POLISH JOURNAL OF NATURAL SCIENCES
Abbrev.: Pol. J. Natur. Sc., Vol 40(2): 81–92, Y. 2025

DOI: 10.31648/pjns.10027

INFLUENCE OF IMPROPER PLAY WITH THE CAT ON THE FREQUENCY OF AGGRESSIVE BEHAVIOUR

***Justyna Wojtaś*[1], *Aleksandra Garbiec*[2], *Karolina Kaleta*[3], *Martyna Decowska*[4], *Joanna Kapustka*[5]**

[1]ORCID: 0000-0002-1275-3240
[2]ORCID: 0000-0001-8430-0729
[3]ORCID: 0009-0004-8853-9568
[4]ORCID: 0009-0000-5391-4197
[5]ORCID : 0000-0001-8175-7299
[1,2,5]Department of Animal Ethology and Wildlife Management
[3,4]Felinology Student Scientific Circle
University of Life Sciences in Lublin, Lublin, Poland

Key words: cat, aggression, cat-human relationship, behavior.

Abstract

This study aimed to assess the relationship between improperly conducted play and the frequency of aggressive behaviour in cats. The research was conducted using an anonymous survey. Three thousand five hundred respondents with cats took part in the study. Among the animals, 58.9% were aged 1 to 5 years, 24.4% were cats aged 6–15 years, under 14.4% and senior cats over 15 years of age 2.3%. The results were analyzed using the Statistica 13.1 program. Almost half of the respondents confirmed playing with the cat with their hands (42.3%). Aggressive behaviours most often mentioned by caretakers were scratching (62.6%), biting (46.8%), attacking hands/legs (43.2%) and attacking other animals (35.0%). Significant correlations were observed between the occurrence of aggressive behaviour and the way of ending play with the cat. The least aggressive behaviour towards other animals occurred when playing more than three times a day.

Introduction

This increase in the popularity of cats may be due to the false belief that they are easy to care for, a belief that has been present for many years (ZASLOFF and KIDD 1994). Due to their relatively small size, cats are more willingly chosen pets by people living in small apartments. In addition, the rapid adaptation of cats to new environments, new caregivers and even in foster programs (VITALE et al. 2022) underscores the flexible nature

Address: Joanna Kapustka, University of Life Sciences in Lublin, ul. Akademicka 13, 20-950 Lublin, Poland, e-mail: joanna.kapustka@up.lublin.pl

of cats, including their ability to be socially self-sufficient, they exhibit less stressful behaviors. Cats are able to be alone for more extended periods (compared to dogs), and more willing to accept care from strangers such as a neighbor or friend of the owner (MEROLA et al. 2015). Cats also require less effort and are less demanding than dogs, which is essential from the point of view of the elderly, disabled or tired of caring for others (ROCHLITZ 2007).

Play is a crucial resource for cats, especially indoor cats and it's often considered an indicator of welfare, and when done correctly, it can facilitate the relationship between cats and humans (HENNING et al. 2023). The absence of hunting cycle may result in the cat's frustration and cause behavioural problems, such as aggression. Many pets are abandoned or euthanized yearly, and behavioural problems, including aggression, are cited as one of the leading disposals causes (SALMAN et al. 2000).

Cats are predators and hunt on small mammals and birds. The researchers indicate that cats, especially free-ranging and feral, have impact of wildlife population (CROWLEY et al. 2019). The evolutionary process has not significantly affected the feline hunting chain. This inherited pattern is very hardcoded in the predator's brain. Most domestic cats do not need to forage for food on their own. Despite this, implementing the hunting sequence is crucial in their lives. Home conditions do not allow hunting for live-moving prey, so the accumulated emotions should be redirected to various types of toys. At the sight of a potential victim, a sequence of behaviours is triggered consisting of the following stages (Figure 1): hunting, catching, playing, killing, eating, grooming and resting.

