Behavioral Indicators of Poor Welfare in Shelter Dogs

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ABSTRACT

We studied behavioral indicators of poor welfare in shelter dogs. Our research question was: How is the welfare of shelter dogs affected by length of stay at a shelter, age, sex, and breed? Data were collected on 18 dogs from October 2016 to March 2017 at a small private shelter in Marietta, GA. Data were collected in 15-minute sessions when the dogs were in their indoor enclosures. No significant differences were found in time spent in abnormal behaviors among dogs that were at the shelter for less than 1 month, 1-6 months, and longer than 6 months, between male and female dogs, between different breeds, and between younger and older dogs. Small sample sizes, individual differences, and an enriched shelter environment could have contributed to the lack of significant findings.

Keywords: welfare, shelter dogs, abnormal behavior

The American Society for the Prevention of Cruelty to Animals (ASPCA) estimates that approximately 3.2 million dogs enter shelters in the United States every year (ASPCA, n.d.). Many researchers have found that shelter environments can lead to poor welfare in some dogs, with common indicators of poor welfare being the exhibition of repetitive behaviors or stereotypies (like circling and pacing), increased barking and panting, and excessive self-grooming (Protopopova, 2016; Stephen & Ledger, 2005). Factors that can affect these behavioral manifestations of poor welfare in shelter dogs include sex, length of stay in shelter, type of breed, and age (Stephen & Ledger, 2005). These factors are discussed in more detail below.

Researchers have found some differences in behavioral manifestations of poor welfare between male and female dogs. Beerda, Schilder, Van Hooff, De Vries and Mol (1998) studied chronic stress in dogs that were both socially and spatially restricted and found that female dogs exhibited significantly more paw lifting and low/crouching postures than male dogs; both of these behaviors are considered to be manifestations of poor welfare. Stephen and Ledger (2005) found that female dogs in shelters displayed abnormal tail chasing behavior sooner than male dogs.

The length of time a dog remains in a shelter can have an impact on behavioral manifestations of poor welfare. Wells, Graham, and Hepper (2002) found that dogs that were housed in the shelter for more than 5 years (long-term dogs) showed significantly different behavior than dogs who were there for a shorter length of time (short-term dogs). Long-term dogs spent more time at the back of their enclosures and less time barking and being active. This has serious implications for the adoptability of

long-term dogs because of pet owners' preference for more active dogs that stay near the front of their enclosures. Similar behaviors were observed by Titulaer, Blackwell, Mendl, and Casey (2013), who found that dogs that were housed in a shelter for a minimum of 6 months spent more time resting, when compared to dogs that were housed in a shelter for less than 6 months. They also observed that long-term dogs were more likely to bark and growl at strange dogs and less likely to interact with new people, when compared to short-term dogs. These behaviors can negatively affect chances of adoption.

Sex, age, and size can also predict length of stay in a shelter. Zak, Vaslarova, Vecerek, and Bedanova (2015) found that male dogs remained in the shelter for a median of 6 days longer than female dogs. Dogs under the age of 1 year stayed a median of 19 days, and dogs ranging from 5-9 years old stayed a median of 53.5 days, which is a significant difference. Dogs over 9 years old stayed a median of 54 days. Both giant breed (e.g., Great Dane) and small breed (e.g., Chihuahua) dogs stayed at the shelter the least amount of time when compared to medium (e.g., Border Collie) and large sized (e.g., Labrador Retriever) dogs.

Type of breed can also have an impact on behavioral manifestations of poor welfare (Protopopova, 2016). Different breeds exhibit differences in emotional reactivity (the way in which individuals respond to environmental stimuli), and this reactivity can manifest with different degrees of excitability, activity, frequency of barking, and fearfulness (Mehrkam & Wynne, 2014). Fearfulness, in particular, tends to lead to physiological and behavioral responses that are markers of stress and poor welfare (Morrow et al., 2015). Researchers have found that smaller breeds (e.g., spaniels and terriers) and toy breeds (e.g., poodles) exhibit more reactivity (and fearfulness) when compared to larger breeds like Labrador retrievers (Merhkam & Wynne, 2014) and this variation in reactivity can affect how different dog breeds respond to a shelter environment (Stephen & Ledger, 2005).

