Journal of
Zoological and Botanical Gardens

MDPI

Article

Gender and Age, but Not Visual Context, Impact Wildlife Attitudes and Perceptions of Animals in Zoos

Andrew C. Alba [1,*], Gina M. Ferrie [1], Mandi Wilder Schook [1], Maureen Leahy [2] and Katherine A. Cronin [2,3]

[1] Animals, Science and Environment, Disney's Animal Kingdom®, Lake Buena Vista, FL 32830, USA
[2] Animal Welfare Science Program, Lincoln Park Zoo, Chicago, IL 60614, USA
[3] Lester E. Fisher Center for the Study and Conservation of Apes, Lincoln Park Zoo, Chicago, IL 60614, USA
* Correspondence: andrew.alba@disney.com

Abstract: People's attitudes toward wildlife may impact their behaviors in support of conservation. We surveyed people in the United States to determine if gender, age, or visual contexts commonly seen in zoos impacted wildlife attitudes and perceptions of animals in zoos. After viewing an image of a two-toed sloth (*Choloepus hoffmanni*) or reticulated python (*Malayopython reticulatus*) in one of six different contexts, respondents indicated their agreement with statements designed to reveal their wildlife attitudes. We categorized attitude types, determined factors influencing attitudes, and investigated perceptions of animals in zoos. Analyses revealed both positive and negative wildlife attitudes. Attitudes were not influenced by the context in which animals were portrayed but were highly impacted by gender and age. Similar factors influenced perceptions of animals in zoos. Zoological facilities should consider how attitudes are shaped by gender and age when designing animal exhibits, educational programs, and media offerings to promote conservation mindedness.

Keywords: wildlife attitudes; zoos; tourism; perceptions; human–animal relationships

Citation: Alba, A.C.; Ferrie, G.M.; Schook, M.W.; Leahy, M.; Cronin, K.A. Gender and Age, but Not Visual Context, Impact Wildlife Attitudes and Perceptions of Animals in Zoos. *J. Zool. Bot. Gard.* **2023**, *4*, 118–133. https://doi.org/10.3390/jzbg4010013

Academic Editor: Kevin Cianfaglione

Received: 13 December 2022
Revised: 27 January 2023
Accepted: 1 February 2023
Published: 7 February 2023

1. Introduction

People's attitudes toward wildlife may influence their behaviors in support of conservation [1,2]. A commonly used instrument to measure wildlife attitudes was developed by Kellert [3]. Although Kellert refined this framework throughout his career [4–11], most of his works include seven wildlife attitudes: naturalism (i.e., interest in and affection for wildlife and nature), ecologism/scientism (i.e., interest in ecosystem functioning and animal biology; hereafter shortened to ecoscientistic; see [12]), moralism (i.e., concern for animal welfare and against animal cruelty), negativism (i.e., avoidance of animals based on indifference, fear, or dislike), utilitarianism (i.e., concern for the material value of animals for human use), dominionism (i.e., interest in controlling or mastering wildlife), and humanism (i.e., interest in and affection for animals based on charismatic or anthropomorphic traits) [13].

Early studies reported that wildlife attitudes were impacted by demographic factors (reviewed in [14]), especially self-defined gender. Females tend to form stronger emotional connections to animals than males, resulting in higher expression of humanistic and moralistic attitudes [10]. Moreover, females may place more value on non-human species, having more concern for the welfare of individual animals and conservation of populations [10,15,16]. Males tend to place greater value on the usefulness of animals for human benefit, scoring higher on utilitarian and dominionistic scales [10,15,17,18]. This difference in attitudes may account for findings that females are more critical of keeping animals in zoos [19,20]. However, for species associated with phobias or danger (e.g., predators or pests), females tend to express stronger feelings of fear or disgust and report negative attitudes, while males feel more favorably toward these species [10,21,22].

Age can also influence wildlife attitudes. Younger generations have demonstrated more positive or protectionist (i.e., supportive of conserving species and/or against animal use) attitudes toward animals [4,7–9,23,24], are more critical of keeping animals in zoos [25], and have reported more interest in having non-domesticated animals as pets [26]. However, younger people have reported more fear, disgust, or negative attitudes toward species viewed as dangerous or frightening [21,27]. In other studies, age did not influence attitudes [28,29] or was only important for some attitude types [12,18].

Understanding how context influences attitudes is important as many zoos and aquariums aim to actively influence the public by providing opportunities to connect people with wildlife [28,30–32]. Approaches for engagement include immersive and participatory activities inside animal exhibits (e.g., feedings, touch tanks), walk-through exhibits, and bringing animals out of their exhibits for close encounters or physical contact on or off grounds (e.g., 'ambassador' animal programs). More passive approaches are also used, such as displaying animals in naturalistic exhibits, conducting training demonstrations, and offering interpretation with animals present [30,33–35]. Zoos and aquariums also use virtual strategies by providing media content for public consumption off grounds [36,37]. Compared to the general population, zoo visitors scored higher on naturalistic, ecoscientistic, moralistic, and humanistic attitude scales and lower on negativistic, utilitarian, and dominionistic scales [7]. Whether or not zoo and aquarium experiences promote connectedness to animals or pro-conservation attitudes is a topic of current interest [28,38–40].

Prior research has investigated how portrayals of animals impact wildlife attitudes and perceptions using imagery or video. Spooner and Stride [41] found that visual context impacted zoo visitors' attitudes, including their desire to have animals as pets, concern for animals becoming extinct, connection to animals, or feeling of animals' importance to the ecosystem. Notably, all contexts were viewed positively, but those who viewed zoo-based images reported greater concern for the environment and animal welfare compared to those who viewed other contexts. In an investigation of the impact of close-encounter images on public perceptions, Shaw et al. [42] found that images with humans and animals in close proximity elicited feelings that those animals were not displaying natural behaviors and would make good pets. In particular, others have explored whether or not visual context influences the desirability of non-domesticated animals as pets. Zoo visitors [43], college students [44], and the general public [45] shown photos or videos of non-human primates in unnatural settings and/or in proximity with humans were more likely to report primates as being suitable pets compared to those viewing them in naturalistic settings or without a human present, while Leighty et al. [43] and Schroepfer et al. [44] did not display animals in zoo contexts, Ross and colleagues [45] found that those viewing chimpanzees in a zoo setting were less likely to report chimpanzees as desirable pets compared to those viewing them in anthropomorphic, wild, or neutral settings. However, Cronin et al. [26] did not find sufficient evidence that context impacted interest in ownership of two-toed sloths and reticulated pythons as pets.

To determine if gender, age, and visual context influence attitudes toward wildlife and animals in zoos, we designed a survey for the general public. We used photos of two-toed sloths (*Choloepus hoffmanni*) and reticulated pythons (*Malayopython reticulatus*) in various contexts without providing messaging. We selected these two species because we anticipated they would inspire positive and negative emotions, respectively [14], and they are common in public-facing zoo programs [35]. Based on previous research, we made the following hypotheses. People viewing either species in a naturalistic or zoo setting would report more positive and conservation-minded attitudes (naturalistic, ecoscientistic, moralistic, humanistic) compared to those viewing portrayals in unnatural settings or in the presence of people (no uniformed zoo staff present). Younger respondents would report more positive attitudes toward both species, and females would report positive attitudes after viewing the sloth compared to males, while males would report more positive attitudes after viewing the python compared to females. Finally, older generations and males would express more favorable perceptions of animals in zoos.