Aggression can take many forms, active or passive. The active state is more frequent and more easily recognized by owners. It is manifested by clear signals such as scratching, biting, bristling, growling, and hissing. In contrast, the passive form is more challenging to recognize. It involves intensely staring at the victim, preventing from accessing essential resources. In the case of passive aggression directed at the other cat, it may be manifested by interfering with the other individual in playing, eating, using bedding, driving away from the owner, etc. (CROWELL-DAVIS et al. 2004). Cat aggression is a severe and prevalent behavioural problem that causes injury to other pets and humans. Aggression directed at other cats tends to occur in households with multiple cats, and in homes with one cat, the owners become frequent targets (CROWELL-DAVIS 2007).

The type of aggression can be determined by the aggressive cat's posture, vocalization, facial expressions, and the context in which the aggressive behaviour occurs. In addition, certain types of aggressive behaviour are more likely to occur in cats of a certain age or gender. The types of aggression commonly recognized in cats can be classified as territorial aggression, gender aggression, fear aggression (in defence), play aggression, and redirected

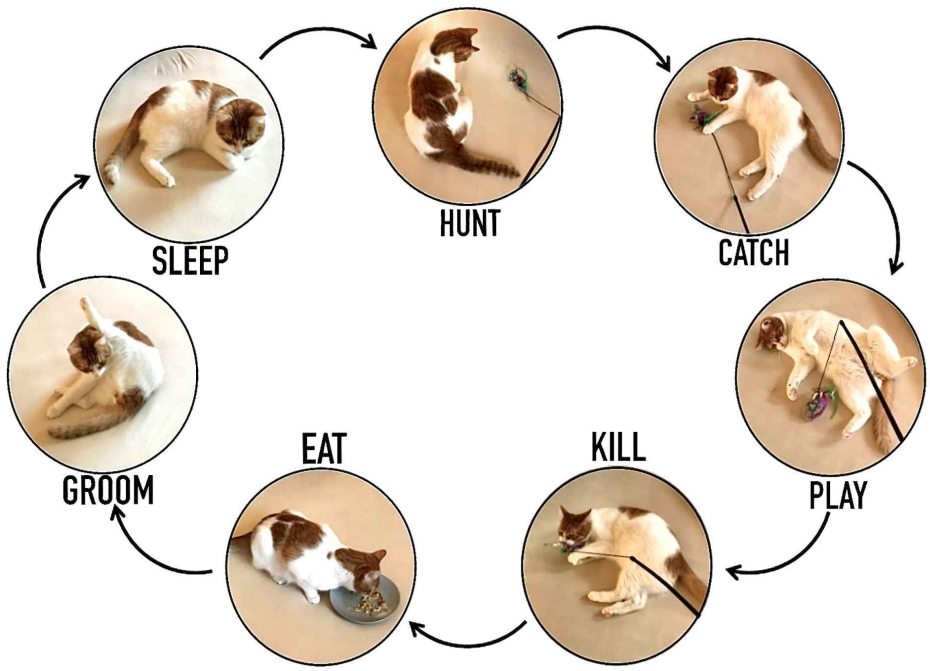

Fig. 1. Cat's hunting cycle

attack. In addition, mothers with kittens may show maternal aggression (CURTIS 2008). This functional classification emphasizes that aggressive behaviour is normal for a cat in many circumstances. Furthermore, it makes understanding the motivations and stimuli that trigger aggressive behaviour easier and helps identify ways to change or avoid it (CHAPMAN 1991).

Aggression in play is most common in healthy young kittens but can occur at any age, regardless of gender (CURTIS 2008). For young kittens whose claws are still soft and short, caregivers encourage kittens to attack their hands or feet, thinking it is a "funny" kind of play. Unfortunately, this is how they teach their cats that human hands and feet are prey that can be attacked. Such play later leads to many dangerous situations, which the owners no longer consider fun because they suffer many serious injuries (CROWELL-DAVIS 2007).

Play-motivated aggression can usually, but not necessarily, be directed at the people chosen by cats. It is not clear why certain people are selected (CURTIS 2008). The diagnosis of aggression in play is based on the behaviour and attitude of the cat. The cat follows the owner, stares at him, hides behind furniture or doors with his tail between his legs, and then runs out and attacks. In mild cases, the cat may run past the owner and paw at the leg, while in the most severe cases, the cat may jump on the owner, biting and

scratching. Although the aggressor is motivated by fun, this aggression often has a dangerous course. Owners of such cats may have many scars and scratches from "play" attacks and may be afraid of their pets (CURTIS 2008).

