JEK
Journal of Earth Kingdom
JEK 3(2): 131–148
ISSN 3024-9821

Institute for Advanced Science, Social and Sustainable Future
MORALITY BEFORE KNOWLEDGE

Pet ownership: Their interactions towards pets and perceptions of animal welfare in zoos

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Received Date: November 28, 2025 Revised Date: January 22, 2026 Accepted Date: January 26, 2026

ABSTRACT

Background: Pets play an important role in human life. Many studies have shown that the presence of pets can improve the physical and mental health of their owners. The relationship between owners and pets tends to result in more positive behavior from owners towards other animals. Zoos are one of the locations where humans interact with various animals. The presence of humans (visitors) in zoos harms animal welfare in that location. Therefore, this study aims to determine the effect of pet ownership on perceptions of animal welfare in zoos. **Methods:** This study uses a quantitative method that examines the impact of pet ownership on perceptions of animal welfare in zoos. Through quantitative methods, a survey was conducted to collect data on public perceptions, both pet owners and non-owners, to see their perceptions of animal welfare in zoos. **Findings:** The study's results revealed that pet owners had higher HAIS values than those who did not have pets. Then the perception of animal welfare in general showed that pet owners tended to have lower perceptions of animal welfare than non-pet owners. The relationship between the level of relationship closeness between humans and pets and the perception of animal welfare showed a low negative correlation, which means that the higher the HAIS value, the lower the perception of welfare towards zoo animals. Pet owners tend to be more sensitive to the conditions of animals that are less than ideal. The following research reveals that positive human interactions with pets will encourage positive behavior toward other animals. **Conclusion:** This study concludes that pet owners have a more critical perception of animal welfare in zoos than visitors who do not have pets. The level of closeness of interaction also influences the critical behavior of pet owners towards animal welfare conditions in zoos. **Novelty/Originality of this article:** The novelty of this study lies in identifying the perceptions of zoo visitors through their level of interaction with pets. This study is unique because it uses the closeness level of interaction with pets to see the zoo visitor's perceptions of animal welfare in zoos.

KEYWORDS: animal welfare; human-animal interactions; pet owner perceptions; pets; zoos.

1. Introduction

Human and animal interactions continue to develop along with the adoption of various types of animals as pets. The presence of pets in human homes is not only as pets but has a much more emotional bond. Pet owners consider their pets to be part of the family and can occupy the same social space as other family members (Bouma, 2022). The positive impacts that humans and their pets experience are often the reason why owners have strong bonds with their pets. Through activities with pets, owners gain bonds of companionship and emotional

Cite This Article:
Majid, M. A. (2026). Pet ownership: Their interactions towards pets and perceptions of animal welfare in zoos. *Journal of Earth Kingdom, 3*(2), 131-148. https://doi.org/10.61511/jek.v3i2.2026.2475

support (Ramirez et al., 2022). This relationship between owners and pets can also provide emotional well-being and security while strengthening them from challenges such as social isolation and disconnection, loneliness, risky lifestyle behaviors, and mental illness (Cleary et al., 2020).

These positive benefits make pet owners tend to have a high level of concern for the welfare of their pets, even more concerned about the welfare of their pets than the welfare of their owners. More than 90% of pet owners acknowledge the importance of providing adequate facilities for their pets such as adequate housing, regular warming and flea treatment, and vaccinations (Forrest et al., 2023). Pet owners seek health facilities for their pets more than they seek health facilities for themselves and tend to describe their pets' health levels as much higher than their health levels (Ramirez et al., 2022).

The relationship between owners and pets that having a reciprocal relationship creates a special sensitivity to human interactions with other animals. This reciprocal relationship is generally measured using the Human-Animal Interaction Scale (HAIS). The HAIS is a self-report instrument consisting of 24 items designed to measure and describe behaviors carried out by humans and animals over some time (Fournier, 2016). The existence of an ownership relationship between humans and pets can increase positive attitudes, concern, and empathy toward animals in general (Torkar, 2020). Pet owners who have positive attitudes towards pets support strategies that seek to avoid species extinction and oppose strategies that endanger species (Shuttlewood, 2016).

Concerning positive attitudes towards animals, the concept of animal welfare is something that needs to be discussed. The concept of animal welfare began to be widely known after the Farm Animal Welfare Council published five concepts of freedom in 1993. The five concepts include freedom from thirst, hunger, and malnutrition; freedom from physical and thermal discomfort; freedom from pain, injury, and disease; freedom from fear and distress; freedom to express normal behavior (Farm Animal Welfare Council, 1993). Along the way, several criticisms emerged regarding the 5 concepts of freedom, one of which was related to the conceptual framework which was considered incapable of determining the level of welfare from an ethical perspective (McCulloch, 2013). Although there are many concepts of development and criticism of the 5 concepts of freedom, this concept is still commonly used, especially for research focused on meeting minimum standards to prevent animals from suffering (Miller & Chinnadurai, 2023). Along the way, this concept of animal welfare continues to develop. Criticism of the minimal inclusion of the mental state of animals in the Five Freedoms concept gave rise to several more contemporary models such as the 5 domains concept of animal welfare (Fig. 1).

