The Effects of Clicker Training on Stress Levels in Communally Housed Shelter Cats

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Abstract

Shelter cat populations are subject to experiencing stress, which can lead to undesirable behavior changes and health concerns such as upper respiratory infections (URIs). Enrichment activities, such as clicker training, have been utilized to successfully help reduce stress levels in shelter cats. This success has been found in cats that were housed individually, however little is known whether these effects are seen in communally housed shelter cats as well. In this study, communally housed cats underwent six, ten-minute clicker training sessions over the course of two weeks in order to learn targeted behaviors. Their stress levels were observed for each session, and URI symptoms were recorded throughout the study. Fourteen of the initial thirty-four cats enrolled were present for two weeks, and of those it was found that the clicker-trained group had a significantly lower final average stress score than the control group. The treatment group also had a significant decrease in their average stress score when comparing the initial and final scores. This decrease was not seen in the control group. Twenty-six cats were present for at least one week and analyzed for URI incidence. While there was a greater number of URIs in the control group, no significant relationship was found between URI incidence and participation in clicker training. These findings suggest that clicker training can be effective in reducing stress levels in communally housed shelter cat populations, and further research could expand on its influence.

Introduction

Stress is a major topic of interest when discussing shelter cat populations, as shelter environments tend to be very stressful for cats. Potential adopters consider the temperament of a cat one of the main factors influencing their decision, and stress-related changes in behavior may hide a cat's true temperament (Kry & Casey, 2007). Exposure to stressful conditions can lead to undesirable behavior changes, such as vomiting, decreased appetite, and urinating outside of litter boxes (Stella et al., 2013).

Stress has also been linked to upper respiratory infections (URIs) (Dinnage et al., 2009; Gourkow & Phillips, 2016). URIs are one of the most common health concerns in shelter environments, as well as for several weeks after adoption (Dinnage et al., 2009; Lord et al., 2008). They are also a major influence when shelters are considering a cat for euthanasia (Dinnage et al., 2009). URIs can be caused by a variety of viral and bacterial infections, including feline herpesvirus 1, calicivirus, B. bronchiseptica, and M. felis. Symptoms include sneezing, ocular and nasal discharge, coughing, congestion, and difficulty breathing (Dinnage et al., 2009; Lappin, 2015). The viruses associated with URIs are more likely to spread when these symptoms are present, a time period known as "shedding." A cat carrying one of these viruses is more likely to shed when experiencing high levels of stress because it weakens their immune system (Dinnage et al., 2009; Gourkow et al., 2014). This weakened state caused by stress could make cats more susceptible to the bacterial causes of URIs as well, highlighting the importance of attempting to reduce stress levels in shelter environments.

One way to reduce stress is through enrichment activities, which are designed to improve the overall welfare of animals in captivity. The method of focus in this study is clicker training, where a cat in this instance is slowly taught a new behavior or skill using a clicker device to reinforce and reward when the desired behavior has been achieved. These typically occurs in short, sub-fifteen minute sessions, with a single cat being worked with at one time (Gourkow & Phillips, 2016; Grant & Warrior, 2019; Kogan et al., 2017). It has been shown to be effective for a variety of behaviors, with simple skills such as touching a target having a success rate of nearly 80% in some instances (Kogan et al., 2017). Previous studies have found positive impacts on reducing stress-related behaviors in individually-housed cats. After training, they spent more time exploring and at the front of their enclosures and were less likely to display behavior that was indicative of frustration. Those undergoing ten days of training were also found to have higher antibody levels and lower rates of URI incidence (Gourkow & Phillips, 2016; Grant & Warrior, 2019).

The promising results of previous research provide a baseline to determine how influential clicker training can be on stress levels. However, it is uncertain whether these effects will still be present when cats are sharing territory and resources, such as in communal housing environments. This could potentially add additional stress to these cats and lead to differences in the effectiveness of enrichment methods. This study aims to determine whether clicker training can have a significant effect on stress levels for a communally housed shelter cat population, and in turn affect the rate of URI incidence.