The study aimed to assess the impact of the caretaker's improper play with the cat on the frequency of aggressive behaviour.

Material and Methods

The study was carried out using the diagnostic survey method. The research technique was a self-developed anonymous questionnaire via Google Forms. Informed consent was obtained from all study participants. Cat owners were informed that the questionnaire responses would be used for research and information provided will remain confidential.

The questionnaire was made available online, on a social networking site to a group of cat owners. It included general questions concerning basic information about the owner and the animal, course of play and the presence of aggressive behaviour (the owners provided information on what their play with the cat looks like, how long it lasts, how often it is repeated, what type of toys they use (the respondents could choose more than one answer in this question) and how it is finished (the respondents could choose more than one answer in this question), frequency of aggressive behaviour (scratching, biting and attacking the hands and feet of the caretaker as well as attacking other animals).

Statistical analysis

The results are presented as descriptive statistics with a mean (X) and standard deviation (SD). The number and percentage of respondents of each group and answers in each question were calculated. In questions regarding aggressive behaviour in cats, the answer YES was defined as 1, and NO as 0. To determine relationships between the variables, the Pearson $\chi 2$ test was performed. The normality of the distribution was checked with the Shapiro-Wilk test. Differences between variables with a normal distribution were determined using Student's t-test, while those not showing a normal distribution were determined with the Mann-Whitney U test. Significance level $p < 0.05$.

Results

Research group – owners

The study was conducted on a group of 3,500 respondents who own cats. The majority (3.381) were women, and 119 were men. The largest group were respondents aged 21–40 (57% of respondents) and 41–60 years old – 32.9%. There were 6% of people under 20, and the smallest group of recipients were owners of cats over 61. More than half of the respondents had higher education (59%). 34.6% of the respondents live in large cities, 24.4% in medium-sized cities, 24.5% in small towns and 16.5% in villages.

Research group – cats

Among cats, 58.9% were individuals aged 1 to 5 years. 24.4% were from 6 to 15 years old, 14.4% were under one year old, and only 2.3% of senior cats were over 15. The exact origin of more than half of the cats is unknown – 53.5% were found or adopted, and 25.9% were adopted from shelters, pro-animal associations or foster homes. 20.6% of animals come from legal breeding. 49.1% of respondents had males, and 50.9% of females. Most cats (88%) had previously undergone castration or sterilization.

As for the frequency of playing with the cat, 72.2% of the respondents declared that they do it daily. The percentage of respondents' answers is presented in the Figure 2a.One session playing with a cat lasted for 43.4% of respondents until the animal had had enough and 7% until the owner had enough. For 28.8% of the respondents, playing with the cat lasted from 5 to 10 minutes, 15.3% for more than 10 minutes, and 5.5% for less than 5 minutes.

The most frequently chosen toys were a fishing rod with feathers, mice, balls , strings and ribbons, and papers and hair ties. The number of respondents who indicated that they play with a specific type of toy is given in Figure 2b.

A significant relationship was observed between the occurrence of aggressive behaviour and playing with the cat with mice and balls ($\chi 2 = 19.765$ P<0.001), papers and hair ties ($\chi 2 = 23.395$, $P < 0.001$) and the owner's hands ($\chi 2 = 95.745$, $P < 0.001$). In addition, a significant effect of playing with hands on the frequency of various types of aggressive behaviour in cats was observed (Table 1). Toys that reduce aggressive behaviour have been observed to be olfactory mats ($\chi 2 = 13.669$, $P = 0.008$), valerian/catnip toys ($\chi 2 = 15.973$, $P = 0.003$) and ball tracks ($\chi 2 = 8.792$, $P = 0.067$). The way of ending the game with a cat and the number