2. Materials and Methods

We created and administered surveys, recruited and compensated survey participants residing in the United States (USA), and designed and presented images (or stimuli) according to Cronin et al. [26]. See Figure 1 for image descriptions. After viewing one randomly selected image for 15 s, survey respondents selected their level of agreement with a series of 24 attitude statements. The first statement was the subject of another study [26], and the remaining 23 were previously validated statements used to identify attitudes toward wildlife and perceptions of animals in zoos [1,2,7,12,44,46–50]. Where applicable, we reworded statements slightly to explicitly refer to sloths or pythons. We presented attitude statements in random order on a single page. For each, respondents selected from a 4-point Likert scale with the following response choices: "strongly disagree, disagree, agree, strongly agree". We provided demographic questions in a set order at the end of the survey. The full survey and details regarding survey settings and instructions can be found in Supplementary Materials.

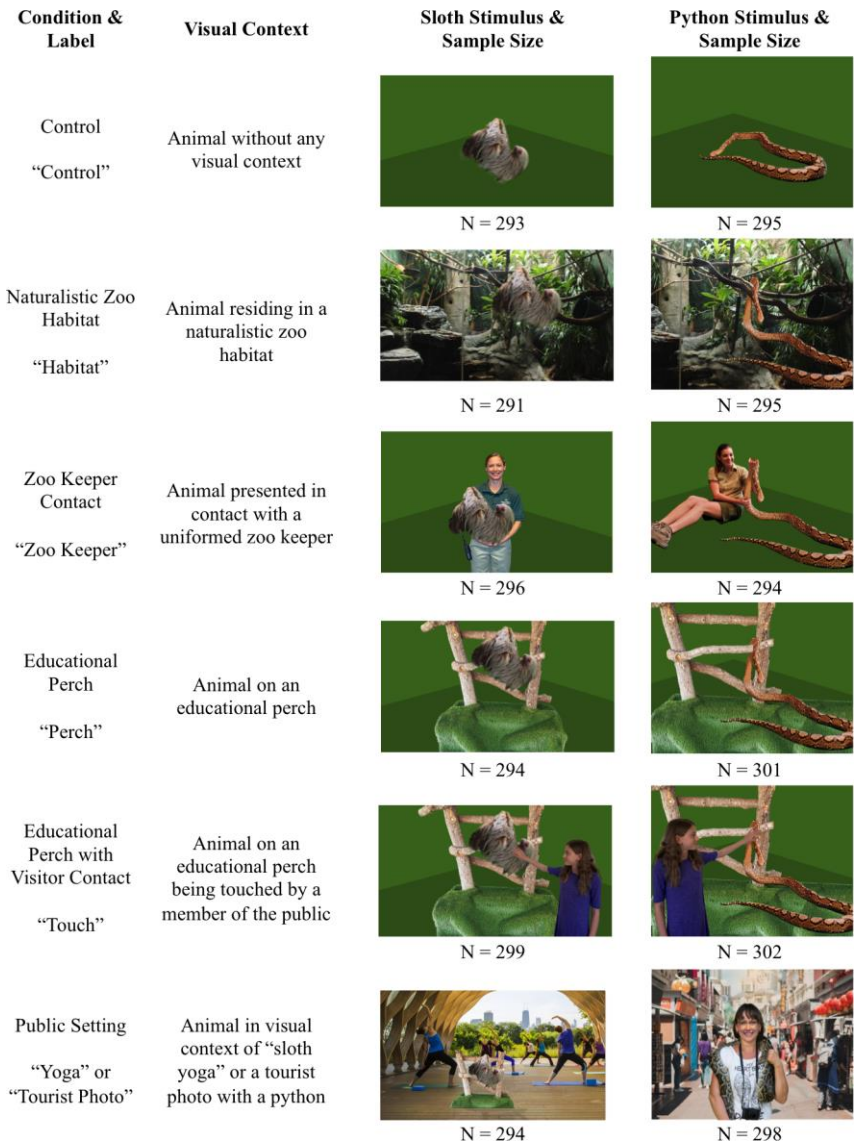

Figure 1. Experimental conditions, survey images, and sample size per condition. Figure reproduced from Cronin et al. [26] with permission under the Creative Commons license.

Data Analysis

We compiled, organized, and processed data as described in Cronin et al. [26]. The final dataset contained responses from 1767 individuals presented with a sloth study image and 1785 individuals presented with a python study image (see Figure 1 for sample size per image). We performed all data analyses using R version 3.6.3 [51].

To determine if our findings supported Kellert's seven attitude types, we conducted a principal components analysis (PCA) on responses to survey statements 2–21 regarding attitudes toward wildlife (Table 1). We analyzed sloth and python datasets separately due to expected differences in attitudes [14]. We used the princomp function in R package 'stats' [51] to conduct and visualize PCAs. We used the alpha function in R package 'psych' [52] to calculate Cronbach's alpha for Scale Reliability, considering $\alpha > 0.6$ to be reliable and $\alpha > 0.8$ to be very reliable [53]. We removed survey statements with loadings $< |0.4|$ and performed iterative PCAs until all factor loadings were $\geq |0.4|$ [54]. We used function KMO in R package 'psych' [52] to calculate the Kaiser–Meyer–Olkin (KMO) Measure of Sampling Adequacy [55] and performed Bartlett's Test of Sphericity using function bart_spher in R package 'REdaS' [56] to confirm the suitability of data for PCA. We used scree plots to visualize eigenvalues and retained components that explained a majority of the variance [57]. Using the fa function in R package 'psych' [52] we applied orthogonal (varimax) rotation and restricted outcomes to retained components. We reviewed factor loadings for each statement and conceptually labeled components as distinct attitude types.

We conducted linear regressions using the lm function in R package 'stats' [51] to estimate whether each of the first two principal components (representing distinct attitude types) was predicted by visual context, gender, and age for respondents who viewed a sloth image and those who viewed a python image, separately. Only the first two components for each species were retained for further analyses since a majority of statements loaded onto those components. We ran four separate models with the index scores of each of the first two principal components for each species as the dependent variable, and, in each model, visual context (fixed categorical predictor with six levels), respondent age (fixed categorical predictor with five levels, binned by generation following Dimock [58] as follows: Gen Z (18–24 years old), Millennial (25–40), Gen X (41–56), Boomer II (57–66), Boomer (67–75), Post War (76–93)), and respondent gender (fixed categorical predictor with three levels: male, female, other) as predictors. While respondents could specify additional gender identities (Supplementary Materials, Table S1), we used three categories to simplify analyses following Lindqvist et al. [59]. For all linear regression models, assumptions were met including homogeneity of variance and normality. We performed Type II likelihood ratio tests using the ANOVA function in R package 'car' [60] to determine the significance of predictors in each model and conducted post-hoc pairwise comparisons (with results averaged over levels of other variables and adjusted p-values calculated using the Tukey method) using the emmeans function in R package 'emmeans' [61].

