

The effect of space on behaviour in large groups of domestic cats kept indoors



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ABSTRACT

The domestic cat (*Felis silvestris catus*) originates from the solitary living African wildcat (*Felis silvestris lybica*). However, through domestication, the domestic cat has become more social towards conspecifics and group housing of cats is common, for example in cat shelters in some countries. In Sweden the animal welfare legislation allows the keeping of up to 15 adult cats in the same room. However, keeping several cats in a small area may increase the level of conflicts between the cats and the social stress. In this study we examined the social and spatial behaviour in large groups of cats, as well as stress related body postures (using the Cat-Stress-Score) and if there were any changes within a stable group of 15 cats kept at different floor areas (1 m², 2 m² and 4 m² per cat). Cats in the study were collected as groups from two shelters and housed in a research facility. Cats from different shelters and groups were never mixed. Cats performed more solitary play ($p=0.0016$) and moved more between different resources ($p=0.03$) in the largest floor area. Based on our results we conclude that increasing the area for group housed cats promote more play and general activity. Play can be an indicator of positive welfare for the cats.

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1. Introduction

The domestic cat (*Felis silvestris catus*) is one of the most common pets in Sweden (SCB, 2014). Although it originates from the solitary living African wildcat (*Felis silvestris lybica*, Macdonald et al., 2000; Driscoll et al., 2007), the domestic cat has become more social towards conspecifics through domestication (Macdonald et al., 2000). As many other domestic species, the domestic cat has more juvenile behaviours than the African wildcat, and this also promotes an increase in tolerance towards other cat individuals (Bradshaw et al., 2012), which may indicate that the domestic cat has easier to live in groups compared to its wild ancestor. It has been seen that feral cat colonies have a social structure where female relatives live together and help each other with kittens, while the males are not socially tied to a particular group (Kleiman and Eisenberg, 1973; Liberg, 1980; Macdonald et al., 2000; Bradshaw, 2016). However, studies have shown that even when cats “choose” to live in groups, there are conflicts (Macdonald et al., 1987; Natoli and De Vito, 1991). According to Leyhausen (1979) cats in groups seem to lack dominance hierarchy that can prevent a lot of aggres-

sion; instead he argues that spacing and tolerance are important mechanisms. Nevertheless, there are also studies indicating that domestic cats do form hierarchies when housed on limited space (van den Bos and de Cock Buning, 1994; Knowles et al., 2004). When investigating dominance order in a group of ten intact female cats, by observing winner and loser in aggressive interactions, van den Bos and de Cock Buning (1994) found a linear hierarchy, whereby seven aggressive interactions were observed per hour when held in a limited space.

It is known that cats, irrespective of group size, show higher levels of stress during the first weeks in a shelter compared with group-housed control cats housed together for 2–16 weeks (Kessler and Turner, 1997). The control cats in Kessler and Turner's study were housed in groups of 6–9 cats at the density 3.2 m² per cat. Other studies have also shown a decrease in stress levels in group housed cats over time, using different behaviours as outcome measures (Durman, 1991 in Rochlitz, 2007; Kessler and Turner, 1999a). In these studies a new group of cats was considered to have reached equilibrium after about two weeks.

In Sweden today, one is allowed to keep up to 15 adult or 20 young cats in one group (SJVFS, 2008:5). Before 2013, it was possible to house 15 cats on 15 m², i.e. 1 m² per cat. Since May 2013, the requirement is 30 m² for 15 cats, i.e. 2 m² per cat. Kessler and Turner (1999a) found that there is a correlation between accessible area

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size and stress related behaviour in cats, i.e. the larger the area per cat the fewer stress related behaviours are shown. However, whether an increase from 1 m² to 2 m² per cat has an effect or not has not been investigated.

The aim of this study was to examine the social and spatial behaviours expressed in large groups of cats kept at different densities and areas, as well as stress related behaviours measured by the Cat-Stress-Score.

2. Material & methods

2.1. Animals and housing

The experiment was approved by the Swedish Ethical Committee in Gothenburg, prior to start. In total 89 cats were used in the study, 32 males and 57 females. In all groups there were both males and females in this distribution; 7:8, 6:9, 3:12, 5:10, 7:8 and 4:10. The cats of known age were between 1 and 12 years of age. For many cats in the study the age was not known since they were stray cats before ending up at a shelter. One group of 15 cats at a time was recruited from a cat shelter and transported to a research facility where it was housed during the experiment. In one of the groups one male cat was very aggressive towards all other cats in the group, and where therefore removed from the group and the study already during the acclimation phase, day 7. Consequently there was one group with 14 cats. After the experiment each group of cats was returned to the cat shelter before the next group was recruited. All cats were neutered/spayed and vaccinated before arrival. In total, six different groups of cats from two different shelters were included in the study.