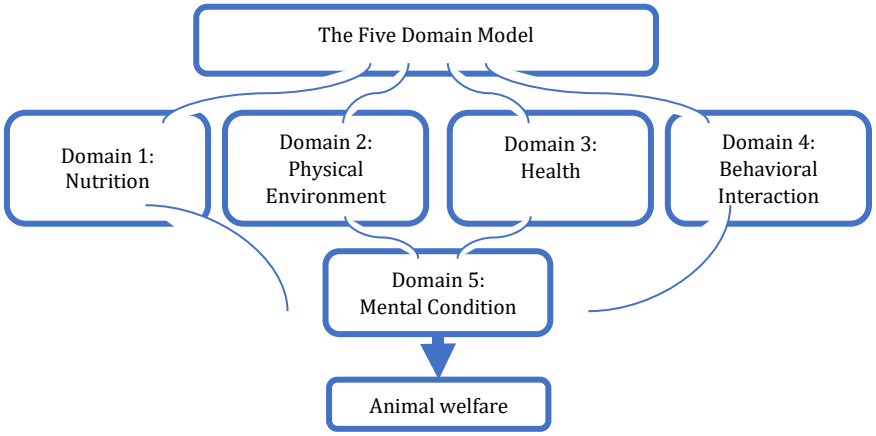

Fig. 1. Structure of the five-domain model (Mellor, 2020)

This concept was first developed in 1994 and has undergone several improvements (Lacinak, 2023). Initially, this concept consisted of nutrition, physical environment, health, behavioral interaction, and mental condition (Mellor, 2016). Then in 2020, this concept was revised again by including the Animal - Caregiver Interactions (ACIs) perspective which is considered to have an impact on animal welfare (Lacinak, 2023). This latest approach is considered a better description of the mental condition of animals and data is seen from a more positive perspective (Mellor et al., 2020).

The Five Domain Model has been reconfigured to provide a clear way to evaluate the animal welfare implications of a range of human-animal interactions effectively and systematically (Mellor et al., 2020): the 'Nutrition' domain refers to the availability and quality of water and feed and access to a balanced diet for the animal; the 'Physical Environment' domain refers to the physical and/or weather conditions that the animal is directly exposed to; the 'Health' domain refers to the welfare impacts of injury, disease and varying levels of fitness; 'Behavioral Interactions' refers to behavioral outcomes as an index of the animal's perception of their external circumstances and also includes animal–human interactions; the 'Mental State' domain refers to the animal's perception about all stimuli received (Lanzoni et al., 2023). The fifth domain is designed to capture the animal's overall mental experience, evaluated based on the suffering caused by all impacts considered in the first four domains (Mellor & Reid, 1994; Mellor et al., 2020).

Human desire to see wildlife makes them build artificial ecosystems containing animals, including safari parks, national parks, and zoos. Keeping animals in captivity in zoos has long been controversial, especially related to the meaning of freedom which is considered an important part of animal welfare (Browning & Veit, 2021). The limitations of efforts to improve animal welfare are related to the differences in attention between animals and humans in these artificial animal ecosystem locations. Attention to animal welfare is at a lower level than attention to the welfare of stakeholders in tourism areas (Fennel, 2023). This is evidenced by research conducted by (Moorhouse et al., 2015) which states that only 25% of wildlife tourism objects have a positive impact on wildlife. Furthermore, in their research which identified 24 tourist attractions in various parts of the world, it was found that 14 tourist attractions harmed conservation and 18 tourist attractions that harmed animal welfare.

This low animal welfare also occurs in zoo areas. Based on the Regulation of the Minister of Forestry of the Republic of Indonesia Number P.31/Menhut-II/2012 concerning Conservation Institutions, a zoo is a place for keeping animals in an artificial environment that is displayed to the public and functions as a place of recreation, education, research, and conservation for endangered animals. However, in its management strategy in zoos, the conservation aspect of animal welfare is often ignored. In Taru Jurug Animal Park, better known as Solo Safari, the principle of sustainable animal tourism management which is assessed based on the concept of The Five Freedoms of Animals is considered suboptimal (Demartoto, 2021). The failure of animal welfare management based on this study was caused by limited budget, organizational management, and animal supervision and control systems.

Animal welfare can be affected by the presence of humans around them. Tourists who interact with animals are often unaware of the consequences of their interactions with the animals (Rizzolo, 2023). Human behavior such as hitting, shouting, rough handling, sudden movements, and loud noises can be perceived negatively and increase the animal's fear of humans (Sherwen & Hemsworth, 2019). The relationship between humans and animals can give rise to a variety of perspectives on human actions towards animals. The complexity of human-animal relationships can be partly explained by different human perspectives on their sensitivity, intelligence, and emotional lives (Kline & Fischer, 2023). Based on this research, it was also found that human motivations for considering animals in their considerations are often not aligned with the regular tension between altruistic reasoning and reasoning driven by human profit. Then, when viewed from the positive side, human-animal relationships can

have a real impact on animal welfare through good knowledge, skills, attitudes, and behaviors related to animal welfare, including through bonds with those who can improve their welfare, fitness, and biological performance and help ensure that animals have a life worth living, namely a life in which they can and take advantage of opportunities to get positive experiences (Mellor, 2016).