We analyzed responses to survey statements 22–24 separately to predict which factors impacted perceptions of animals in zoos. Again, we analyzed data separately by species. We conducted ordinal logistic regression to estimate the effects of visual context, generation, and gender on the response to each statement independently using the polr function in the R package 'MASS' [62]. For each model, the dependent variable was the four-level ordered categorical response (the respondent's Likert response). We used the same predictors as those reported above in linear regression models, and we conducted Type II likelihood ratio tests to determine the significance of predictors and post-hoc pairwise comparisons for each variable. For each ordinal logistic model, we found no evidence of multi-collinearity, and we used the function brant in R package 'brant' [63] to perform the Brant test [64], which indicated that the parallel regression assumption held in each case.

Table 1. Survey statements used in principal components analyses (PCA) and predicted attitude. Survey statement 1 was the subject of another study [26] and is not included below but can be found in Supplementary Materials.

Survey Statement	Attitude
2. People should have the right to buy and keep a sloth (python) if they want to. [44]	Dominionistic
3. Allowing people to hold or handle a sloth (python) for a photo opportunity should be banned. [50]	Dominionistic
4. I would enjoy learning about the ecosystem of wild sloths (pythons). [12]	Ecoscientistic
5. I am very interested in learning about wild sloth (python) populations in nature. [12]	Ecoscientistic
6. It is important that we learn as much as we can about wildlife. [1]	Ecoscientistic
7. I am afraid of sloths (pythons). [12]	Negativistic
8. I think sloths (pythons) are unclean and full of disease. [12]	Negativistic
9. I do not think sloths (pythons) are smart enough to be trained in a zoo. [12]	Negativistic
10. I like to see pictures or watch TV programs depicting animals like sloths (pythons), but I have little desire to see them in the wild. [12]	Naturalistic
11. I would be thrilled to take a tour in Central/South America (Asia) to see sloths (pythons) in the wild. [12]	Naturalistic
12. If I were to take a tour in Central/South America (Asia), I would prefer to stay in a modern facility in a city rather than in nature where there might be wild sloths (pythons) around. [12]	Naturalistic
13. I think love is an emotion that people should feel for other people, not for sloths (pythons). [12]	Utilitarian
14. I think it is okay if wild animals participate in experiences such as sloth yoga (tourist photos). [12]	Utilitarian
15. If there are plenty of sloths (pythons) in the wild, I believe people should be allowed to hunt or capture and sell them if it helps improve their livelihood. [12]	Utilitarian
16. It harms animals to use them in the media, such as commercials, television programs, or movies. [44]	Moralistic
17. In my opinion, animals are definitely inferior to humans. [47]	Moralistic
18. There should be extremely harsh penalties including jail sentences for people who participate activities that result in cruelty to animals. [48]	Moralistic
19. I am, or could become, very emotionally attached to some of the sloths (pythons) I see at the zoo. [12]	Humanistic
20. I feel a sense of connection with the animals I see at a zoo. [2]	Humanistic
21. I do not feel affectionate toward animals I see at a zoo. [7]	Humanistic

3. Results

3.1. Principal Components Analyses

The PCA of survey statements for both species revealed that our data did not support Kellert's wildlife attitude framework [3]. Cronbach's alpha for Scale Reliability indicated that data were very reliable ($\alpha = 0.84$) for sloths and reliable ($\alpha = 0.71$) for pythons. We removed statement seven from both datasets and statement two (see Table 1) from the python dataset due to factor loadings $< |0.4|$. The reduced datasets were deemed acceptable for PCA, with a KMO factor adequacy close to one (KMO = 0.89 for sloths, KMO = 0.82 for pythons) and highly significant results for Bartlett's Test of Sphericity ($p < 0.001$). Data clustered around four components for both sloth- and python-oriented statements, explaining 57.5% and 55.2% of the variance, respectively. Orthogonal (varimax) rotation and restriction

to four components for both sloths and pythons revealed that most statements loaded onto the first two components (Table 2). Statement six and statement twelve loaded evenly onto the first two components for the sloth and python datasets, respectively, and statement ten loaded weakly ($<|0.4|$) onto the second component for the python dataset.

Table 2. Principal component analyses (PCA) for the sloth and python experiments. The highest loadings for each component that were $\geq|0.4|$ are shown in green. We conceptually labeled the first two components into attitude types. The third component emulated a protectionist attitude. Survey statement 1 was the subject of another study [26] and is not included below but can be found in Supplementary Materials.

Survey Statement	Principal Component (Attitude Type) with Eigenvalues							
	Sloth Experiment				Python Experiment			
	1 (Negative)	2 (Positive)	3	4	1 (Positive)	2 (Negative)	3	4
2	0.654	0.142	−0.174	0.177	not included in python PCA			
3		0.144	0.662			0.112	0.706	
4	−0.103	0.769			0.742			0.213
5		0.760	0.156		0.789			0.118
6	−0.370	0.390			0.160	−0.188		0.584
8	0.545	−0.168	0.323			0.578	0.254	−0.204
9	0.578	−0.117	0.286			0.492	0.168	
10	0.504	−0.133	0.236	0.204		0.384		0.130
11		0.709		−0.139	0.774			
12	0.400	−0.292	0.192	0.278	−0.364	0.365		0.259
13	0.679	−0.126	0.229		−0.142	0.635		−0.152
14	0.674	0.213	−0.125	0.164	0.208	0.454	−0.410	
15	0.762				0.202	0.479	−0.190	−0.175
16	0.170	0.175	0.514		0.216		0.613	
17	0.607	−0.133				0.621	−0.125	−0.215
18	−0.403	0.166	0.150	0.159		−0.200	0.114	0.535
19		0.621	0.104	0.294	0.700		0.170	
20		0.568		0.438	0.459		0.160	0.261
21	0.638	−0.229	0.240	−0.191		0.546		−0.346

The first two components for each species revealed two distinct attitude types. For sloths, the first component represented a negative attitude and the second a positive attitude; for pythons, the valence was reversed, such that the first component represented a positive attitude and the second a negative attitude. A third component emulated a protectionist attitude for both datasets (loading onto statements 3 and 16, Table 2). A fourth component had no loadings greater than that of other components for the sloth dataset, and two survey statements loaded onto a fourth component for the python dataset (statements 6 and 18, Table 2). Due to the low number of statements on which the third and fourth components loaded, we restricted further analyses to the first two components.

