lower frequency level, these differences in total separation anxiety scores were not significant.

Both the causation and manifestation of separation anxiety are complex and could be affected by many variables, such as age (Van Rooy et al., 2018b) and gender (Storengen et al., 2014), the dog's history, owner's behavior

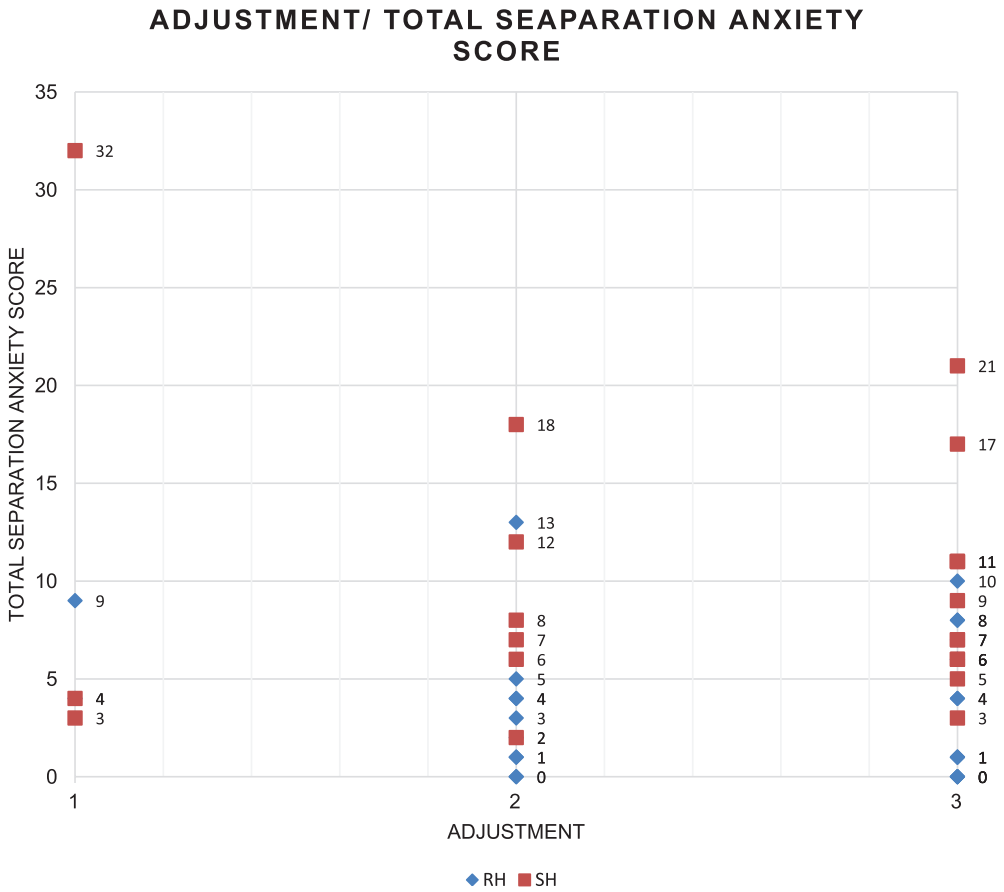

Fig. 2. Owners rating of their dogs' adjustment the new home (3 = from the beginning, 2 = after one to two weeks, 1 = still working on it; RH = blue, SH = red) in relation to the dogs' total separation anxiety score

(Elliott et al., 2010), environment, owner's lifestyle, and the dog/owner relationship (Appleby & Pluijmakers, 2003; Lenkei et al., 2018). This complexity might account for the lack of differences between the two groups.

Advice during adoption can reduce the occurrence of separation-related behavior problems (Blackwell et al., 2016), and systematic desensitization can help dogs with separation anxiety (Butler et al., 2011). Possibly, the present results can be explained by the advice commonly given to owners to gradually leave their dog alone.