In the zoo environment, visitors can be key to achieving many zoo-based conservation goals (Sherwen & Hemsworth, 2019). In Indonesia, it is estimated that 67% of the population owns pets (Nurhayati-Wolff, 2022). However, the influence of pet owner bonds on positive behavior with other animals needs to be studied because the welfare of animals in zoos tends to be low. Zoos in developing countries, one of which is Indonesia, have low levels of animal welfare, especially related to the mental condition of animals and their treatment (Ward, 2020). Then the death of animals in zoos that are not caused by age factors still often occurs in Indonesia, such as the death of 3 tigers at Medan Zoo in 2023, 2 monkeys in Minizoo Bogor cage in 2022, and a baby elephant at Surabaya Zoo in 2021 (Tirto.id, 2024).

Research related to animal welfare in zoos has been widely conducted. Likewise, research on the relationship between the behavior of pet owners and animals outside their pets. However, research that combines the relationship between pet owners and animal welfare in zoos has not been widely conducted and is the state of the art of this research. Through this research, it is hoped that the relationship between pet ownership and perceptions of animal welfare in zoos can be described.

2. Method

2.1 Quantitative research approach and survey design

This study uses quantitative methods to see the relationship between pet ownership and perceptions of animal welfare in zoos. Quantitative research methods can be interpreted as testing a theory that is carried out by examining the relationship between variables measured using research instruments, and the data obtained is analyzed using statistical procedures (Creswell, 2014). The data collection technique used is a survey method that is carried out by distributing questionnaires online. The survey design provides a quantitative description of the trends, attitudes, and opinions of a population, or tests the relationship between variables in a population, by studying a sample of that population (Creswell, 2014).

$$n = \frac{N}{1+Ne^2} \quad \text{(Eq. 1)}$$

$$n = \frac{31{,}240{,}000}{1 + 31{,}240{,}000 \times (0.1)^2}$$

$$n = \frac{31{,}240{,}000}{1 + 312{,}400}$$

$$n = 99.9\ (converted\ into\ whole\ numbers\ by\ researchers\ to\ 100)$$

The population covered in this study is based on the population in Jabodetabek which includes DKI Jakarta Province, Bogor Regency, Bogor City, Depok City, Tangerang Regency, Tangerang City, South Tangerang City, Bekasi Regency, and Bekasi City. In this area, many animal husbandry places are open to the public such as Ragunan Zoo, Bogor Safari Park, and Faunaland Ancol, which have visited Ragunan Zoo in the last five years. The number of visitors to Ragunan Zoo and Jagat Satwa Nusantara. The population in Jabodetabek is 31.24 million people based on the 2020 population census. If using the Slovin formula (Sugiyono, 2017) then the formula used is then the following results will be obtained in Equation 1, with *n* as number of samples; *N* as population size; and *e* as coefficient. The results based on Slovin's calculations

will be rounded up to a whole number, resulting in a figure of 100 respondents. The survey results analyzed using descriptive statistical analysis techniques to determine the relationship between variables such as correlation tests using Pearson correlation.

Table 1. The five-domain model questionnaire design

Indicator	Question Draft
Nutrition	Fulfillment of animal nutritional needs
Physical Environment	Animal movement space
	The existence of physical components and facilities for animals
Health	Efforts to prevent disease and injury in animals
Behavioral Interaction	Animal interaction
	Interaction between animals and humans
	Animals - interaction with visitors has negative impacts on animals (-)

(Mellor, 2020)

2.2 Research instrumentation and operationalization

The variables used in this study are pet ownership as the independent variable (X) and perception of animal welfare in zoos as the dependent variable (Y). Variable X refers to human and animal interactions as measured by the Human-Animal Interaction Scale (HAIS) with a question design referring to (Fournier et al., 2016) and is described in Table 2. Variable Y will refer to The Five Domain Model developed by (Mellor et al., 2020) and is described in Table 1.

Table 2. HAIS question reference items

Subject of Behavior	HAIS Item	Item type	
		Positive	Negative
Human behavior	Seeing pets	✓	
	Spending time around pets	✓	
	Petting a pet	✓	
	Talking to pets	✓	
	Playing with pets	✓	
	Holding a pet	✓	
	Hugging a pet	✓	
	Kissing pets	✓	
	Caring for Pets	✓	
	Feeding pets	✓	
	Training pets	✓	
	Taking pictures/photos with pets	✓	
	Avoid interaction with pets		✓
	Behaving aggressively towards pets		✓
Pet behavior	Initiating interaction	✓	
	Make a friendly sound	✓	
	Eat the food given	✓	
	Obey orders	✓	
	Sniffing the owner	✓	
	Lick the owner	✓	
	Avoid the owner		✓
	Make a disturbing sound		✓
	Make a mess		✓
	Behave aggressively		✓

Table 3 establishes classification criteria for various research subjects by defining numerical ranges for total behavior scores. To ensure statistical accuracy across different group sizes, these ranges are calculated as a function of N (total number of respondents), creating a proportional scaling system. Using a five-point scale (1-5), the resulting categorization is produced in Table 3 (N = number of respondents).