3.2. Predicting Attitudes

Our hypothesis regarding the effect of context on attitude was not clearly supported by the results. Visual context was not a significant predictor of attitudes for sloth or python datasets. Both gender and generation were significant predictors of attitudes of respondents who viewed images of either species (see results of likelihood ratio tests in Table S2 in Supplementary Materials). As hypothesized, younger respondents exhibited a more positive attitude compared to older generations for both species (Figure 2A for sloths, Figure 3A for pythons), while older generations expressed a negative attitude (Figure 2B for sloths, Figure 3C for pythons). Specifically, Gen Z and Millennial respondents who

viewed a sloth image expressed a more positive attitude compared to those belonging to the Boomer II and Boomer generations, and Millennials also expressed a more positive attitude compared to Gen X (Figure 2A). Further, Millennial and Gen X respondents who viewed a sloth image exhibited a more negative attitude compared to Gen Z (Figure 2B). For those who viewed a python image, Gen Z, Millennial, and Gen X respondents each expressed a more positive attitude compared to respondents from the Boomer II and Boomer generations (Figure 3A). Gen Z and Millennials also demonstrated a more positive attitude than the Post-War generation (Figure 3A). Millennial, Gen X, Boomer II, and Boomer respondents who viewed a python image each exhibited a more negative attitude compared to Gen Z (Figure 3C). Contrary to our hypothesis, there were no differences in the expression of positive attitudes after viewing a sloth image between genders, but male respondents expressed a more negative attitude compared to females and other genders (Figure 2C). As predicted, males and those who specified other genders exhibited a more positive attitude after viewing a python image compared to females (Figure 3B). However, males who viewed a python image also scored higher on the negative attitude type compared to females and other genders (Figure 3D). We also provide full model results in Tables S3–S6 and pairwise contrasts between predictor levels in Tables S7 and S8 in Supplementary Materials.

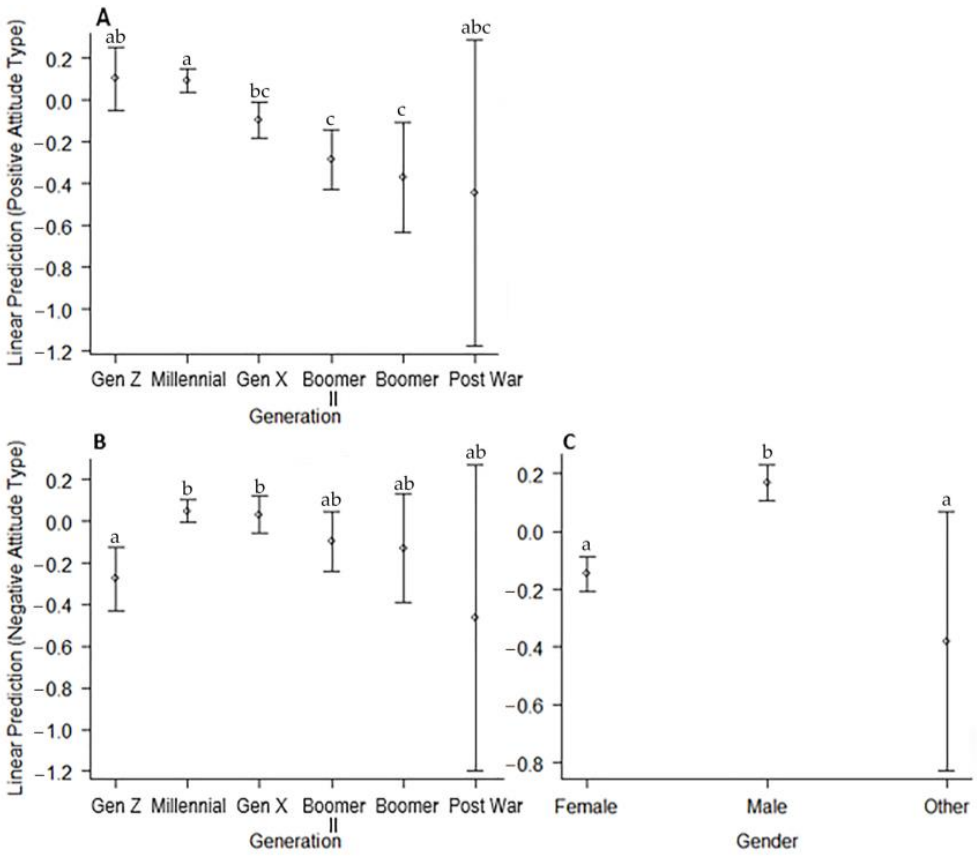

Figure 2. Predictor effect plots for regression models for the sloth experiment, showing the effect of (**A**) generation on positive attitudes and (**B**) generation and (**C**) gender on negative attitudes. In each panel, results are averaged over levels of other predictor variables. Linear predictions are shown with 95% confidence intervals as error bars. Predictor levels that do not share any letter are significantly different ($p < 0.05$) as determined by pairwise comparisons conducted using the Tukey method.

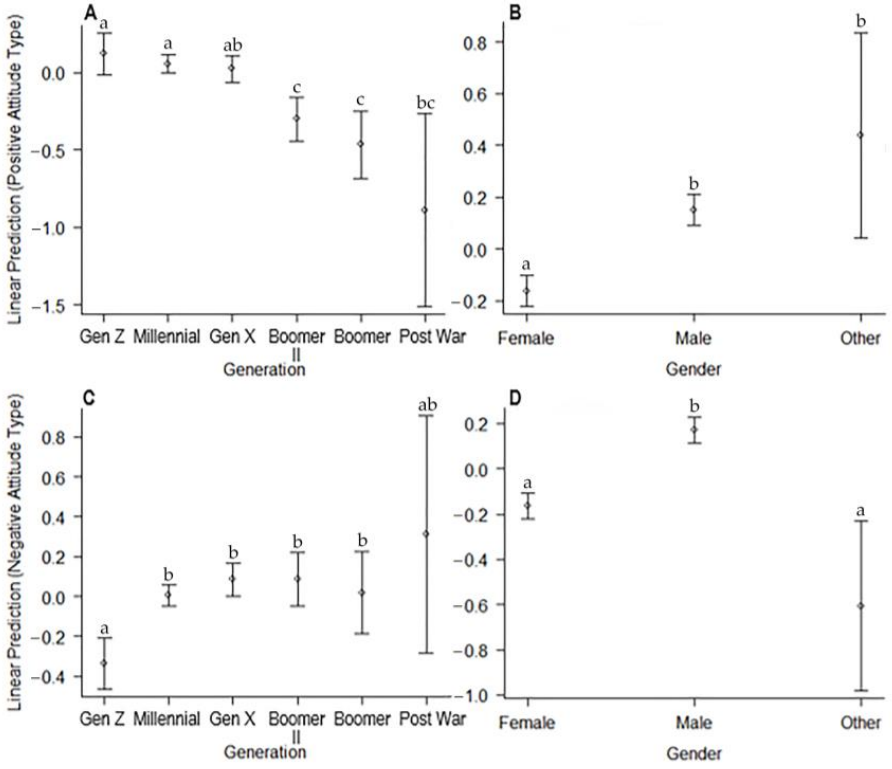

Figure 3. Predictor effect plots for regression models for the python experiment, showing the effect of (**A**) generation and (**B**) gender on positive attitudes, and the effect of (**C**) generation and (**D**) gender on negative attitudes. In each panel, results are averaged over levels of other predictor variables. Linear predictions are shown with 95% confidence intervals as error bars. Predictor levels that do not share any letter are significantly different ($p < 0.05$) as determined by pairwise comparisons conducted using the Tukey method.