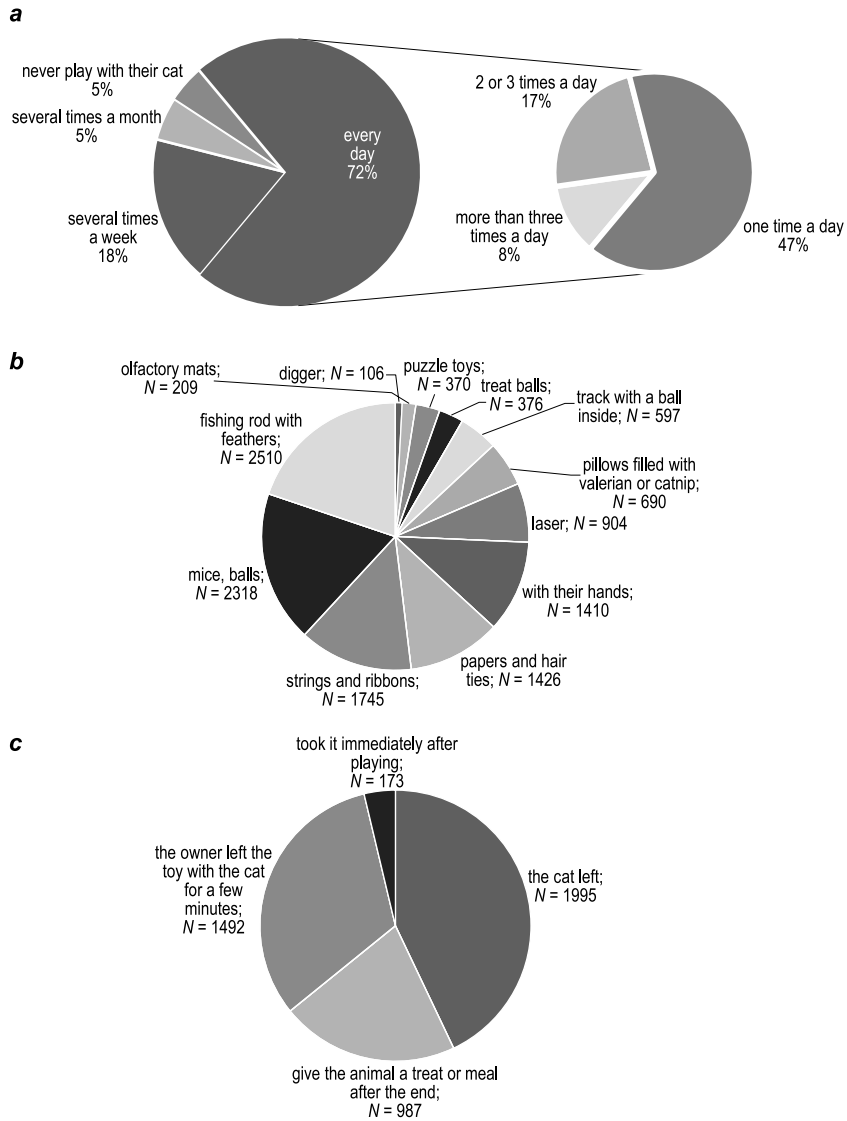

Fig. 2. The number and percentage distribution of given answers in questions: *a*) How often do you play with your cat? *b*) What type of toys do you play with your cat? *c*) How do you end a play with your cat?

distribution of answers to this question is given in Figure 2c. More than half of cat owners (62.6%) declared that there was a situation in which their cat scratched them. Among them, 5.4% had such incidents daily, 12.6% several times a week, 21.7% several times a month, 32.7 times a year, and 27.7% a one-off event. In contrast, 37.4% did not experience a cat scratch. Bites by cats occurred in 46.8% of respondents. Among them, such behaviour was

Table 1

The occurrence of aggressive behaviour in cats depending on the play with the hands of the owner

Aggressive behaviour	Owners playing with the cat with their own hands $N = 1410$		Owners not playing with the cat with their own hands $N = 2089$		*P*-value
	$\bar{x}$	SD	$\bar{x}$	SD	
Scratch	0.67	0.47	0.60	0.49	$P < 0.001$
Bite	0.50	0.50	0.44	0.50	0.003
Attacking hands/legs	0.56	0.50	0.35	0.48	$P < 0.001$
Attacking other animals	0.38	0.49	0.33	0.47	0.006
The sum of aggressive behaviours	1.72	1.20	2.11	1.23	$P < 0.001$

most often recorded several times a year, i.e. in 29.3%. It occurred several times a month in 21.3% and as a one-time incident in 24.9% of respondents. 15.9% were bitten several times a week, and 8.6% were bitten daily.