Table 3. Categorization criteria for subject behavior based on total proportional value (N)

No	Subject of Behavior	Total Value	Category
1	People	40(N) – 60(N)	High
		20(N) - 40(N)	Middle
		0 (N) – 20 (N)	Low
2	Pet	20(N) - 30(N)	High
		10(N) – 20(N)	Middle
		0(N) – 10(N)	Low
3	Humans and Pets	60(N) - 90(N)	High
		30(N) – 60(N)	Middle
		0(N) – 30(N)	Low

Table 4 presents a standardized rubric designed to systematically convert numerical averages into qualitative descriptive terms, thereby enhancing comprehension and analytical depth. It is pertinent to note that a comprehensive scale ranging from 1 to 5 is employed in the computation of these averages, which are categorized in accordance with the framework presented in Table 4. This methodological approach establishes a consistent framework for interpreting the average performance of any given variable, thus enabling a clear and objective assessment of the results' positioning within the continuum of behavioral outcomes.

Table 4. Classification criteria for mean variable outcomes

No	Average value	Category
1	4-5	Very high
2	3-4	High
3	2-3	Middle
4	1-2	Low
5	0-1	Very Low

2.3 Statistical framework and comparative studies

The relationship will be calculated based on SPSS calculations using Pearson correlation and significance value. The significance value used in this study is 0.05, which means that the relationship between variables that have a value lower than 0.05 is considered to have a significant relationship, while those with higher values will be considered insignificant. Then, to categorize the level of Pearson correlation is described in Table 5.

Table 5. Classification of Pearson correlation coefficient strength

No	Average value	Category
1	0.00-0.19	Very weak
2	0.20-0.39	Weak
3	0.40-0.59	Middle
4	0.60-0.79	Strong
5	0.80-1.00	Very strong

Research related to human perceptions of animal welfare in zoos has previously been conducted by several researchers. The details of previous research are presented in the following Table 6. Table 6 provides a structured overview of existing research on public

perception and their impact on animal welfare in zoo facilities. This table compiles a range of research objectives, ranging from measuring visitor satisfaction to studying behavioral correlations between humans and specific animal species.

Table 6. Previous research related to human perceptions of animal welfare in gardens

No	Title (Researcher, Year of Publication)	Research purposes	Locus and object of research	Results
1	Evaluation of Visitor Satisfaction and Perception of Animal Welfare at the University of Ibadan Zoo (Ojo, 2019)	Measuring the overall level of zoo visitor satisfaction and assessing visitor perceptions of animal welfare at the zoo.	The research location was conducted at the University of Ibadan Zoo in Nigeria with respondents being general zoo visitors.	Satisfaction rates for animal welfare in zoos tend to be high with the highest levels of negative perception being dissatisfaction with the space and handling of cages for birds (28%) and primates (21%). This study resulted in recommendations for increasing the size of cages and hygienic conditions in animal cages at Ibadan Zoo.
2	The Relationship between Visitor Perception and Behavior Towards the Welfare of Timor Deer in Cikembulan Garut Zoo (Puspitasari et.al, 2015)	Measuring the relationship between visitor perceptions and behavior towards the level of welfare of Timor deer animals by referring to the 5 minimum standards of animal welfare stipulated in the Regulation of the Director General of PHKA No. P.9/IVSET/2011.	The location of this research is at Cikembulan Zoo, Garut, with respondents being general visitors to Cikembulan Zoo.	The welfare aspect of Timor deer in Cikembulan Zoo which was considered the lowest by visitors was related to deer activity and the availability of cage facilities. Then related to behavioral relationships, visitor actions such as maintaining distance, taking pictures without flash, throwing garbage in its place, obeying the rules, not shouting, and not shaking the fence, did not correlate with improving the welfare of Timor deer in Cikembulan Zoo. Another interesting correlation result in this study is that improving animal welfare will be able to increase visitor interest in Timor deer. The recommendation from this study is to improve management, especially in terms of efforts to prevent disease and injury in Timor deer.

3. Results and Discussion

3.1 Human interaction with pets

The survey findings illustrate that pet owners tend to be more critical of the welfare conditions of animals in zoos. Table 7 shows an overview of the survey results. Of the 126 respondents who filled out the questionnaire, the majority were respondents aged 39 years and over and aged 15-29 years. Then the number of female respondents was greater than the male respondents. Then for pet ownership, 42.9% of respondents had pets and 57.1% did not have pets. However, respondents who did not have pets still interacted with domesticated animals (dogs and cats).