Stephen and Ledger (2005) found some behavioral differences in manifestations of stress among dogs in different age groups. The dogs observed play bouncing and chewing their bedding were younger than the dogs that did not perform these behaviors. The opposite was found for panting and excessive barking; older dogs were observed performing these behaviors more than younger dogs. These results are similar to findings in other studies (Hubrecht, 1995; Siwak, Murphey, Muggenburg, & Milgram, 2002).

Although the studies reviewed here show good evidence for behavioral indicators of poor welfare in shelter dogs, there are some gaps in the literature. Researchers have not used consistent operational definitions for "abnormal behaviors," and there are inconsistent findings from different studies because of this (Protopopova, 2016). In addition, the duration of data collection in previous studies has been very short (typically, 2 weeks); the longest study conducted lasted 6 weeks (Stephen & Ledger, 2005). These gaps indicate a need for more research on this topic. Finally, much of the previous research in this field is cross-sectional in nature. This is problematic when using length of stay as an independent variable because it is difficult to know whether it is the time in the shelter that is affecting behavior, or whether the dog's behavior itself is affecting adoptability (and therefore,

time in shelter). Thus, it is important to also conduct studies that are longitudinal in nature.

The focus of the current study was to examine specific behavioral indicators of poor welfare in shelter dogs. Findings from this study can provide insight into how different factors affect shelter dog welfare. This knowledge could potentially help shelters provide an environment conducive to better welfare for dogs. Our research question was: How is the welfare of dogs in a small private shelter affected by their length of stay at the shelter, age, breed, and sex? The present study addressed some of the gaps in previous studies by collecting data over a period of 16 weeks and using established operational definitions for abnormal behaviors. Our research hypotheses are as follows:

1. Female dogs will exhibit more abnormal behaviors than male dogs.
2. The longer a dog has been in a shelter the more behaviors associated with poor welfare will be observed.
3. Different dog breeds will exhibit different welfare indicators.
4. Older dogs will exhibit more behaviors that indicate poor welfare than younger dogs.

Method

Procedure

Data were collected at a small private shelter in Marietta, GA from October 2016 to March 2017. During data collection, the dogs were fed and exercised by shelter staff according to their normal routine and water was available ad libitum. All of the dogs in the shelters were housed indoors, and their enclosures were cleaned by shelter staff. All dogs were singly housed with similar kennel environments (water bowl,

food dish, bed with blanket, and chew toys). Data were collected in 15-minute sessions when the dogs were in their indoor enclosures. The observer did not interact with the dog during data collection and gave each dog 10 minutes to acclimate to her presence before data collection. Data were collected at different times of the day to ensure reasonable time sampling. Each dog was observed according to a predetermined schedule to ensure an equal number of observation sessions for each dog in the sample. The dogs' normal routine was not altered during data collection. No data were collected when visitors were present.

Data were collected using Noldus Pocket Observer® software installed on Samsung Galaxy® tablets (see Tables 1 and 2 for ethograms). Observations did not place the animals in situations that caused stress. This research complied with protocols approved by the Institutional Animal Care and Use Committee at Kennesaw State University and adhered to the laws of the USA. Data were analyzed using Univariate Analysis of Variance in SPSS with an alpha of 0.05.

Subjects

Eighteen dogs (8 male and 10 female) were observed during 88 sessions that spanned a total of 22.92 hours (Table 3). The ages of the dogs ranged from 1 to 11 years old. For data analysis, the dogs were split into two groups: The dogs from 1 to 5 years old ($n = 13$) were classified as young, and the dogs from 6 to 11 years old ($n = 5$) were classified as older. The length of stay was categorized as less than 1 month ($n = 8$), 1 to 6 months ($n = 4$), and more than 6 months ($n = 6$). Breed classification was based on the American Kennel Club (AKC) breed classification system and information provided by shelter staff. The breed groups

Table 1. *Ethogram of Abnormal Behaviors, adapted from Stephen and Ledger (2005)*