More than half of the owners reported that their dogs adjusted right from the beginning. However, contrary to the study hypothesis, no significant difference was found in the overall adjustment of the adopted dogs between the two groups. Perhaps, the best explanation for the results regarding adjustment to the new home variable is that this factor is subjective. Attachment to a dog is associated with owner expectation and perception of the ideal dog versus the actual behavior of the dog (Serpell, 1996), which could also explain why the total score of separation anxiety did not predict the rating of adjustment to the new home (Fig. 2). This is in agreement with other post-adoption studies (Gates et al., 2018; Mornement et al., 2015).

Access to information also had no effect on the adjustment rating. Possibly the common practice of giving general advice about dog care may have compensated for the lack of specific information. This is supported by the findings of Diesel et al. (2008) who report that owners who received general advice from the shelter staff at the time of adoption were less likely to return the dog. Owners indeed tend to follow counseling recommendations (Herron et al., 2014), at least to some degree.

Past research suggests that owner involvement in training is negatively correlated with behavior problems (Bennett & Rohlf, 2007; Diesel et al., 2008). However, this was not demonstrated in a study that looked at the relationship between obedience training and the occurrence of separation anxiety in rescued greyhound dogs (Elliott et al., 2010). Moreover, dogs' behavioral problems seem to decrease over time regardless of the use of professional help or owners' previous experience (Vitulová et al., 2018).

In this study, owners' ratings of their dogs' adjustment to their new homes did not seem to be affected by whether they had sought professional help or had previous experience with dogs. This result agrees with previous studies suggesting that past ownership of a dog does not necessarily lead to more successful adoptions (Shore, 2005) due to the owner's expectations (Stafford et al., 2003) and intolerance of the new dog's behavior (Mondelli et al., 2004).

CONCLUSIONS

This study attempted to look at an existing alternative to the shelter system – the re-homing method – and found some advantages: more RHs were successfully house-trained after a given period following the adoption. In addition, RHs seemed less likely to exhibit behaviors indicative of separation anxiety, which, if it appeared at all, was at a lower frequency level. However, contrary to the study hypothesis, differences in total separation anxiety scores were not significant between the RHs and the ones coming directly from a shelter to their new owners. Nevertheless, these results provide hope for the successful adoption of SHs, since no significant differences were found between the groups regarding owners' overall adjustment rating of their adopted dogs.

However, the results of this study should be viewed with caution, since only owners who still kept their dogs participated in the survey. Other limitations were the less number of participants and the lack of information regarding the dog's background and the time spent in the shelter, as well as the reasons for relinquishing the dogs. Thus, an extensive more in-depth study is recommended that will include the dog's history prior to re-homing or entering the shelter, and a more detailed questionnaire with additional variables, such as the dog's characteristics, owner's personality, lifestyle, and activities.

Acknowledgments: The author would like to thank the SOS Animal Organization and the owners for participating in the study and The American College of Applied Science, Dr. Marine Cassoret, and Dr. Morgan for providing helpful comments. The author would also like to thank Odelia Bawnik for conducting the telephone survey.

Ethical Statement: Participation in the study was voluntary. The participants were contacted through phone. At the beginning, they were informed about the purpose of the study, and they could freely decide whether they would like to participate or not. Permission was granted by the SOS Animal Organization to recruit participants from their database. Information obtained in the study was maintained anonymity with a third party.

Funding Statement: There was no funding obtained for this study.

Data Accessibility: The data sets supporting this article have been uploaded as part of the Supplementary Material.

Competing Interests: The author declares no competing interests.

Author's Contributions: NR is a significant contributor and responsible for the submission of final version of the manuscript.

REFERENCES

Appleby, D., Pluijmakers, J. (2003) Separation anxiety in dogs the function of homeostasis in its development and treatment. *Vet. Clin. Small Anim. Pract. 33*, 321–344.

Bennett, P. C., Rohlf, V. I. (2007) Owner-companion dog interactions: relationships between demographic variables, potentially problematic behaviours, training engagement and shared activities. *Appl. Anim. Behav. Sci. 102*, 65–84.

Blackwell, E.J., Casey, R. A., Bradshaw, J. W. S. (2016) Efficacy of written behavioral advice for separation-related behavior

problems in dogs newly adopted from a rehoming center. *J. Vet. Behav. 12*, 13–19.