Table 7. General description of respondents (N=126)

Classification		N	%
Respondent Age	>39	52	41.3
	20-24	6	4.8
	25-29	38	30.2
	30-34	20	15.9
	34-39	10	7.9
Gender	Man	56	44.4
	Woman	70	55.6
Pet Ownership	Yes	54	42.9
	No	72	57.1

The woman respondents who have pets (cats and dogs) are the same as non-pet owners, while for male respondents only 25% have pets. Then in terms of age, each gender and pet ownership is represented, with the most respondents being women aged over 39 years with a total of 37 respondents, and men aged 25-29 years with a total of 21 respondents. Cats are the most widely owned animal by respondents with an ownership rate of 74.1%, while dog ownership is at 20.4% (Table 8) of the total 54 pet-owning respondents, 3 respondents keep both cats and dogs. Most (61.1%) of pet owners have had pets for more than 5 years. All respondents who have had pets for less than 1 year are cat owners, and all respondents who have both pets (dogs and cats) have kept pets for more than 5 years. Based on the calculation of HAIS values (Table 9), pet owners have significantly higher HAIS values than non-pet owners.

Table 8. Classification of animal types and duration of ownership of pet owner respondents (N=54)

Classification		N	%
Types of Pets	Cat	40	74.1
	Dog	11	20.4
	Both of them	3	5.5
Duration of ownership	< 1 year	7	13
	1-3 years	11	20.4
	4-5 years	3	5.5
	> 5 years	33	61.1

The highest HAIS values for both pet owners and non-pet owners are in the interaction of seeing pets, while for pets, eating food given by the owner is the interaction with the highest value. Then, if we look at the duration of their pet ownership, pet owners who have interacted for more than 5 years have an average HAIS value of 3.3, a duration of 4-5 years has an average HAIS of 3.2, a duration of 1-3 years has an average of 3.13, and for those less than 1 year has an average value of 2.66. This shows that the longer a person interacts with pets (cats and dogs) that they own or do not own, the greater their HAIS value will be. Gender differences also produce different HAIS values where female pet owners have a higher HAIS average (3.23) than male (3.05). Previous studies also show that women are more concerned and aware of animal welfare than men (Randler et al., 2021; Clark et al., 2016). This is because women tend to have higher emotional intelligence and empathy and are able to implement it by behaving positively towards animals (Gómez-Leal et al., 2021). In terms of age, pet owners over 39 years old have an average HAIS value of 2.96, those aged 30-39 years old have an average value of 3.17, and those aged 20-29 years old have an average value of 3.52. This shows that the older a person is, the lower their HAIS value will tend to be. Based on previous studies, owning and interacting with pets has a positive impact on mental health, such as reducing stress and loneliness for young people, while in older people this positive impact is not found (Scoresby et al., 2021).

Table 9. HAIS means results (N=126)

Subject of Behavior	HAIS Item	Pet owners (N=54)		Non-pet owners (N=72)	
		Total	Average	Total	Average
Human behavior (pet owners)	Seeing pets	244	4.52	227	3.15
	Spending time around pets	206	3.81	145	2.01
	Petting a pet	213	3.94	168	2.33
	Talking to pets	215	3.98	169	2.35
	Hugging a pet	182	3.37	133	1.85
	Playing with pets	201	3.72	168	2.33
	Kissing pets	161	2.98	103	1.43
	Caring for Pets	237	4.39	132	1.83
	Feeding pets	246	4.56	174	2.42
	Training pets	164	3.04	115	1.60
	Holding a pet	220	4.07	176	2.44
	Taking pictures/photos with pets	181	3.35	158	2.19
	Avoid interaction with pets (-)	99	1.83	159	2.21
	Behaving aggressively towards pets (-)	87	1.61	126	1.75
Total Human Behavior Score (1)		2284		1583	
Pet behavior	Initiating interaction	224	4.15	223	3.10
	Make a friendly sound	212	3.93	208	2.89
	Eat the food given	252	4.67	210	2.92
	Obey orders	195	3.61	177	2.46
	Sniffing the owner	208	3.85	194	2.69
	Lick the owner	157	2.91	125	1.74
	Make a disturbing sound (-)	103	1.91	155	2.15
	Behave aggressively (-)	120	2.22	156	2.17
	Make a mess (-)	120	2.22	165	2.29
	Avoid owner (-)	102	1.89	156	2.17
Total Animal Behavior Score (2)		803		505	
HAIS Total Score (1+2)		3087		2088	

3.2 Human perceptions of zoo animal welfare

Respondents who visited the zoo numbered 120 out of a total of 126 respondents (Table 10). Of all the respondents who had visited the zoo, on average they had visited more than one zoo location, with the visit locations dominated by Ragunan Zoo (84 people) and Taman Safari Bogor (87 people). The time of the last visit of the respondents to the zoo mostly occurred more than 3 years ago (52.5%), while respondents who visited the zoo within a period of 1-3 years ago were 22.5% and those less than 1 year ago were 30%.