Abnormal Behavior	Description
Pace	Dog repeatedly (>3) paces around kennel in a fixed route
Wall Bounce	Dog repeatedly (>3) jumps up kennel wall from side to side
Tail Chase	Dog chases tail repeatedly (>3) for reasons other than discomfort or grooming
Circling	Dog walks around in small circle repeatedly (>3)
Play Bounce	Dog repeatedly displays the play bow posture (>3)
Chew Bedding	Dog chews its own bedding
Self-Lick	Dog licks its own body repeatedly (>5 min per session)
Lip-lick	Dog licks lips repeatedly (>5 min per session)
Pant	Dog pants for reasons other than physical exertion or a warm ambient temperature (only recorded if temperature is <25 degrees C)
Hide	Dog attempts to escape from the view of kennel staff behind its bed or other kennel furniture for prolonged periods when not asleep (>2 min); may be accompanied by a low posture or trembling
Chew Bars	Dog repeatedly chews and bites at the wire of the kennel (>20 sec)
Self-bite	Dog repeatedly bites its own body (>10sec)
Yawn	Dog opens mouth wide while taking a deep inhalation
Paw lift	Dog raises one forelimb off the ground for a prolonged period of time (>5sec)
Body shake	Dogs entire body shakes back and forth in a lateral motion, sometimes seen when they are wet to dry off
Startle	Dog jumps and shows concern by looking around and being alert to the surroundings
Polydipsia	Dog drinks large volumes of water in excess of what is normal
Lack of appetite	Dog does not eat more than 50% of the food that is presented
Excessive vocalization	Dog barks for prolonged periods (>1 min) in the visual and auditory absence of people and other dogs
Listless	Dog is withdrawn and unresponsive to commands
Escape attempt	Dog attempts to escape kennel in a forceful manner whenever the kennel door is opened and closed

included in our research were the herding group (3 dogs), sporting group (6 dogs), nonsporting group (4 dogs), hound group (2 dogs), and terrier group (3 dogs). Given the low sample size for the hound and terrier groups, these two breed groups were combined for data analysis.

The number of observation sessions for each dog varied due to adoptions throughout the data collection period, but the average number of sessions for each dog was 5 (ranging from 1 to 8 sessions).

Table 2. *Ethogram of Normal Behaviors, adapted from Stephen and Ledger (2005)*

Normal Behavior	Description
Bark	Dog produces a short and loud vocalization
Whine	Dog produces a prolonged usually higher pitch vocalization (>3sec)
Growl	Dog produces a prolonged low pitch vocalization
Scratch	Dog uses legs to agitate parts of his or her body to relive an itch
Rest	Dog remains still and relaxed for a prolonged length of time
Wag tail	Dogs tail goes in a back and forth lateral motion from one side of their body to the other multiple times (>3 times)
Jump up on crate	Dog places front paws on the sides of its kennel for extended length of time (>5sec)
Play	Dog displays behaviors such as a play bow or interacts with toys or other animals in a happy and friendly manner
Eat	Dog consumes food with its mouth
Drink	Dog laps up and ingests water
Other	Behaviors not specified

Table 3. *Descriptive Information on Observed Shelter Dogs*

Name	Breed type	Time at shelter at start of data collection	Past history	Age	Sex	Sterilized
Ozzie	Herding	> 6 months	Stray	1	M	yes
Penelope	Herding	1 - 6 months	Stray	3	F	no
Windy	Herding	< 1 month	Owner Surrender	7	F	yes
Clay	Sporting	< 1 month	Stray	1	M	no
Bob	Sporting	< 1 month	Stray	2	M	yes
Sally	Sporting	< 1 month	Stray	1	F	yes
Sophia	Sporting	> 6 months	Owner Surrender	3	F	yes
Calypso	Sporting	< 1 month	Stray	4	F	no
Luke	Sporting	1 - 6 months	Stray	1	M	yes
Nick	Nonsporting	1 - 6 months	Stray	2	M	no
Sunnie	Nonsporting	> 6 months	Owner Surrender	6	F	yes
Cleo	Nonsporting	> 6 months	Stray	11	F	yes
Steve	Toy/nonsporting	> 6 months	Owner Surrender	7	M	yes
Maddie	Hound	1 - 6 months	Stray	5	F	yes
Hank	Hound	> 6 months	Stray	10	M	yes
Carrie	Terrier	< 1 month	Stray	4	F	yes
Alphie	Terrier	< 1 month	Owner Surrender	2	M	yes
Talia	Terrier	< 1 month	Stray	1	F	no

Results

Overall

Overall, the percentage of time spent in abnormal behaviors was approximately 2%.

Sex

No significant differences were found in time spent in abnormal behaviors among male versus female dogs [$F(1,16) = 1.93$, $p = .18$]. Please refer to Table 4 and Figure 1 for means, standard deviations, and sample sizes.