Methods

Shelter Protocol

This study was conducted at the League for Animal Welfare located in Batavia, Ohio during January and February of 2020. All cats were housed in one of the eleven available communal cat rooms. Upon arrival to the shelter, each cat was examined by the on-site veterinary staff at the adjacent clinic building and was treated subsequently. All cats were spayed/neutered, microchipped, and vaccinated against rabies, rhinotracheitis, calicivirus, and panleukopenia. They were tested for feline leukemia virus (FeLV) and feline immunodeficiency virus (FIV), and checked for intestinal parasites through a fecal sample. If necessary, they were given medication to treat fleas and/or intestinal parasites. Any additional health concerns were also treated at this time.

Once recovered and deemed healthy, they were moved to one of the eleven communal cat rooms and placed in a smaller individual cage in order to acclimate to the new environment. The cats tended to spend 24 hours in this cage before they were allowed access to the rest of the room. Cats were placed into rooms based on personality and compatibility with the other cats, with each room housing an average of 2-6 cats. At least one room was designated for kittens and juvenile cats at any given time. Each room was approximately 10 feet by 15 feet and featured an outdoor area of the same size that was completely enclosed with woven wire fencing. This area was accessible through a full-size sliding glass door and a small cat door, giving the cats access to the outdoor portion at will throughout the day. The outdoor areas were separate so that cats from adjacent rooms were unable to make physical contact with one another.

The cat care staff arrived at the shelter at approximately 6 AM to clean the environment daily. Floors were swept and mopped in each room, as well as in the connecting hallways. Litter

boxes were scooped daily and disinfected weekly. Kittens were provided with non-clumping litter, while the adult litter boxes varied depending on what had been donated to the shelter. Blankets in the rooms were refolded daily to reduce visible hair, and fully changed when visibly dirty or refolded several times. This method of keeping blankets in rooms was intended to reduce stress levels.

Food bowls were disinfected with dish soap each morning. Cats were fed Science Diet brand dry food, at approximately 1/2 cup per cat in room. They were fed once daily in the evenings, and the food was left out until the staff arrived the following morning. An exception to this was for the kitten room, where food was left out all day. All toys and brushes were designated to a specific room and were not transferred to another room before being disinfected. Volunteers were able to remove toys and brushes from rooms at any point when they were deemed dirty, and those remaining were disinfected every week. On at least a weekly basis, every surface in the rooms, such as platforms and benches, were disinfected as well.

The cat care staff and veterinary staff communicated daily through the use of a journal, recording any health concerns with the cats. If an issue was noted, the veterinary staff came to examine the cat to determine if it needed medical treatment or needed to be transferred to the clinic.

Stress Assessment

After at least 24 hours had passed since the cat was released from the individual cage, they were randomly assigned to the treatment or control group. They were then monitored for their initial stress score. The scoring system was based off of the Cat-Stress-Score system developed by Kessler and Turner (1997). A certain number of factors, including body posture, position of the tail, ears, eyes, and head, vocalization, and activity, were rated on a scale of 1-7. A score of 1 was considered fully relaxed, while a score of 7 was considered terrorized. Each score included a description of the behavior or criteria that would fall under that rating, which can be found in Table 2 in Kessler and Turner (1997). The average of these individual scores was used as the cat's overall stress score. These scores were recorded three times a week between 8-10:30 AM at the beginning of each session.

Clicker Training

At least 24 hours after the initial observation, the treatment group began clicker training. A clicker training device was used in such a way that when the distinct click noise was made, a small treat was provided to the cat. The targeted behaviors used in this study were a sit and a handshake, where the cat would bring its paw up to at least elbow height and make contact with the trainer's outstretched hand. Each training session lasted 10 minutes and occurred three times a week. Cats participated voluntarily and were not forced to stay in one location, nor were they physically handled during the session. All sessions took place individually in the outdoor portion of the enclosure, with all other cats in the room locked in the indoor space. In the adjacent rooms, all cats were locked indoors so as to reduce distractions. All sessions took place between 8-11:00 AM before the shelter opened and cats were interacted with by volunteers.