In contrast, 53.2% of cats have never bitten their owner. Behaviour such as attacking the owner's hands and feet occurred in 43.2% of the handlers. In this group, 30.3% of owners experienced it several times a month, 27.7% experienced it several times a week, and 18.6% experienced it several times a year. In addition, 17.7% of cats attacked the arms and legs of their owners daily, and 5.7% of the cases were one-time incidents. However, 56.8% of the study participants did not encounter such behaviour.

A significant effect of the frequency of playing with the cat on the occurrence of aggressive behaviour was found (Figure 3). The sum of aggressive behaviours was highest when the owner played with the cat 2–3 times a day ($\bar{x} = 1.97 \pm 1.18$), while minor behaviours occurred when the cat was not playing ($\bar{x} = 1.54 \pm 1.22$, $P < 0.001$). Furthermore, the frequency of all aggressive behaviours (Figure 2), except for aggression towards other animals, was significantly lower in cats that did not play with their owners compared to those that played with them very often: more than three times a day ($0.000 < P < 0.042$), 2–3 times a day ($0.000 < P < 0.003$) and when playing once a day ($0.000 < P < 0.008$).

It was observed that the more often the owner played with the cat, the less aggressive behaviour the cat showed towards other animals (Figure 4). The least aggressive behaviour towards other animals occurred when playing more than three times a day ($\bar{x} = 0.24 \pm 0.43$), and the most when playing several times a month ($\bar{x} = 0.52 \pm 0.5$, $P < 0.001$), with no play with a cat, the average the number of aggressive behaviours towards other animals was 0.49 (SD = 0.5, $P < 0.001$). The most common aggressive behavior was

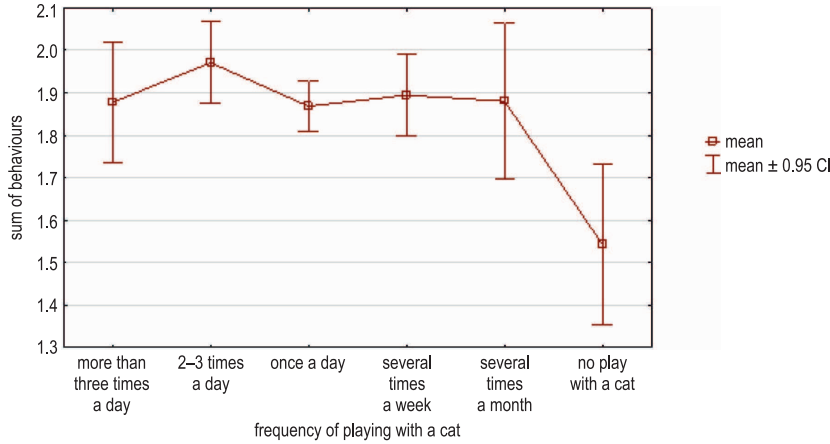

Fig. 3. Boxplot of the sum of aggressive behaviours depending on the frequency of playing with the cat