Length of stay

No significant differences were found in time spent in abnormal behaviors among dogs who were at the shelter for less than 1 month, 1 to 6 months, and longer than 6 months [$F(2,15) = .27$, $p = .77$]. Please refer to Table 5 and Figure 2 for means, standard deviations, and sample sizes.

Breed

Table 4. *Average time spent in abnormal behaviors for male versus female dogs*

	M	SD	N
Male dogs	45.67	79.62	10
Female dogs	132.94	178.87	8

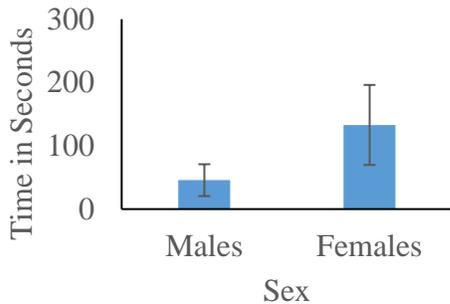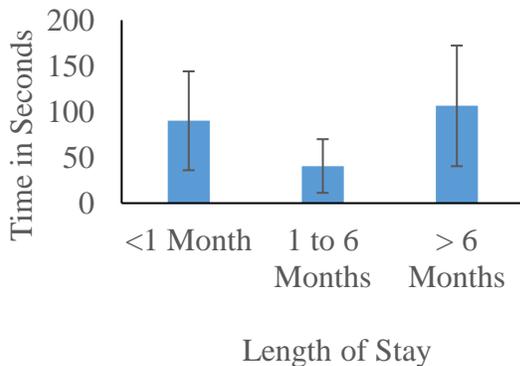*Figure 1.* Average time spent in abnormal behaviors for male versus female dogs.

Table 5. *Average time spent in abnormal behaviors for dogs with different length of stay in shelter*

Length of stay	M	SD	N
<1 Month	90.01	152.81	8
1 to 6 Months	40.59	58.62	4
> 6 Months	106.31	161.43	6

Figure 2. Average time spent in abnormal behaviors for dogs with different length of stay in shelter.
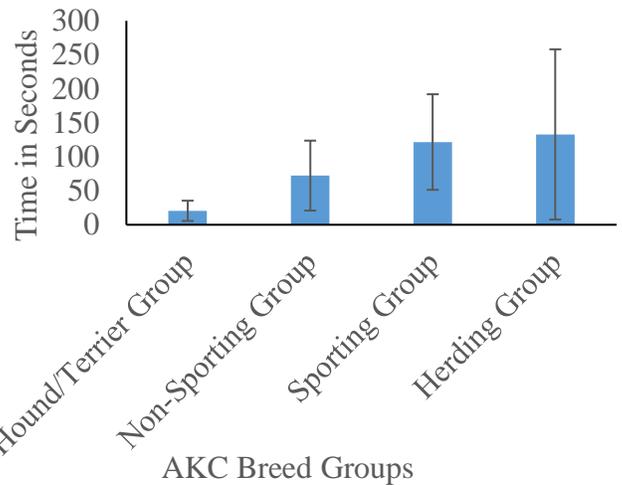

No significant differences were found in time spent in abnormal behaviors between dogs who were classified into different breed categories [$F(3,14) = .61$, $p = .62$]. Please refer to Table 6 and Figure 3 for means, standard deviations, and sample sizes.

Table 6. *Average time spent in abnormal behaviors for each AKC breed group*

Breed	M	SD	N
Herding Group	132.89	216.82	3
Hound/Terrier Groups	20.51	33.22	5
Nonsporting Group	72.27	102.91	4
Sporting Group	121.67	172.19	6

*Figure 3.* Average time spent in abnormal behaviors for each AKC breed group.

Age

No significant differences were found in time spent in abnormal behaviors between dogs classified as young (5 years old or less) and dogs classified as old (older than 5 years) [$F(1,16) = .35$, $p = .56$]. Please refer to Table 7 and Figure 4 for means, standard deviations, and sample sizes.

