

A Proposed Clinical Intervention for Feline Cognitive Dysfunction (*Felis catus*) using Cognitive Enrichment

Aspen Shirley

Comparative Behavior, PSY 324 | Dr. Heide Island | Pacific University | 2043 College Way | Forest Grove, OR 97116

Background

Feline cognitive dysfunction syndrome (CDS) is a neurodegenerative condition of older cats that is similar to human dementia. Over the last 20 years in the United States there has been a 15% increase in the number of cats living beyond 10 years old and CDS is found in roughly 50% of cats who are 15 years or older (Karagiannis & Mills, 2014). Comparable to human dementia, Amyloid- β deposits are found in feline brain tissue; however, Amyloid- β deposits in cats are less matured than those found in humans. These Amyloid- β plaques found in cats also do not exhibit neurofibrillary tangles (NFT) like in human dementia, but significant neuronal loss overall does occur (Chambers et al., 2015)

Feline CDS consists of specific symptoms including but not limited to anxiety, mood changes (e.g., unprovoked aggression), problems with memory, house soiling, and excessive vocalization at night (e.g., yowling) (Stilwell, 2020). These changes seen in domestic cats with CDS are distressing and uncomfortable for both the owner and the felines (Zadik-Weiss et al., 2020). Reports from CDS cat owners regarding their behavior when their cat was younger compared to their cat's behavior with a CDS diagnosis (Sordo & Gunn-Moore, 2021).

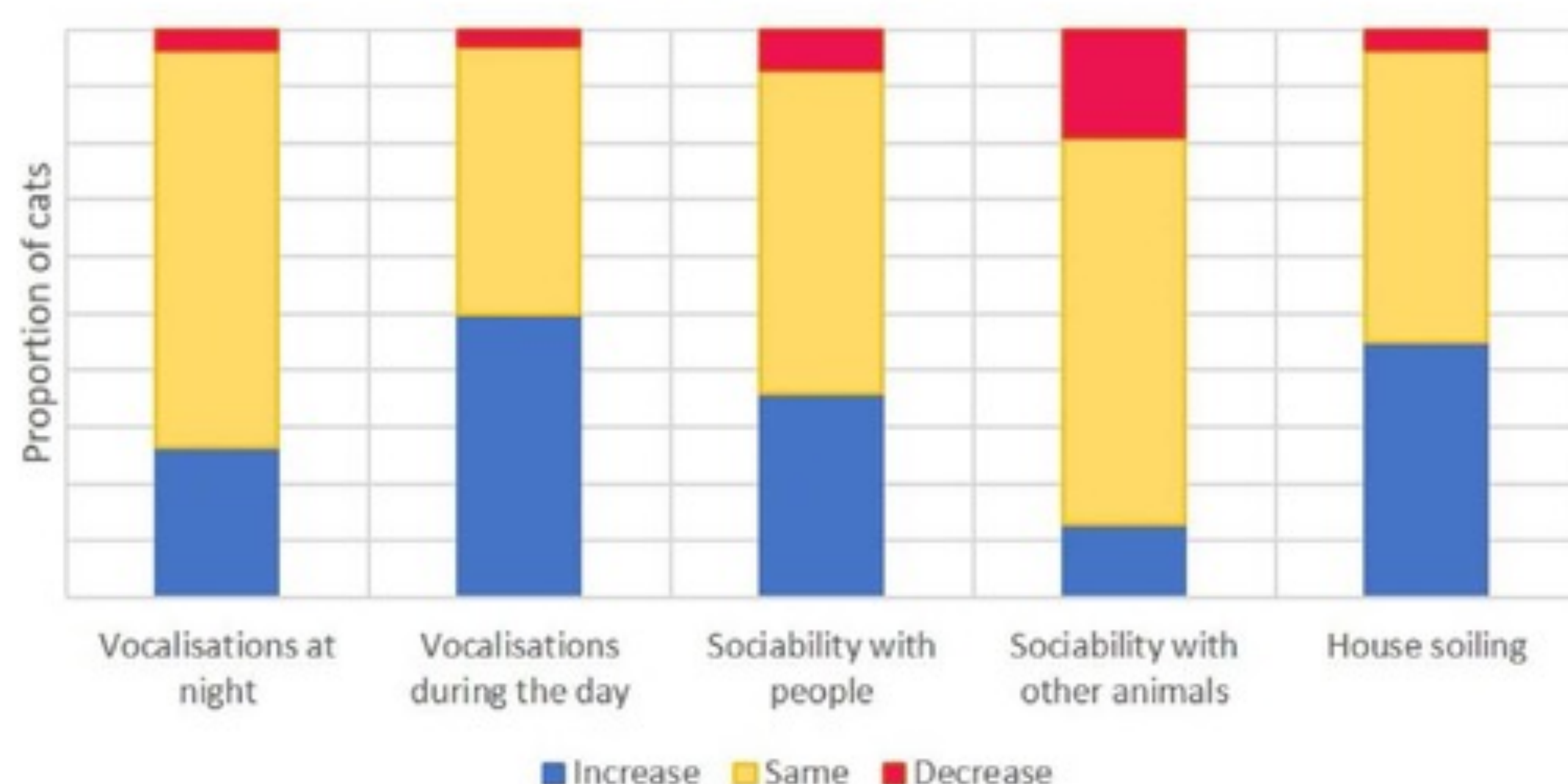
Empirical Question: *To what extent will behavioral and cognitive enrichment (e.g., stimulating play toys, physical exercise, food puzzles) alleviate feline CDS symptomology?*



Amyloid- β deposits in the parietal cortex in a 20-year-old domestic cat

Amyloid- β deposits in the hippocampus of 15-year-old domestic cat (Sordo & Gunn-Moore, 2021)

Behavioural changes associated with CDS



Proposed Methodology

Sample

Fifty domestic cats aged 11-13 years old will be sampled from varying Banfield Pet Hospital locations around Portland, Oregon will be randomly assigned to one of three conditions. All cats will come from single-cast homes with a CDS diagnosis and no other contraindicated diagnoses (e.g., renal failure) or medications prior to recruitment.