Table 10. Respondents' zoos visit data (N=120)

Classification		N	%
Zoos visited	Ragunan Zoo	84	70
	Bogor Safari Park	87	73
	Faunaland or Sea World Ancol	48	40
	Animal World or Bird Park Taman Mini	45	38
	Jakarta Aquarium	15	12.5
	Other Places to See Animals in Jabodetabek	9	7.5
	Other Places to See Animals Outside Jabodetabek	24	20
Last visit to the zoo	<1 year ago	36	30
	1-3 years ago	27	22.5
	>3 years ago	63	52.5

Respondents who visited the zoo had varying perceptions regarding animal welfare in the zoo. Based on the survey results, the environmental indicator was the indicator with the lowest perception with an average of 2.76 for animal movement space and 2.91 for the existence of physical components and facilities for animals. This indicator is included in the medium category indicator along with the health indicator which has an average of 2.99. Then the highest value is in the nutrition indicator where the average value is 3.14. The nutrition indicator is included in the high category along with the interaction indicator which has an average value of 3.00 (questions about interactions between animals and visitors are not counted because of negative questions). When viewed as a whole, the respondents' perceptions of animal welfare in the zoo are in the medium category (Table 11).

Table 11. Respondents' perceptions of animal welfare in zoos (N=120)

Indicator	Question	Total	Average
Nutrition	Fulfillment of animal nutritional needs	377	3.14
Environment	Animal movement space	331	2.76
	The existence of physical components and facilities for animals	349	2.91
Health	Efforts to prevent disease and injury in animals	363	3.03
Interaction	Animal interaction	354	2.95
	Interaction between animals and humans	366	3.05

The physical environment affects the sensory exposure of animals to visitors. Appropriate enclosures provide animals with the freedom to choose whether or not to interact so that their mental condition can be maintained. The complexity of the enclosure (size, height, type of barriers, and enclosure facilities) provides space for animals to control the distance and interaction of animals with visitors according to the animal's wishes so that they can maintain their mental condition (Sherwen & Hemsworth, 2019). The condition of the enclosure that is too small and without a place to hide makes animals unable to avoid interaction or disturbance from visitors which triggers stress so that they look lethargic and are in the corner of the enclosure as far away as possible from visitors. This may be what visitors see so the values of the physical environment are the lowest indicators.

3.3 Pet owners' perceptions of animal welfare in zoos

Analyzing pet owners' perceptions of animal welfare requires attention to the interaction period with the last visit to the zoo. Therefore, an analysis is needed that adjusts the duration of animal ownership with the last visit to the zoo. The duration of pet ownership must be longer or at least the same as the time of the last visit to the zoo. The last visit that occurred before pet ownership will not be valid for measuring the relationship between animal ownership and animal welfare at the zoo.

Table 12. Data from pet owner respondents that can be analyzed (N=41)

Duration of ownership	Visit to the zoo			
	< 1 year	1-3 years	> 3 years	Total
< 1 year ago	0	3	4	0
1-3 years ago	2	3	6	5
4-5 years	0	0	3	3
> 5 years	9	6	18	33
Total	11	9	21	41

From the overlay of the duration of pet ownership with zoo visits as explained in Table 12, data was generated that there was a total of 41 pet owner respondents who could be analyzed. Then, based on all the analyzable data regarding perceptions of animal welfare in

zoos, a comparison will be made with pet ownership as shown in Table 13. The analysis of Table 13 reveals that the average perception of pet owners towards animal welfare in zoos was in the moderate category with an average HAIS value in the high category. Then when compared with non-pet owners, the following comparison was produced (Table 14).

Table 13. Pet owners' perceptions of animal welfare

HAIS mean value	Animal welfare perception domain 1-4 (Mean)				Domain 5
	Nutrition	Physical Environment	Health	Behavioral Interaction	Mental Condition (Total 1-4)
3.27	2.98	2.56	2.71	2.72	2.57

If we look at the relationship between HAIS values and perceptions of animal welfare in zoos, it can be seen through the analysis results. There is a significant difference in HAIS values between pet owners and non-pet owners. The average HAIS of pet owners is in the high category with a score of 3.27, while non-pet owners are in the low category with a score of 1.69. This shows that the level of closeness of the relationship between pet owners is much higher than those who do not have pets.

Table 14. Comparison of zoo animal welfare perceptions

Pet ownership	HAIS mean value	Animal welfare perception domain 1-4 (Mean)				Domain 5
		Nutrition	Physical Environment	Health	Behavioral Interaction	Mental Condition (Total 1-4)
Have	3.27	2.98	2.56	2.71	2.72	2.57
Don't have	1.69	3.30	3.04	3.32	3.30	3.24

Animal nutrition fulfillment in the zoo according to the perception of pet owners is in the moderate category, while according to people who do not have pets, nutritional fulfillment is already in the highest category. Then from the physical environmental conditions, pet owners assess the physical environmental conditions, both the animal movement space and the components of physical facilities for animals, are in the moderate category. For those who do not have animals, the perception of environmental conditions for zoo animals is average in the high category, but for the component of animal movement space, it has a value of 2.95 which is in the moderate category. In the Health domain, pet owners on average assess Health services for pets in the moderate category, while non-pet owners are in the high category. The behavioral interaction domain also shows the same category pattern as the other domains.