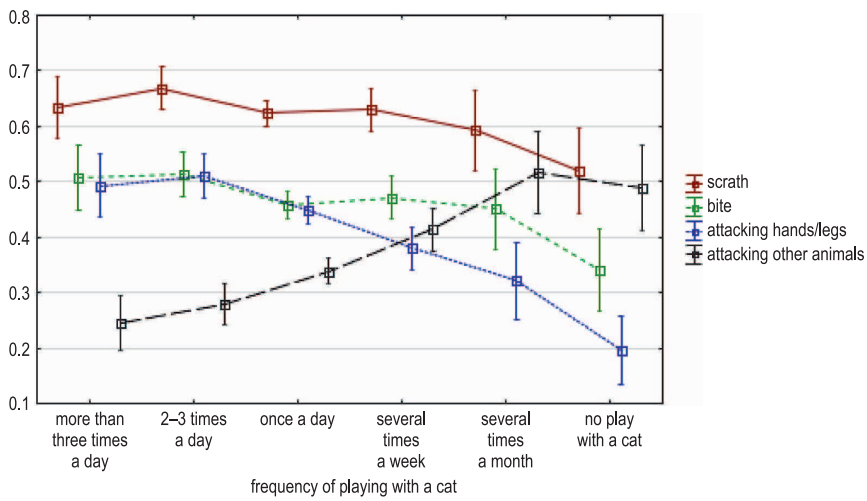

Fig. 4. Boxplot of specific aggressive behaviours depending on the frequency of the owner playing with the cat

scratching the owner, on average from 0.68 ±0.47 when playing 2–3 times a day to 0.52 ±0.5 when not playing with the cat (p = 0.003). The other differences were not statically significant.

Significant correlations were observed between the occurrence of aggressive behaviour and the way of ending play with the cat. There was a significant effect of ending play by leaving a toy for a few minutes on the occurrence of scratching ($\chi 2$ = 8.697; P = 0.003), attacking arms/legs ($\chi 2$ = 14.547; P < 0.001) and the total number of aggressive behaviours

($\chi 2 = 12.611$; $P = 0.013$). Feeding after play affected the occurrence of biting ($\chi 2 = 6.155$; $P = 0.013$) and attacking other animals ($\chi 2 = 29.854$; $P < 0.001$). In the group of cats whose owners took away the toy after the end of the play, the total number of aggressive behaviours was the lowest among the selected ways of ending play (taking away the toy: $\bar{x} = 1.78 \pm 1.27$; leaving the toy: $\bar{x} = 1.94 \pm 1.20$; serving the meal: $\bar{x} = 1.85 \pm 1.19$; the cat leaves on its own: $\bar{x} = 1.91 \pm 1.25$) – Table 2.

Table 2

The average frequency of aggressive behaviours regarding the type of ending a game with cat

The type of end a game		Took away toy after the end of the play		Leaving a toy for a few minutes		Feeding a cat		Cat leaves on its own	
		X	*P*-value	*X*	*P*-value	*X*	*P*-value	*X*	*P*-value
Scratch	yes	0.60	0.472	0.65	0.013*	0.64	0.270	0.63	0.689
	no	0.63		0.61		0.62		0.62	
Bite	yes	0.47	0.999	0.47	0.927	0.50	0.032*	0.48	0.155
	no	0.47		0.47		0.46		0.45	
Attacking arms/ legs	yes	0.40	0.437	0.47	0.001*	0.42	0.741	0.44	0.175
	no	0.43		0.40		0.44		0.42	
Attacking other animals	yes	0.32	0.455	0.35	0.940	0.28	<0.001*	0.36	0.175
	no	0.35		0.35		0.38		0.33	
Sum of aggressive behaviours	yes	1.78	0.280	1.94	0.013*	1.85	0.473	1.91	0.039*
	no	1.88		1.83		1.89		1.83	

**P*-value <0.05 are considered significant

Discussion

According to research, cat owners who play with their own hands with their cats are particularly exposed to scratching and other aggressive behaviour. But, of course, playing with your hands is just one of the factors that can trigger aggressive behaviour. For example, AHOLA et al. (2017) found a predisposition for aggression in early-weaned cats. They discovered that the late-weaned cats were less likely to behave aggressively and display stereotypically. Although the tendency to aggressive behaviour towards the caregiver may also be inherited (SALONEN et al. 2019), it may depend on sex or coat colour (STELOW et al. 2016).

A crucial aspect when playing with a cat is to fulfil the hunting chain. The collected research revealed that most animals during this activity stare

at the target, chasing it and catching and biting it. After playing, most respondents leave the toy for a few minutes. An element that should not be omitted is serving a meal or a treat after the end of the "hunt". The predator will feel fulfilled thanks to this action because the hunt was successful (CECCHETTI et al. 2021). However, our study observed that providing a meal increased the risk of bites to the owner but minimized attacks on other animals. It is possible that the keepers fed the cat a meal at the wrong time in the hunting cycle.