3.3. Predicting Perceptions of Animals in Zoos

Considering survey statement 22, "Animals in zoos are healthy and comfortable", 63.84% of survey respondents who viewed a sloth image (Figure 4A) and 63.19% who viewed a python image (Figure 4B) agreed (considering "agree" and "strongly agree" combined here and below). For respondents who viewed either species, visual context was not a significant predictor of agreement with survey statement 22, but gender and generation were. As hypothesized, males tended to agree more with statement 22 compared to females, and older generations (Millennials and Gen X for both experiments, Boomer II for the python experiment only) tended to agree more than the youngest generation (Gen Z; Figure 5). In response to statement 23, "Zoo staff provide the animals in their care with a high quality of life", 76.80% of survey respondents who viewed a sloth image (Figure 4A) and 76.81% who viewed a python image (Figure 4B) agreed. For either species, visual context and gender were not significant predictors of agreement with survey statement 23, but generation was significant for pythons, with Millennials tending to agree more than Gen Z respondents (Figure 6). Finally, for statement 24, "Keeping sloths (pythons) in zoos, no matter how large and attractive their surroundings are, strikes me as cruel and unusual", 46.58% of survey respondents who viewed a sloth image (Figure 4A) and 46.83% who viewed a python image (Figure 4B) agreed. None of the variables tested were significant predictors of agreement with statement 24 for either species. We provide the results of likelihood ratio tests to identify whether visual context, gender, and/or generation predicted agreement with statements 22–24 in Table S9, full model results in Tables S10 and S11, and pairwise contrasts between predictor levels in Tables S12–S14 in Supplementary Materials.

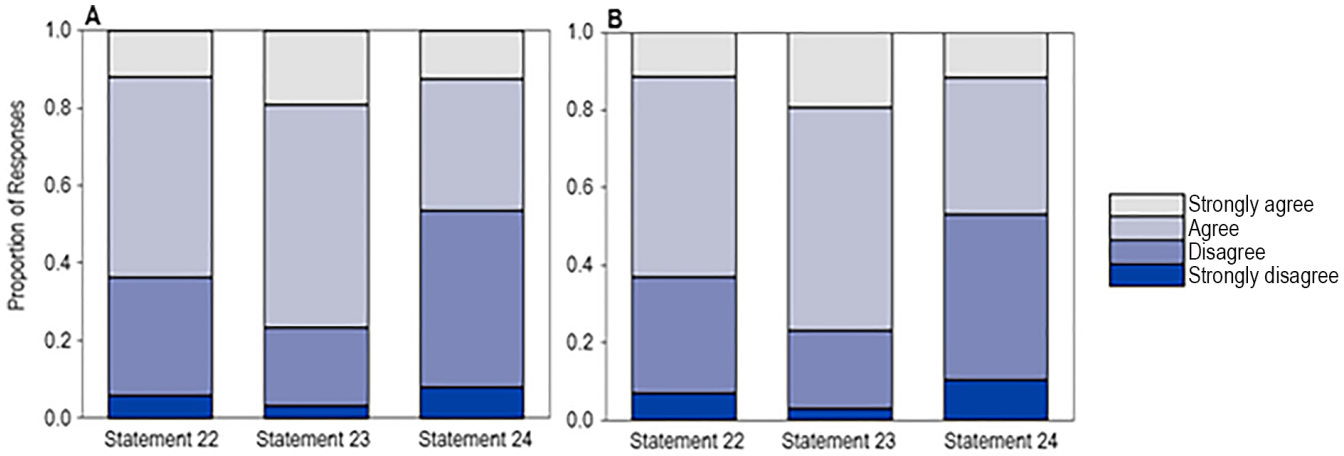

Figure 4. Overall Likert results for zoo animal perception statements for (**A**) the sloth experiment and (**B**) the python experiment. Statement 22: "Animals in zoos are healthy and comfortable". Statement 23: "Zoo staff provide the animals in their care with a high quality of life". Statement 24: "Keeping sloths (pythons) in zoos, no matter how large and attractive their surroundings are, strikes me as cruel and unusual".