Bollen, K., Horowitz, J. (2008) Behavioural evaluation and demographic information in the assessment of aggressiveness in shelter dogs. *Appl. Anim. Behav. Sci. 112*, 120–135.

Butler, R., Sargisson, R. J., Elliffe, D. (2011) The efficacy of systematic desensitization for treating the separation-related problem behaviour of domestic dogs. *Appl. Anim. Behav. Sci. 129*, 136–145.

Diesel, G., Pfeiffer, D. U., Brodbelt, D. (2008) Factors affecting the success of rehoming dogs in the UK during 2005. *Prev. Vet. Med. 84*, 228–241.

Duffy, D. L., Hsu, Y., Serpell, J. A. (2008) Breed differences in canine aggression. *Appl. Anim. Behav. Sci. 114*, 441–460.

Elliott, R., Toribio, J. A. L. M. L., Wigney, D. (2010) The greyhound adoption program (GAP) in Australia and New Zealand: a survey of owners' experiences with their greyhounds one month after adoption. *Appl. Anim. Behav. Sci. 124*, 121–135.

Flannigan, G., Dodman, N. H. (2001) Risk factors and behaviors associated with separation anxiety in dogs. *J. Am. Vet. Med. Assoc. 219*, 460–466.

Gácsi, M., Topál, J., Miklósi, A., Dóka, A., Csányi, V. (2001) Attachment behaviour of adult dogs (*Canis familiaris*) living at rescue centers: forming new bonds. *J. Comp. Psychol. 115*, 423–431.

Gates, M. C., Zito, S., Thomas, J., Dale, A. (2018) Post-adoption problem behaviours in adolescent and adult dogs rehomed through a New Zealand animal shelter. *Animals 8*(6), 1–11.

Herron, M. E., Lord, L. K., Husseinic, S. E. (2014) Effects of preadoption counseling on the prevention of separation anxiety in newly adopted shelter dogs. *J. Vet. Behav. 9*(1), 13–21.

Hsu, Y., Serpell, J. A. (2003) Development and validation of a questionnaire for measuring behavior and temperament traits in pet dogs. *J. Am. Vet. Med. Assoc. 223*, 1293–1300.

Landsberg, G., Hunthausen, W., Ackerman, L. (2003) *Handbook of Behavior Problems of the Dog and Cat*. 2nd ed. Elsevier Saunders, Philadelphia.

Lenkei, R., Gomez, S. A., Pongrácz, P. (2018) Fear vs. frustration – possible factors behind canine separation related behaviour. *Behav. Proc. 157*, 115–124.

Lord, L. K., Reider, L., Herron, M. E., Graszak, K. (2008) Health and behavior problems in dogs and cats one week and one month after adoption from animal shelters. *J. Am. Vet. Med. Assoc. 233*(11), 1715–1722.

Marder, A., Duxbury, M. M. (2008) Obtaining a pet: realistic expectations. *Vet. Clin. North Am. 38*(5), 1145–1162.

Marder, A., VanDiel, M., Engel, J. (2005) A comparison of canine behavior in pre-adoptive and post-adoptive homes. In: Mills, D., Levine, E., Landsberg, G., Horwitz, D., Duxbury, M., Mertens, P., Meyer, K., Huntley, L. R., Reich, M., Willard, J. (eds.) *Current Issues and Research in Veterinary Behavioral Medicine*. Purdue University Press, West Lafayette, IN, pp. 262–263.

Mondelli, F., Prato Previde, E., Verga, M., Levi, D., Magistrelli, S., Valsecchi, P. (2004) The bond that never developed: adoption and relinquishment of dogs in a rescue shelter. *J. Appl. Anim. Welf. Sci. 7*, 253–266.

Mornement, K. M., Coleman, G. J., Toukhsati, S. R., Bennett, P. C. (2015) Evaluation of the predictive validity of the Behavioural Assessment for Re-homing K9's (B.A.R.K.) protocol and owner satisfaction with adopted dogs. *Appl. Anim. Behav. Sci. 167*, 35–42.