Failure to meet hunting needs causes the accumulation of emotions and the inability to channel them. Growing frustration may cause or increase the frequency of inappropriately aggressive behaviour, such as biting and attacking hands and feet (STRICKLER and SHULL 2013). In our study, 17.7% of cats attacked the arms and legs of their owners daily. A typical situation in homes is a cat that lurks behind furniture and jumps out of hiding at a passing owner, attacking him. The lack of stimuli makes the owner's moving legs a desirable target for the cat. Such behaviours should be redirected to toys, regular active play should be introduced into the cat's life and attempts to attack the caregiver should be consistently stopped (FRANK and DEHASSE 2004). An alternative solution is introducing a second cat of similar character and age. This activity is less involved for the owner because the cats play together (BEAVER 2004). However, on the other hand, play between adult animals (except dogs) is described as rare (MILLS 2008). If aggression occurs in play between cats, the cats should be separated, and the attacking cat should be redirected to a toy or play with the owner (MOESTA and CROWELL-DAVIS 2011).

An inappropriate toy selection can also affect the frequency of aggressive behaviour in a cat. Each animal has its preferences when choosing toys, but the most common are small, easy-to-move, toss-and-grab objects that resemble natural prey. Playing with hands and incorrect laser play should be avoided, as the cat cannot catch and complete the hunting cycle, which leads to frustration (AMAT and MANTECA 2019). In our study, some caregivers indicated playing with their pets using a laser. It is not the best choice because the cat cannot catch the light and complete the hunting cycle. Nevertheless, you can use this toy, under certain conditions, to start an activity. And then redirect the animal to a physically accessible item (KOGAN and GRIGG 2021).

STRICKLER and SHULL (2013) found no significant relationship between the frequency of play and the total number of cats behavioural problems in their studies. However, our study observed that the less the owner played with the cat, the less aggressive the cat showed towards the owner. The result is surprising because the quality of the cat-caretaker relationship is usually significantly related to the amount of daily play (HENNING et al. 2023). In the case of improper play with a cat, the phenomenon of redirected aggression

may occur, described in detail in the studies of many scientists, including STELOW (2022) and ALVAREZ BUENO (2020). Based on the study, it can be concluded that the way and frequency of playing with a cat significantly impacts aggressive behaviour. The obtained results may help minimize frustration in the cat, thus reducing aggression directed at the owner or other animals. The toy choice and the way of playing should be selected individually for a cat. The results help understand the cat's needs and build a positive relationship between the owner and the cat. Properly conducted activity in a cat helps maintain a satisfactory well-being level.

Translated by JOANNA KAPUSTKA with help of Grammarly, Inc.

Accepted for print 3.04.2025

References

AHOLA M., VAPALATHI K., LOHI H. 2017. *Early weaning increases aggression and stereotypic behaviour in cats*. Sci. Rep., 7: 10412, doi: 10.1038/s41598-017-11173-5.

ALVARES BUENO R. 2020. *Feline redirected aggression*. Etología, 221: 26–27.

AMAT M., DE LA TORRE J., FATJO J., MARIOTTI V., VAN WIJK S., MANTECA X. 2009. *Potential risk factors associated with feline behaviour problems*. Appl. Anim. Behav. Sci., 121(2): 134–139, doi:10.1016/j.applanim.2009.09.012.

AMAT M., MANTECA X. 2019. *Common feline problem behaviours: Owner-directed aggression*. J. Feline Med. Surg., 21(3): 245–255, doi:10.1177/1098612X19831206.

BEAVER B. 2004. *Fractious cats and feline aggression*. J. Feline Med. Surg., 6(1): 13–18, doi:10.1016/j.jfms.2003.09.011.

CACCETTI M., CROWLEY S., GODWIN C., MCDONALD R. 2021. *Provision of high meat content food and object play reduce predation of wild animals by domestic cats felis catus*. Curr. Biol., 31(5): 1107-1111, doi:10.1016/j.cub.2020.12.044.

CHAPMAN B. 1991. *Feline aggression. Classification, diagnosis, and treatment*. Vet. Clin. N. Am. Small Animal Practice, 21(2): 315–327, doi:10.1016/S0195-5616(91)50035-8.