Table 15. Degree of correlation between pet ownership and perception of the adequacy of zoo animal nutrition.

		Closeness of Relationship	Nutrition
Closeness of Relationship	Pearson Correlation	1	-0.275
	Sig. (2-tailed)		0.082
	N	41	41
Nutrition	Pearson Correlation	-0.275	1
	Sig. (2-tailed)	0.082	
	N	41	41

Note. Values are Pearson's *r* (2-tailed): *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

In general, domains 1-4 for pet owners and non-pet owners show the same pattern, where pet owners with a high average HAIS value have a perception domain in the moderate category, while non-pet owners who have a low average HAIS value tend to have a perception in the high category. The mental condition domain, which is an accumulation of perception domains 1-4, shows a medium perception category for pet owners, while non-pet owners are in the high

category. Then the correlation and significance of the relationship between pet ownership and perceptions of animal welfare in each domain produces varying levels of correlation, and not all have a significant relationship. The degree of correlation between pet ownership and perceptions of the adequacy of zoo animal nutrition shows a low negative correlation (Table 15). Pet owners consider the fulfillment of animal nutrition in zoos to be in the moderate category, while non-pet owners consider animal nutrition to be fulfilled (high category). Based on the correlation value, it was found that there was a negative relationship between the closeness of the relationship and the adequacy of nutrition with a weak level of relationship with a significance value that exceeded the minimum limit. So there is no significant relationship between the closeness of the human-pet relationship and the perception of the adequacy of animal nutrition in zoos. This shows that the behavior of some pet owners to provide healthy food for their pets compared to themselves as explained by Schleicher et al. (2019) is not followed by their perception of the adequacy of animal nutrition in zoos. However, the correlation results that produce negative values indicate that pet owners still have a negative tendency toward the condition of animal nutrition in zoos.

Table 16. Degree of correlation between pet ownership and perception of the suitability of the physical environment for zoo animals.

		Closeness of Relationship	Physical environment
Closeness of Relationship	Pearson Correlation	1	-0.321*
	Sig. (2-tailed)		0.040
	N	41	41
Physical environment	Pearson Correlation	-0.321*	1
	Sig. (2-tailed)	0.040	
	N	41	41

Note. Values are Pearson's *r* (2-tailed): *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

The correlation value in Table 16 shows that there is a low negative correlation between the closeness of the human-pet relationship and the perception of the environmental suitability for zoo animals. The significance value shows that there is a significant relationship between the variable of the closeness of the human-pet relationship and the perception of the environmental conditions of zoo animals. The higher a person's HAIS value, the more negative the person's perception of the environmental conditions of zoo animals will be.

Pet owners consider that placing pets in enclosures cages will hurt pets. Cats kept in cages trigger stress due to the lack of shelter when cats experience stress or fear (Ellis et al., 2021). Keeping cats outside the cage will provide space for them to fulfill their behavioral needs, such as territorial marking, roaming, and climbing (Foreman-Worsley et al., 2021). Therefore, the presence of animals in conditions of confinement in inappropriate places in zoos has negative implications for their perception of animal welfare.

Table 17. The degree of correlation between the closeness of the human-pet relationship and the perception of the appropriateness of health care for zoo animals.

		Closeness of Relationship	Health
Closeness of Relationship	Pearson Correlation	1	-0.292
	Sig. (2-tailed)		0.064
	N	41	41
Health	Pearson Correlation	-0.292	1
	Sig. (2-tailed)	0.064	
	N	41	41

Note. Values are Pearson's *r* (2-tailed): *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

The relationship between the closeness of the human-pet relationship and the perception of the appropriateness of health care for zoo animals shows a low negative correlation (Table 17). Then the significance value is above 0.05 which indicates that there is no significant relationship between the closeness of the human-pet relationship and the perception of the appropriateness of health care for zoo animals. This shows that high concern for the health conditions of pets as explained by Forrest et al. (2023) and Ramirez et al. (2022) does not have a significant effect on the perception of the adequacy of health facilities at the zoo. However, based on the correlation results, it still produces a negative correlation, which means that pet owners tend to have a negative assessment of the handling of animal health at the zoo.

Table 18. Degree of correlation between pet ownership and perceived appropriateness of interaction for zoo animals.

		Closeness of Relationship	Interaction
Closeness of Relationship	Pearson Correlation	1	-0.328*
	Sig. (2-tailed)		0.036
	N	41	41
Interaction	Pearson Correlation	-0.328*	1
	Sig. (2-tailed)	0.036	
	N	41	41

Note. Values are Pearson's *r* (2-tailed): *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

The perception of the appropriateness of interaction for zoo animals among pet owners showed a low negative correlation (Table 18). The significance figure of the relationship was 0.036, indicating a significant relationship between pet ownership and their perception of the appropriateness of animal interactions in the zoo. The higher the HAIS value of pet owners, the more negative the perception of the appropriateness of animal interactions in the zoo.