Photo credit: International Cat Care

Materials

There will be one survey (i.e., Average Day) for the owners to fill out regarding the average daily behavior of their feline (see Human Companion Survey in the appendix). This is to establish a baseline for comparison that pertains only to their cat. There will also be a chart (i.e., Daily Behavior Chart) for the feline owners to complete daily regarding the frequency (i.e., how many times the behavior occurred) of observed behaviors after their designated conditions have been conducted. Further, for participants who do not own an operable smartphone, a digital video camera will be loaned to the pets' human companions, so they can document any behaviors that may occur while they are gone (e.g., at work, shopping, etc.). For those randomly assigned to the medication condition, Gabapentin will be provided with appropriate dosage for the weight of their cat. Gabapentin is a known anti-anxiety medication for felines and has potential therapeutic effects for feline CDS (Supasitthumrong et al., 2019).

Design and Procedure

This study is a pre-post, experimental design, to assess the potential array of symptomology alleviating interventions for the treatment of feline CDS. Subjects will be given a random number for random assignment of the felines to 1 of 3 conditions. The Average Day survey will be distributed to pet owners one week prior to the start of this experiment. They will be asked to complete and submit this survey within three days. When the experiment begins, pet owners will begin their interventions which is either cognitive stimulating play, medication (i.e., Gabapentin), or nothing (i.e., control). For the play control, custodians will be asked to play with their feline for 30 minutes daily at the onset of each day. The custodians will monitor behavior for the remainder of the day and complete the Daily Behavior Chart. For the Gabapentin condition, custodians will give their felines the medication in the morning and at night (e.g., every 12 hours) and document the behaviors they observe on the Daily Behavior Chart. The control group will not administer medication, nor change their routine play habits with their feline – nothing will change daily for this group. All three conditions are expected to last for 3 weeks (e.g., documenting daily behaviors for 3 continuous weeks).

Proposed Results

The research predictions for this study were that behavioural and cognitive enrichment would yield the most statistically significant results in alleviating symptomology among the domestic cats. Environmental enrichment that promotes cognitive and behavioural stimulation enhances the growth and survival of neurons, thus helping to improve cognition (Sordo & Gunn-Moore, 2021). Ensuring that cats have adequate stimulation is not only potentially beneficial to the prevention and/or reduction in feline CDS, but it is known to improve their mood and help keep their weight at healthy levels.



Photo credit: Caticles



Photo credit: Clinician's Brief

Conclusions

The purpose of this project was to investigate the efficacy of mental stimulation and gabapentin as potential therapeutic interventions for feline cognitive dysfunction syndrome. There is minimal research on the experimentation of varying interventions for the alleviation of symptomology in feline CDS. It is critical to continue researching treatments as feline CDS is distressing not only to owners but also to cats. Human dementia cases can potentially act as a model for approaching new treatments for feline dementia in addition. Feline CDS is difficult to diagnose and is often misdiagnosed. Items like cat trees/towers, organic or home-grown catnip, their favourite toys, and puzzle treats are all helpful in keeping cats entertained, mentally stimulated, and physically stimulated as part of a healthy life-style.

Select References

- Chambers, J. K., Tokuda, T., Uchida, K., Ishii, R., Tabebe, H., Takahashi, E., Tomiyama, T., Une, Y., Nakayama, H. (2015). The domestic cat as a natural animal model of Alzheimer's disease. *Acta Neuropathol Commun*, 3, 78. doi: 10.1186/s40478-015-0258-3
- Karagiannis, C., & Mills, D. (2014). Feline cognitive dysfunction syndrome. *Veterinary Focus*, 24(2), 42-47
- Sordo, L., & Gunn-Moore. (2021). Cognitive dysfunction in cats: Update on neuropathological and behavioral changes plus clinical management. *Veterinary Record*, 188(1), 30-41.
- Stilwell, N. (2020). Unpacking feline dementia: A veterinary guide. *Vetted*, 115(5). <https://www.dvm360.com/view/unpacking-feline-dementia-veterinary-guide>
- Supasitthumrong, T., et al. (2019). Gabapentin and pregabalin to treat aggressivity in dementia: A systematic review and illustrative case report. *British Journal of Clinical Pharmacology*, 85, 690-703.
- Zadik-Weiss, L., Ritter, S., Hermush, V., Asher, N., Avital, A., Or, R. (2020). Feline cognitive dysfunction as a model for Alzheimer's disease in the research of CBD as a potential treatment – a narrative review. *Journal of Cannabis Research*, 2(43). <https://doi.org/10.1186/s42238-020-00054-w>

A complete list of references are available upon request, shir8204@pacificu.edu