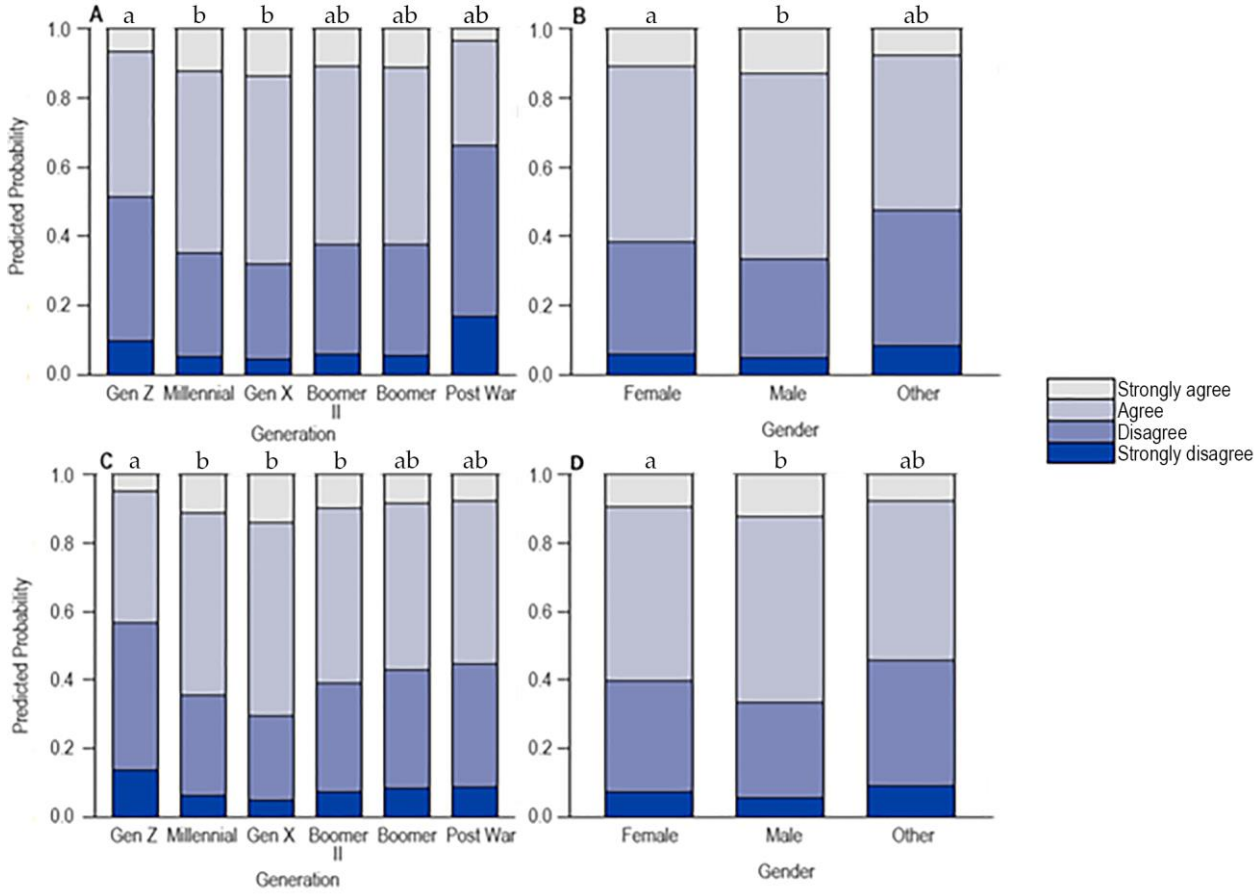

Figure 5. Predictor effect plots for responses to Statement 22 ("Animals in zoos are healthy and comfortable"), showing the effect of (**A**) generation and (**B**) gender for the sloth experiment, and the effect of (**C**) generation and (**D**) gender for the python experiment. In each panel, results are averaged over levels of other predictor variables. Predictor levels that do not share any letter are significantly different ($p < 0.05$) as determined by pairwise comparisons conducted using the Tukey method.

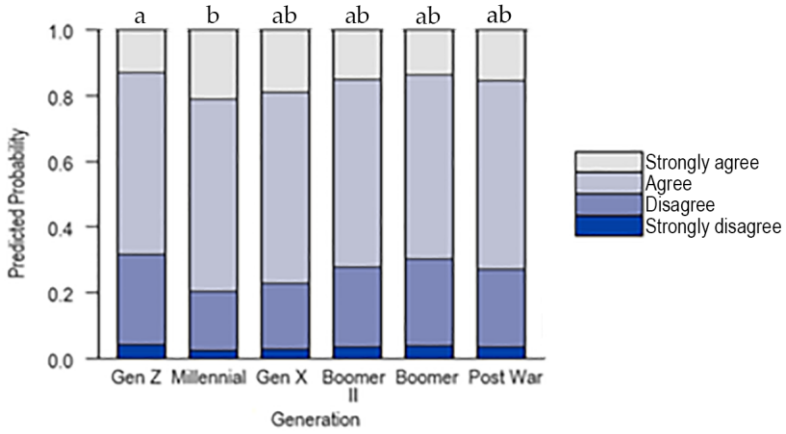

Figure 6. Predictor effect plots for responses to Statement 23 ("Zoo staff provide the animals in their care with a high quality of life"), showing the effect of generation for the python experiment. Results are averaged over levels of other predictor variables. Predictor levels that do not share any letters are significantly different ($p < 0.05$) as determined by pairwise comparisons conducted using the Tukey method.

4. Discussion

This study reveals that survey respondents residing in the USA expressed two main attitude types (positive and negative attitudes) toward wildlife regardless of whether they viewed a sloth or python image. These attitude types did not support the seven dimensions of Kellert's wildlife attitudes [13]. While we categorized attitudes using a dichotomous positive and negative valence describing the results of the PCA (i.e., most statements loaded onto the first or second components), we acknowledge that human emotions are more complex. Indeed, the broad attitude types described here were multidimensional. Survey respondents with positive attitudes tended to agree with statements aligning with ecoscientistic, naturalistic, and humanistic dimensions, while those with negative attitudes tended to agree with statements aligning with dominionistic, negativistic, and utilitarian dimensions. Attitudes were not influenced by the visual context in which animals were portrayed but were highly impacted by gender and age. Similar factors influenced perceptions of animals in zoos. This study expands on previous research by investigating the impact of gender, age, and context on people's attitudes and perceptions after viewing images that may be typically seen in a zoo or tourism setting and featuring species that, to our knowledge, have not yet been studied in this capacity.

The positive and negative attitude types found here may be akin to models of wildlife value orientations (WVOs) proposed in prior literature [65,66]. WVOs are networks of beliefs shaped by values and cultural ideologies that are thought to influence people's attitudes and behavior toward wildlife [66]. Specifically, two contrasting ideologies have been proposed—mutualism and domination, corresponding with the positive and negative attitude types found here, respectively. People who express the mutualism WVO tend to be concerned with animal welfare, show compassion for individual animals, and view wildlife as coexisting peacefully with humans. Those who express the domination WVO prioritize human well-being over animal welfare, viewing wildlife as something to be controlled and mastered [67]. Corresponding with our results for sloths and partly for pythons, males and older individuals tend to be more domination-oriented, while females and younger individuals are more mutualism-oriented [66–68]. While we did not extend our analysis to explore the third and fourth components, protectionist views (fitting the third component for both sloth and python datasets) have been described in contrast to dominionistic and utilitarian attitudes and are associated with mutualism [67,69]. While we expected protectionist statements to align with positive attitudes, the positive attitude type found here corresponded more closely with interest in and affection for animals.

To determine how viewing non-domesticated animals in various contexts might influence wildlife attitudes, we showed images of sloths and pythons in naturalistic zoo habitats, with uniformed zoo staff, outside of zoo habitats on educational perches, and in typical photo-prop tourism settings. Based on previous research, we predicted that people viewing either species in a naturalistic or zoo-based setting would report more positive attitudes, and that those viewing portrayals in unnatural settings or in the presence of people (no uniformed zoo staff present) would report more negative attitudes. In the present study, there was insufficient evidence to conclude that context affected respondent attitudes; however, it may be that a brief visual exposure, as applied in this study, is not sufficient to alter preconceived attitudes. Given that attitudes develop over time, brief image presentation was likely not influential enough to affect responses on the survey designed to measure more deeply rooted attitudes. Additionally, respondents are likely to have encountered frequent exposure to depictions of animals in unnatural settings or portrayed as pets in the media, which may normalize the contexts shown in this study and could partially explain the lack of relationship between context and attitudes [40]. Further, to eliminate self-selection bias, respondents were not aware that the survey involved animals before agreeing to participate (see Survey Instrument in Supplementary Materials). Surveys of zoo visitors, many of whom are likely to express an affinity for and positive attitudes toward animals, may have produced different results. Moreover, there are additional characteristics of zoo and media presentations our study did not replicate. With interpretative messaging or other sensory stimuli, context may have had a stronger influence on attitudes or perceptions [39,49]. We may also have expected context to impact attitudes had we shown images of non-human primates. Previous work suggests that viewing portrayals of non-human primates in anthropomorphic or entertainment settings can alter public perception in negative ways [43–45].

Demographic factors were important predictors of wildlife attitudes. Aligning with previous research and our predictions, younger generations tended to express more positive attitudes. While specific generational differences were somewhat inconsistent between experiments and attitude types (see Results), Gen Z and Millennials expressed a more positive attitude than two or more of the older generations in each experiment. Further, Gen Z respondents were less likely to express a negative attitude in both experiments, though the effect was more pronounced in the python experiment, with significant differences detected between Gen Z and all other generations surveyed with the exception of Post War. The persistence of this relationship between age and wildlife attitudes, and the lack of effect of visual context, may be partially attributed to engagement with social media. In the USA, younger individuals interact with the Internet and social media more often than older people [70]. The prevalence of human–animal interactions portrayed in social media [37,71], coupled with increasing usage [72], may be impacting younger generations in a way that is not easily modified by brief exposure to these visual contexts.