Table 7. *Average time spent in abnormal behaviors for young versus older dogs*

Age	M	SD	N
Young (1-5)	96.41	150.25	13
Older (6-11)	53.39	96.53	5

Figure 4. Average time spent in abnormal behaviors for young versus older dogs.
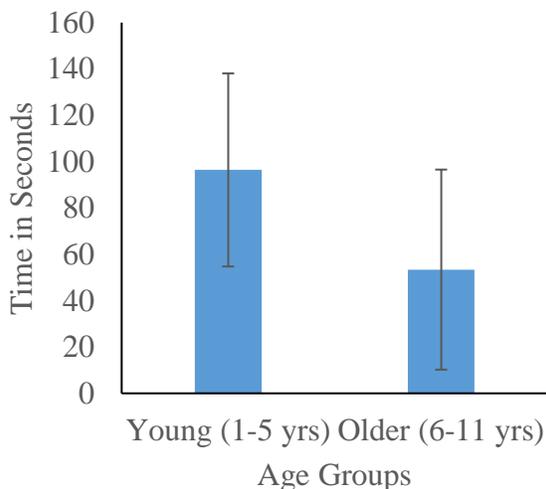
Discussion

The dogs observed in our study spent an average of 2% of their time under observation in abnormal behaviors, which is low when compared to previous findings. Previous researchers have found that shelter dogs exhibit abnormal behaviors approximately 30% of the time, on average (Denham, Bradshaw, & Rooney, 2014). We examined differences between male and female dogs, dogs considered young versus those considered older, dogs of different AKC breed groups, and the differing lengths of time the dogs spent in the shelter. All data analyses produced nonsignificant results, but a few trends lead us to believe that with more hours of data collected on each dog, significant results could be attained. We had a small sample size of only 18 dogs and the average number of sessions for each dog was 5 (ranging from 1 to 8 sessions) because

of adoptions throughout the data collection period. In addition, the shelter where we collected data provides an extremely enriched environment for the dogs in their care. The dogs are provided socialization multiple times a day, have toys readily available in each of their kennels as well as other necessities for their care that are provided on a schedule so the dogs are as relaxed and comfortable as possible. The enriched shelter environment, the small sample size, and the variability (large standard deviations) within our sample may have contributed to our nonsignificant results.

Researchers aiming to learn more about dogs in shelters are very important for many reasons. Learning how best to care for dogs in shelters to decrease the development of abnormal behaviors can lead to a significant decrease in the overall time they spend in shelters. Adoption rates increase when the dogs display normal and interactive behaviors. Currently, about 6.5 million dogs and cats enter shelters across the United States each year. About 1.5 million dogs and cats are euthanized, and 3.2 million get adopted (ASPCA, n.d.). Knowledge gained from research in this field can decrease the rate of euthanasia, increase the rate of adoption, and improve welfare for dogs living in shelters. Wells et al. (2002) observed that dogs that spent more time in a shelter developed more abnormal behaviors over time. Potential adopters want interactive dogs with positive behaviors (Wells & Hepper, 2000), but researchers conducting cross-sectional studies have found that dogs with longer stay lengths tend to exhibit negative behaviors such as always resting at the back of their kennels and becoming more antisocial; this discourages visitors from adopting them (Wells et al., 2002).

The area of research considering welfare in shelter dogs specifically through behavioral observation is still a growing field, and researchers face many challenges. When working with animals, there is always some unpredictability around what will happen during observation. For instance, although we collected as much data as was feasible, some of the dogs were adopted during data collection, which may have contributed to our nonsignificant results. In addition, although we do not see this as an issue in our study, future researchers might consider using cameras to record the dogs to make sure that behavior is not affected by the researcher's presence. One of the strengths of our study was that we were able to collect data on dogs with different lengths of stay (ranging from less than 1 month to 7 years) over a long period of time (16 weeks). In the future, we would like to collect more data with a larger sample size, as well as include data from different types of shelters (public vs. private) to compare behaviors in different shelter environments. We would also like to further explore individual differences in behavior, as Protopopova (2016) hypothesized that individual differences may help explain some of the inconsistent findings in previous research. In addition, given the cross-sectional nature of most of the research conducted on this topic (including the present study), it would be important to conduct longitudinal studies for the following reason. When using length of stay as an independent variable in cross-sectional studies, it is difficult to know whether it is the time in the shelter that is affecting behavior, or whether the dog's behavior itself is affecting adoptability (and therefore, time in shelter). Thus, it would be important to assess abnormal behaviors upon intake as well as later, in order to look at the possible impact of pre-existing behaviors. Finally, it would be of interest to study the shelter environment itself to see what the shelter staff in the present study did to maintain an enriched environment that led to the relatively small percentage of abnormal behaviors observed.

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