In the room where the cats were housed during the experiment, they had access to seven shelves hanging on the walls at different heights, one shelf standing on the floor with nine different compartments, three climbing trees with several levels of shelves and hiding places, four benches and two travel cages placed on the floor (Fig. 1). There were also two full-height observation pens where the observers could sit without physical contact with the cats. These pens were built of wire and the outside could therefore be used by the cats when climbing. The cats also used the roof of the pens as resting areas. Some of the shelves and benches were equipped with soft bedding. There were in total nine hiding places where cats could stay without being visible to other cats at all; five in the climbing trees, two in one of the benches and two in the two transport cages. There were also four small hammocks in the climbing trees where cats could hide although being visible from some high shelves in the room. Small toys were always available for the cats. When the cats were in the largest area (60 m²), part of the area were behind a wall and could be perceived as “another room” since there was a sight barrier, although it was constantly accessible.

Water was provided ad libitum in nine water bowls, food was supplied twice daily in 15 food bowls and the cats had access to eight litter boxes that were cleaned twice a day. Food and water bowls were distributed evenly in the different areas tested. Once a day, all cats were externally checked. All cats were weighed twice a week.

2.2. Design and observations

In the experimental room, the available area for the cats could be changed by moving two of the walls. The three areas tested on each cat group were 1 m²/cat, 2 m²/cat and 4 m²/cat. All cat groups were tested in all three areas in a balanced order, i.e. 1 2 4; 2 1 4; 4 2 1; 4 2 1; 4 1 2; 1 4 2. When arriving at the research facility each cat group was released into their allocated area. Upon arrival and at every change of treatment area the cat groups were given

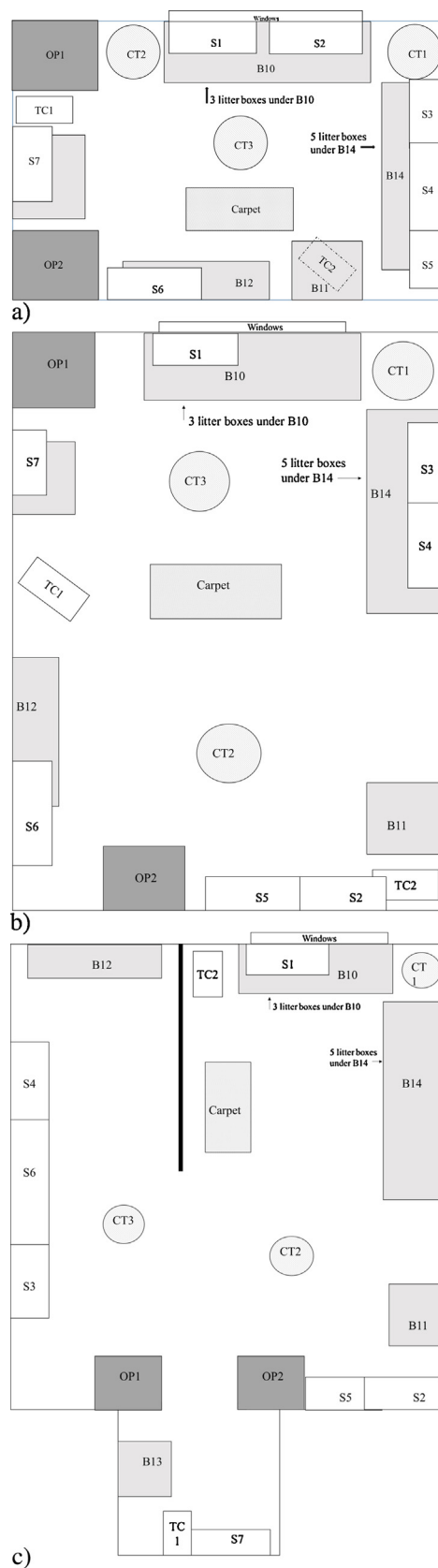


Fig. 1. Overview over the room where the cats were located and observed during the study, (a) 15 m² (1 m²/cat), (b) 30 m² (2 m²/cat), (c) 60 m² (4 m²/cat). S1–7 are shelves hanging on the walls on different levels, CT1–3 are climbing trees with scratching poles, shelves, hiding places and hammocks, B10–14 are benches standing on the floor (B12 with nine different compartments, B13 with one hiding shelf), OP1–2 are observation pens (1 m² each), and TC1–2 are travel cages on the floor.

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