The growing influence of social media is important for zoos to consider. Social media use is thought to impact wildlife attitudes, human–animal relationships, and zoo perceptions in positive and negative ways [37,40,73,74]. Sharing media in responsible ways is important for avoiding unintended consequences such as promoting non-domesticated pet ownership or unsafe human–animal interactions [75], both of which may compromise animal welfare [76–79]. Although the youngest generation (Gen Z) expressed positive wildlife attitudes, this group was less likely to agree that animals in zoos are healthy and comfortable (statement 22), further highlighting the need for zoos to evaluate the impact of their social media presence on young consumers. Data collected by the Association of Zoos and Aquariums (AZA) revealed that younger generations view zoos less favorably than older generations [25]. While our study design was cross-sectional, and we cannot predict whether or not zoo perceptions change as people age, longitudinal studies may reveal if individual perceptions of zoos change over time. However, generation was not an important predictor of agreement with zoo animal perception statement 24. This suggests that the phrasing of survey questions may impact results [80], or that respondents may

perceive the various aspects of zoos in different ways (e.g., animal experience versus staff ability/intention) and with varying degrees of intensity (e.g., use of the terms "cruel" and "unusual" may have been too polarizing in statement 24 to detect more ambiguous or subtle emotions).

Gender was also important for predicting attitudes. Considering the sloth dataset, while the positive attitude type was not impacted by gender, males expressed a more negative attitude, supporting the prevalence of dominionistic or utilitarian attitudes among males [10,15,18]. However, males who viewed a python image expressed both positive and negative attitudes. This may suggest a pluralist value orientation (high mutualism, high dominant/utilitarian; [17]) for males, corresponding with both positive and negative attitudes described here. Gender was only important in one of the zoo animal perception statements. Males were more likely to agree that "Animals in zoos are healthy and comfortable". Similarly, other public surveys have reported females more likely to perceive zoo animals as bored [20] or express concern for keeping animals in zoos [19].

Overall, most respondents agreed with positively valenced zoo animal perception statements 22 and 23. Our results are comparable with surveys conducted by AZA, finding that zoo favorability has fluctuated between 66–80% since 2015 [25]. However, for the negatively valenced statement 24, a similar proportion of respondents agreed and disagreed, possibly highlighting that the way survey items are phrased can influence responses (see [80]). While the experiment was not set up to compare reactions to different species, we saw similar results for both the sloth and python datasets for the zoo animal perception survey statements (within 1% for all statements). Again, this suggests that briefly viewing different species may not impact zoo animal perceptions, but research directly comparing perceptions of people after viewing different species is needed.

We also consider other study limitations that may have impacted our results. While the aim of this study was to understand how brief presentation of scenes commonly experienced in a zoo environment impact attitudes, Amazon Mechanical Turk (MTurk) "workers" surveyed here may not necessarily be representative of typical zoo-goers. While we asked how often respondents visited zoos in the past year, we did not analyze responses to this question due to the unusual circumstances of the COVID-19 pandemic when many USA zoos shut down [81]. Other recent studies have more directly addressed how context impacts zoo-goer attitudes by conducting in-person surveys in zoos [41] or targeting followers of zoo social media [42]. Based on previous investigation, however, we assert that MTurk "workers" are representative of the general public and that data collected using MTurk are valid [82]. Since we only surveyed "workers" living in the USA, and we captured responses from a relatively large sample (1767 and 1785 participants for the sloth and python experiment, respectively), responses analyzed here are likely to be representative of USA residents. Other factors, such as brief image exposure or the visual layout of the survey instrument may have affected responses, potentially accounting for differences in results between this and previous studies using different survey designs and methodologies [80].

Attitudes are related to and may predict behavioral intention and behavior [1,2]. Thus, zoos and aquariums are interested in understanding the attitudes of visitors, and how visiting a zoo or aquarium might influence wildlife attitudes and pro-conservation behavior. Visitor attitude studies can be used to evaluate or improve educational animal programs [33,83] and media content shared online [41,42]. While we did not find that the context in which animals are briefly presented in images affects wildlife attitudes, we acknowledge that additional research is needed to understand the influence of viewing animals in different contexts, especially portrayed with people or in entertainment settings, on wildlife attitudes. However, this study corroborates previous research suggesting that demographic factors predict wildlife attitudes and value orientations. Zoological facilities should consider how attitudes are shaped by gender and age when designing animal exhibits, educational programs, and media offerings to promote conservation mindedness.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/jzbg4010013/s1, Survey Instrument; Table S1: Self-reported gender identities; Table S2: Likelihood ratio test results for four linear regression models; Table S3: Linear regression results for the sloth experiment, positive attitude type; Table S4: Linear regression results for the sloth experiment, negative attitude type; Table S5: Linear regression results for the python experiment, positive attitude type; Table S6: Linear regression results for the python experiment, negative attitude type; Table S7: Pairwise contrasts (estimate) with standard errors (S.E.) between predictor levels for the sloth experiment; Table S8: Pairwise contrasts (estimate) with standard errors (S.E.) between predictor levels for the python experiment; Table S9: Likelihood ratio test results for ordinal logistic regression models; Table S10: Ordinal logistic regression results investigating agreement with zoo animal perception questions for the sloth experiment; Table S11: Ordinal logistic regression results investigating agreement with zoo animal perception questions for the python experiment; Table S12: Pairwise contrasts (estimate) with standard errors (S.E.) between predictor levels for agreement with zoo animal perception statement 22 (Animals in zoos are healthy and comfortable); Table S13: Pairwise contrasts (estimate) with standard errors (S.E.) between predictor levels for agreement with zoo animal perception statement 23 (Zoo staff provide the animals in their care with a high quality of life); Table S14: Pairwise contrasts (estimate) with standard errors (S.E.) between predictor levels for agreement with zoo animal perception statement 24 (Keeping sloths (pythons) in zoos, no matter how large and attractive their surroundings are, strikes me as cruel and unusual).

Author Contributions: Conceptualization, A.C.A., G.M.F., M.W.S., M.L. and K.A.C.; methodology, A.C.A., G.M.F., M.W.S., M.L. and K.A.C.; validation, A.C.A. and K.A.C.; formal analysis, A.C.A. and K.A.C.; investigation, A.C.A., G.M.F., M.W.S., M.L. and K.A.C.; resources, A.C.A. and K.A.C.; data curation, A.C.A. and K.A.C.; writing—original draft preparation, A.C.A., G.M.F., M.W.S., M.L. and K.A.C.; writing—review and editing, A.C.A., G.M.F., M.W.S., M.L. and K.A.C.; visualization, A.C.A.; supervision, G.M.F., M.W.S., M.L. and K.A.C.; project administration, A.C.A., G.M.F., M.W.S., M.L. and K.A.C. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: No animals were removed from their primary habitat nor handled for the purpose of this study. Research was deemed exempt by the Lincoln Park Zoo Institutional Review Board (IRB-20-01-EX) and approved by the Lincoln Park Zoo Research Committee and Disney's Animal Care and Welfare Committee and Scientific Review Committee (IR2004).