CROWELL S., CECHETTI M., MCDONALD R. 2019. *Hunting behaviour in domestic cats: An exploratory study of risk and responsibility among cat owners*. People Nat., 1: 18–30, doi: 10.1002/pan3.6.

CROWELL-DAVIS S. 2007. *Human feet are not mice: How to treat human-directed feline aggression*. Compend. Contin. Educ. Vet., 29(8): 483–486.

CROWELL-DAVIS S., CURTIS T., KNOWLES R. 2004. *Social organization in the cat: A modern understanding*. J. Feline. Med. Surg., 6(1): 19–28, doi:10.1016/j.jfms.2003.09.013.

CURTIS T. 2008. *Human-directed aggression in the cat*. Vet. Clin. N. Am. Small Animal Practice, 38(5): 1131–1143, doi:10.1016/j.cvsm.2008.04.009.

FRANK D., DEHASSE J. 2004. *Differential diagnosis and management of human-directed aggression in cats*. Clin. Tech. Small Anim. Pract., 19(4): 225–232, doi:10.1053/j.ctsap.2004.10.004.

HENNING J., NIELSEN T., FERNANDEZ E., HAZEL S. 2023. *Cats just want to have fun: Associations between play and welfare in domestic cats*. Anim. Welf., 32, e9: 1–11, doi:10.1017/awf.2023.2.

KOGAN L., GRIGG E. 2021. *Laser light pointers for use in companion cat play: Association with guardian-reported abnormal repetitive behaviors*. Animals, 11(8): 2178, doi:10.3390/ani11082178.

MEROLA I., LAZZARONI M., MARSHALL-PESCINI S., PRATO-PREVIDE E. 2015. *Social referencing and cat–human communication*. Anim. Cogn., 18: 639–648, doi:10.1007/s10071-014-0832-2.

MILLS D. 2008. *The encyclopedia of applied animal behaviour and welfare*. Wallingford CABI. pp. 685.

MOESTA A., CROWELL-DAVIS S. 2011. *Intercat aggression – general considerations, prevention and treatment.* Tierarztl Prax. Ausg. K. Kleintiere Heimtiere., 39(2): 97–104, doi:10.1055/s-0038-1623563.

ROCHLITZ I. 2007. *The welfare of horses.* Dordrecht, Springer, pp. 30–80.

SALMAN M., HUTCHISON J., RUCH-GALLIE R., KOGAN L., NEW J., KASS P., SCARLETT J. 2000. *Behavioral reasons for relinquishment of dogs and cats to 12 shelters.* J. Appl. Anim. Welf. Sci., 3(2): 93–106, doi:10.1207/s15327604jaws0302_2.

SALONEN M., VAPALATHI K., TIIRA K., MAKI-TANILA A., LOHI H. 2019. *Breed differences of heritable behaviour traits in cats.* Sci. Rep., 9(1): 1–10, doi:10.1038/s41598-019-44324-x.

SEKSEL K. 2014. *Fear, aggression, communication, body language and social relationships in cats.* EJCAP., 24(3): 20–27.

STELOW E. 2022. *Aggression toward humans.* Clinical Handbook of Feline Behavior Medicine, Hoboken, New Jersey, Willey, pp. 157–173.

STELOW E., BAIN M., KASS P. 2016. *The relationship between coat color and aggressive behaviors in the domestic cat.* J. Appl. Anim. Welf. Sci., 19(1): 1–15, doi:10.1080/10888705.2015.1081820.

STRICKLER B., SHULL E. 2013. *An owner survey of toys, activities, and behavior problems in indoor cats.* J. Vet. Behav., 9(5): 207–214, doi:10.1016/j.jveb.2014.06.005.

VITALE K., FRANK D., CONROY J., UDELL M. 2022. *Cat foster program outcomes: behavior, stress, and cat – human interaction.* Animals, 12: 2166, doi:10.3390/ani12172166.

ZASLOFF R., KIDD A. 1994. *Attachment to feline companions.* Psychol. Rep., 74(3): 747–752, doi:10.2466/pr0.1994.74.3.747.