The first session for all cats consisted of familiarizing them to the clicker and forming a conditioned response. The trainer would randomly click and immediately toss a treat on the ground near the cat. Any time the cat sat or lifted their paw, they received a click as well. This conditioned response was considered learned when the cat looked towards the area on the ground where it would receive a treat after hearing the clicking sound. After this was learned, each session varied between cats depending on their learning ability and success.

The first targeted behavior was sitting. For some cats, this was a natural response after beginning to receive treats, while others required luring into position. Luring was done by holding a treat in front of the cat's face and moving it slowly forwards and upwards above their head. The typical response was for the cat to look up and lower its hind end, either to walk backwards or to try to jump up to reach the treat. The cat received a click any time its hind end lowered until a sit was formed. A verbal cue of "sit" was also used. The hand signal was slowly transitioned to a closed fist, palm facing upwards, moving from an outstretched position towards the trainer's shoulder. The sit behavior was considered learned when performed consistently with the hand signal and verbal cue. Once learned, the handshake behavior was formed.

The first step to initiating the handshake behavior was paw movement. This was accomplished by holding a hand or treat near the cat's paw and clicking for any movement where the paw was not in contact with the ground. The verbal cue "paw" was introduced as well. Paw raising was then targeted by reaching out with a flat, upturned hand and touching the bottom of the paw. The paw was manually pushed up a short distance and the cat then received a click. This continued, with the paw being raised slightly higher each time, until it reached approximately the height of the cat's elbow. After consistently allowing the trainer to manually lift the paw, the final handshake behavior was targeted. This was done by holding out a flat, upturned hand directly in front of the cat around their elbow height and giving the verbal cue, waiting for a response. Voluntary contact between the trainer's hand and the cat's paw was considered successful and received a click. If the behavior was mastered before the sixth session, it was reinforced throughout the remaining sessions, with longer

Table I. Descriptive Statistics

Session	Group	Mean	SD	SEM	df	t	p
0	Control	2.00	0.29	0.11	12	0.30	0.77
	Treatment	2.06	0.44	0.17			
1	Control	1.79	0.14	0.05	12	0.30	0.77
	Treatment	1.83	0.35	0.13			
2	Control	1.81	0.21	0.08	12	0.15	0.89
	Treatment	1.83	0.30	0.11			
3	Control	1.76	0.10	0.04	12	0.06	0.95
	Treatment	1.77	0.22	0.08			
4	Control	1.83	0.14	0.05	12	2.02	0.07
	Treatment	1.70	0.11	0.04			
5	Control	1.74	0.13	0.05	12	1.71	0.11
	Treatment	1.64	0.08	0.03			
6	Control	1.78	0.03	0.01	12	3.05	0.01
	Treatment	1.61	0.15	0.06			

Descriptive statistics of independent-samples t-tests, comparing stress scores between treatment and control groups for each session. Significance was only found for session six.

pauses between contact and receiving the click and treat.

Upper Respitory Infection Assessment

Throughout this study, all cats were observed for any URI symptoms. Any excessive sneezing, coughing, or ocular/nasal discharge was noted for each day it was observed. Any cat diagnosed with a URI by the veterinary staff was removed from their room and treated in the veterinary clinic. Those who were diagnosed were removed from the training portion of the study.

Statistical Analysis

There were 34 cats enrolled that arrived at the shelter during the time frame of this study, ranging in age from four months to six years old. For analysis of stress levels in relation to clicker training, only those who were present for six sessions over the course of two weeks were included in statistical analyses. Previous studies have found that this approximate time frame was appropriate to see successful learning and significant changes in behavior in response to the clicker training (Grant & Warrior, 2019; Kogan et al., 2017). Those who developed a URI within six sessions were excluded from this analysis, as they did not undergo any remaining sessions after being diagnosed. For analysis of URI incidence, those cats who were present for at least three sessions and at the shelter for a minimum of seven days were included. The rationale behind this was to allow all cats in the treatment group a reasonable amount of time to develop a response to clicker training. All cats in the treatment group had formed a conditioned response to the clicker by the end of the second session, so all were exposed to shaping of the desired behaviors by session three. Any of the 34 cats not included in these analyses were adopted within seven days of arrival, or were moved to the clinic for unrelated health concerns.