Pet owners are more aware of the interaction that can trigger stress for animals in zoos as they know the behaviors that trigger stress for their pets. Making loud noises, sudden movements, and screaming that have negative mental impacts and increase fear in animals in zoos as explained by Sherwen & Hemsworth (2019) are also understood by pet owners because their pets will also feel disturbed if these behaviors are carried out.

Table 19. Degree of correlation between pet ownership and perceived mental condition of zoo animals

		Closeness of Relationship	Mental
Closeness of Relationship	Pearson Correlation	1	-0.470**
	Sig. (2-tailed)		0.002
	N	41	41
Mental	Pearson Correlation	-0.470**	1
	Sig. (2-tailed)	0.002	
	N	41	41

Note. Values are Pearson's *r* (2-tailed): *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

Mental condition is the result of the accumulation of the previous 4 domains (nutrition, physical environment, health, and interaction). Compared to the previous four domains, animal mental condition is the only domain of animal welfare perception that has a moderate negative correlation with pet ownership (Table 19). The significance value of this domain is below 0.01, indicating that there is a very significant relationship between pet ownership and the perception of animal mental health in the zoo. The higher the level of closeness of the relationship between pet owners and their pets, the negative effect on the perception of pet owners. This shows that pet owners are concerned about the mental condition of animals in the zoo through their perceptions of the conditions of nutritional fulfillment, the suitability of the physical environment, health, and animal interactions in the zoo.

The overall relationship between pet ownership and perception of animal welfare in each domain shows a negative correlation, which means that every increase in the level of closeness of the relationship between humans and their pets will decrease their level of perception of animal welfare in the zoo. Then the relationship between pet ownership and perception of animal welfare is at a low level of correlation in the domains of nutrition, physical environment, health, and behavioral interaction. While the perception of the mental health domain is in the moderate category. Another thing to note is that the zoo animal nutrition and health domains have no significant relationship, while the other three domains already have significant relationships.

3.4 Discussion

The lowest value of the animal welfare domain based on this study is the condition of the physical environment of the animals which includes the space for animal movement and the components of physical facilities for animals. This is due to previous studies that showed visitor dissatisfaction with space, cage handling, and the availability of cage facilities at the zoo (Ojo, 2019; Puspitasari et al., 2015). This shows the need for zoo managers to prioritize improving the components of physical facilities at the zoo because one of the sources of negative perceptions of zoo management is the management of cage facilities for animals.

Moving on to the general perception of animal welfare, the results of the study showed that pet owners had a more negative perception of animal welfare in zoos compared to non-pet owners. However, this does not necessarily indicate that the performance of zoo management is bad in their eyes. Based on the results of the HAIS assessment, the perception of animal owners is in the medium category, not in the low or very low category so their assessment is not entirely bad.

A more negative perception is caused by pet owners tending to be more critical of the condition of the animals. This is due to the intense interaction between pets and their owners. Pet owners are accustomed to caring for their pets such as providing proper food, providing routine health services, and/or providing proper housing. This is to research which states that pet owners feel the need to provide a decent home, carry out regular treatment, and vaccinate their pets (Forrest, et al., 2023), even some pet owners identify that the health of their pets is more important than their health (Ramirez et.al., 2022). Therefore, when pet owners see the condition of the zoo that looks dirty, a sense of sensitivity will arise that the condition of the animals in the zoo is not yet prosperous. Pet owners tend to have greater empathy for the animals in the zoo because of the emotional connection between them and their pets (Binngießer et al., 2013; Ramirez et.al., 2022).

4. Conclusion

Pet owners assess the level of animal welfare in zoos more critically than those who do not have pets. This is influenced by the intensity of the pet owner's interaction with their pets. Intense interaction with pets produces emotional bonds, sensitivity, and empathy for pets. This also affects their perception of the welfare of other animals in zoos. Visitors who do not have pets tend to think that the condition of animals in zoos is good because the basic needs of animals have been provided by the management. However, their lack of knowledge and interaction with animals makes them less critical in assessing the fulfillment of the needs of animals in zoos. Future research that can be developed related to the perception of animal welfare can encourage pet owners to contribute to improving animal welfare in zoos either through materials, education, or action movements because zoos are also locations for animal education and conservation.

Acknowledgement
The author would like to express gratitude to the reviewers for their invaluable feedback and insightful recommendations, which significantly enhanced the quality and clarity of this manuscript.

Author Contribution
This work was solely conducted by M, A. M., who was responsible for the conceptualization, methodology, data collection, analysis, and writing of the manuscript.

Funding
This research received no external funding.

Ethical Review Board Statement
Not available.

Informed Consent Statement
Not available.

Data Availability Statement
Not available.

Conflicts of Interest
The author declares no conflict of interest.

Declaration of Generative AI Use
The author declares that no generative artificial intelligence tools were used in the preparation, writing, analysis, or editing of this manuscript. All contents were produced entirely through the authors' own reasoning, interpretation, and analysis based on existing data and published literature.

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