Neidhart, L., Boyd, R. (2002) Companion animal adoption study. *J. Appl. Anim. Welf. Sci. 5*(3), 175–192.

Overall, K. L. (1997) *Clinical Behavioral Medicine for Small Animals*. Mosby Inc, St. Louis, MO.

Palestrini, C., Minero, M., Cannas, S., Rossi, E., Frank, D. (2010) Video analysis of dogs with separation-related behaviors. *Appl. Anim. Behav. Sci. 124*, 61–67.

Pongrácz, P., Miklósi, Á., Vida, V., Csányi, V. (2005) The pet dogs ability for learning from a human demonstrator in a detour task is independent from the breed and age. *Appl. Anim. Behav. Sci. 90*, 309–323.

Protopopova, A. (2016) Effects of sheltering on physiology, immune function, behavior, and the welfare of dogs. *Physiol. Behav. 159*, 95–103.

Salman, M. D., Hutchinson, J., Ruch-Gallie, R. (2000) Behavioral reasons for relinquishment of dogs and cats to 12 shelters. *J. Appl. Anim. Welf. Sci. 3*(2), 93–106.

Schoon, A., Berntsen, T. G. (2011) Evaluating the effect of early neurological stimulation on the development and training of mine detection dogs. *J. Vet. Behav. 6*, 150–157.

Schwartz, S. (2003) Separation anxiety syndrome in dogs and cats. *J. Am. Vet. Med. Assoc. 222*(11), 1526–1532.

Scott, S., Jong, E., McArthur, M., Hazel, S. J. (2018) Follow-up surveys of people who have adopted dogs and cats from an Australian shelter. *Appl. Anim. Behav. Sci. 201*, 40–45.

Serpell, J. (1996) Evidence for an association between pet behavior and owner attachment levels. *Appl. Anim. Behav. Sci. 47*, 49–60.

Shore, E. R. (2005) Returning a recently adopted companion animal: adopters' reasons for and reaction to the failed adoption experience. *J. Appl. Anim. Welf. Sci. 8*(3), 187–198.

Stafford, K., Erceg, V., Kyono, M., Lloyd, J. K. F., Phipps, N. (2003) *The dog/human dyad – a match made in heaven?* Proceedings to the 28th Conference of the World Small Animal Veterinary Association, Bangkok, Thailand, pp. 225–227.

Storengen, L. M., Boge, S. C. K., Strøm, S. J., Løberg, G., Lingaas, F. (2014) A descriptive study of 215 dogs diagnosed with separation anxiety. *Appl. Anim. Behav. Sci. 159*, 82–89.

Udell, M. A. R., Dorey, N. R., Wynne, C. D. L. (2010) The performance of stray dogs (*Canis familiaris*) living in a shelter on human-guided object-choice tasks. *Anim. Behav. 79*, 717–725.

Van den Berg, S. M., Heuven, H. C. M., Van den Berg, L., Duffy, D. L., Serpell, J. A. (2010) Evaluation of the C-BARQ as a measure of stranger-directed aggression in three common dog breeds. *Appl. Anim. Behav. Sci. 124*, 136–141.

Van Rooy, D., Arnott, E R., Thomson, P. C., McGreevy, P. D., Wade, C. M. (2018a) Using an owner-based questionnaire to phenotype dogs with separation-related distress: do owners know what their dogs do when they are absent? *J. Vet. Behav. 23*, 58–65.

Van Rooy, D., Thomson, P. C., McGreevy, P. D., Wade, C. M. (2018b) Risk factors of separation-related behaviours in Australian retrievers. *Appl. Anim. Behav. Sci. 209*, 71–77.

Vitulová, S., Voslá ová, E., Ve erek, V., Bedá ová, I. (2018) Behaviour of dogs adopted from an animal shelter. *Acta Vet. Brno 87*(2), 155–163.

Wells, D. L., Hepper, P. G. (2000) Prevalence of behaviour problems reported by owners of dogs purchased from an animal rescue shelter. *Appl. Anim. Behav. Sci. 69*, 55–65.