Independent samples t-tests were used for each session to determine whether a significant difference in stress scores was present between the groups. A paired samples t-test was also used to compare session 0 and 6 for each group in order to determine if stress scores significantly changed between the initial and final observations. A chi-square test of independence was used to determine if there was any significance between the amount of URI cases that developed and whether or not the cat received clicker training.

Results

There were 14 cats, seven in both groups, that were present for six sessions of clicker training. The independent samples t-tests showed no significant difference between the initial observation (session zero) or the first five sessions when comparing the average stress scores of the control and treatment groups (Table 1). However, the average stress score of the treatment group was found to be significantly lower than the control group after session six. Stress scores were also found to be significantly lower when comparing session six to session zero for the group that received clicker training,

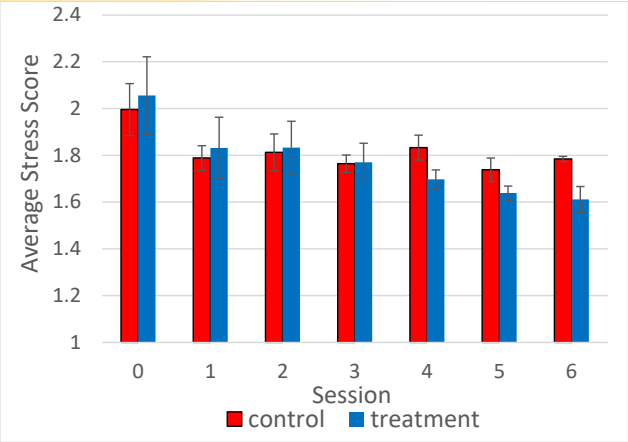

Figure 1. A comparison of average stress scores recorded during each session between treatment and control groups. Error bars indicate standard error of the mean.

$t(6) = 2.69$, $p = 0.04$. This was not the case for the control group, where the average stress scores were not found to be significantly different, $t(6) = 1.81$, $p = 0.12$.

There were 26 cats who underwent at least three sessions and were at the shelter for a minimum of one week. Of those, four cats in the control group (N = 13) displayed URI symptoms, while two displayed symptoms from the group who underwent clicker training (N = 13). Two of the four symptomatic cats in the control group were diagnosed with a URI and were removed from their environment, as well as the primary study. Of the two symptomatic cats in the treatment group, one was diagnosed and transferred to the clinic. The chi-square test of independence indicated that there was no significant relationship between URI development and whether or not the cat underwent clicker training, $X2(1, N = 26) = 0.867$, $p = 0.35$. Also, due to the small sample size, the assumption that all expected counts were greater than 5 was not met.

Discussion

Cats housed in communal rooms exhibited lower stress scores after undergoing six clicker training sessions over the course of two weeks. This supports the notion that enrichment activities such as clicker training are effective stress reduction methods. Additionally, clicker training could be a viable enrichment option to implement in shelter environments, as it has been shown to be successful. Requiring few resources and lacking a complex methodology, it is a feasible program to implement in a shelter environment that tends to have volunteers willing to participate.

However, there are some limitations to these conclusions due to the statistical analysis methods used. While the independent and paired-samples t-tests measured the differences between specific sessions for each individual analysis performed, they do not provide a measure of the overall change across all sessions for both groups. Further statistical analysis, such as a repeated measures ANOVA, could prove to be beneficial in measuring the change across sessions and would allow for a more definitive interpretation of the data.

While the URI incidences were not found to be related to whether the cat underwent clicker training, there was a slight trend indicating a potential relationship. Twice as many cats in the control group developed symptoms and were diagnosed with a URI than the treatment group. The insignificance was partly due to a small sample size that was not enough to meet assumptions for chi-square analysis. Future research involving larger sample sizes could indicate whether this method is effective in lowering instances of URIs.

In conclusion, clicker training is a reasonable and effective enrichment method to implement in order to help reduce stress levels. While previous research has found this to be true for cats housed individually, this study indicates that communally housed shelter cats can benefit as well. Additional research into the effects of clicker training on stress-related health concerns could further support its utilization as an enrichment tool in shelter environments.

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