Data Availability Statement: Survey data for respondents that viewed a sloth image can be found here: https://doi.org/10.1371/journal.pone.0262208.s002 (accessed on 26 January 2022) [26]. Survey data for respondents that viewed a python image can be found here: https://doi.org/10.1371/journal.pone.0262208.s003 (accessed on 26 January 2022) [26].

Acknowledgments: We acknowledge the contribution of S. Ross to the design and interpretation of this study. We thank C. Bijalba and J. Torchalski for creating study images, L. Maynard and J. Andrews for advising the survey design, and senivpetro for sharing the open-source sloth photo on www.freepik.com.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Fulton, D.C.; Manfredo, M.J.; Lipscomb, J. Wildlife value orientations: A conceptual and measurement approach. *Hum. Dimens. Wildl.* **1996**, *1*, 24–47. [CrossRef]
2. Grajal, A.; Luebke, J.F.; DeGregoria Kelly, L.; Matiasek, J.; Clayton, S.; Karazsia, B.T.; Saunders, C.D.; Goldman, S.R.; Mann, M.E.; Stanoss, R. The complex relationship between personal sense of connection to animals and self-reported proenvironmental behaviors by zoo visitors. *Conserv. Biol.* **2017**, *31*, 322–330. [CrossRef] [PubMed]
3. Kellert, S. *From Kinship to Mastery: A Study of American Attitudes toward Animals*; Report to the Fish and Wildlife Service of the U.S. Department of the Interior; Yale University: New Haven, CT, USA, 1974.
4. Kellert, S.R. *Public Attitudes toward Critical Wildlife and Natural Habitat Issues, Phase I*; Report to the U.S. Fish and Wildlife Service; Government Printing Office: Washington, DC, USA, 1979.
5. Kellert, S.R. Zoological Parks in American Society. In Proceedings of the American Association of Zoological Parks and Aquariums, St. Louis, Missouri, USA, 30 September–4 October 1979; pp. 88–126.

6. Kellert, S.R. *Activities of the American Public Relating to Animals, Phase II*; Report to the U.S. Fish and Wildlife Service; Government Printing Office: Washington, DC, USA, 1980.
7. Kellert, S.R. American attitudes toward and knowledge of animals: An update. In *Advances in Animal Welfare Science 1984/85*; Fox, M.W., Mickley, L.D., Eds.; The Humane Society of the United States: Washington, DC, USA, 1984; pp. 177–213.
8. Kellert, S.R. Attitudes, knowledge, and behavior toward wildlife among the industrial superpowers: United States, Japan, and Germany. *J. Soc. Issues* **1993**, *49*, 53–69. [CrossRef]
9. Kellert, S.R. Values and perceptions of invertebrates. *Conserv. Biol.* **1993**, *7*, 845–855. [CrossRef]
10. Kellert, S.R.; Berry, J.K. Attitudes, knowledge, and behaviors toward wildlife as affected by gender. *Wildl. Soc. Bull.* **1987**, *15*, 363–371.
11. Kellert, S.R.; Dunlap, J. *Informal Learning at the Zoo: A Study of Attitude and Knowledge Impacts*; Unpublished Report to the Zoological Society of Philadelphia; Zoological Society of Philadelphia: Philadelphia, PA, USA, 1989.
12. Lukas, K.; Ross, S. Zoo visitor knowledge and attitudes toward gorillas and chimpanzees. *J. Environ. Educ.* **2005**, *36*, 33–48.
13. Letourneau, L. Development and Validation of the Biophilic Attitudes Inventory (BAI). Doctoral Dissertation, University of Nevada, Las Vegas, NV, USA, 2013.
14. Serpell, J.A. Factors influencing human attitudes to animals and their welfare. *Anim. Welf.* **2004**, *13*, 145–151. [CrossRef]
15. Czech, B.; Devers, P.; Krausman, P. The relationship of gender to species conservation attitudes. *Wildl. Soc. Bull.* **2001**, *29*, 187–194.
16. Leuschner, W.A.; Ritchie, V.P.; Stauffer, D.F. Opinions on wildlife: Responses of resource managers and wildlife users in the Southeastern United States. *Wildl. Soc. Bull.* **1989**, *17*, 24–29.
17. Gamborg, C.; Jensen, F.S. Wildlife value orientations: A quantitative study of the general public in Denmark. *Hum. Dimens. Wildl.* **2016**, *21*, 34–46. [CrossRef]
18. Knight, S.; Vrij, A.; Cherryman, J.; Nunkoosing, K. Attitudes towards animal use and belief in animal mind. *Anthrozoös* **2004**, *17*, 43–62. [CrossRef]
19. Gurusamy, V.; Tribe, A.; Toukhsati, S.; Phillips, C.J.C. Public attitudes in India and Australia toward elephants in zoos. *Anthrozoös* **2015**, *28*, 87–100. [CrossRef]
20. Reade, L.S.; Waran, N.K. The modern zoo: How do people perceive zoo animals? *Appl. Anim. Behav. Sci.* **1996**, *47*, 109–118. [CrossRef]
21. Fredrikson, M.; Annas, P.; Fischer, H.; Wik, G. Gender and age differences in the prevalence of specific fears and phobias. *Behav. Res. Ther.* **1996**, *34*, 33–39. [CrossRef] [PubMed]
22. Lu, M.; Wang, X.; Ye, H.; Wang, H.; Qiu, S.; Zhang, H.; Liu, Y.; Luo, J.; Feng, J. Does public fear that bats spread COVID-19 jeopardize bat conservation? *Biol. Conserv.* **2021**, *254*, 108952. [CrossRef] [PubMed]
23. Driscoll, J.W. Attitudes toward animal use. *Anthrozoös* **1992**, *5*, 32–39. [CrossRef]
24. Su, B.; Martens, P. Public attitudes toward animals and the influential factors in contemporary China. *Anim. Welf.* **2017**, *26*, 239–247. [CrossRef]
25. Choi, W.T.; Vernon, R. Tracking Data Analysis (Report to the Public Relations Committee). In Proceedings of the Association of Zoos and Aquariums Meeting Weeks, Virtual, 15 September 2021.
26. Cronin, K.A.; Leahy, M.; Ross, S.R.; Schook, M.W.; Ferrie, G.M.; Alba, A.C. Younger generations are more interested than older generations in having non-domesticated animals as pets. *PLoS ONE* **2022**, *17*, e0262208. [CrossRef]
27. Myers, O.E., Jr.; Saunders, C.D.; Birjulin, A.A. Emotional dimensions of watching zoo animals: An experience sampling study building on insights from psychology. *Curator* **2004**, *47*, 299–321. [CrossRef]
28. Learmonth, M.J. Warming a Cold Shoulder: Animal Ethics, Sentience, and Preferences for Human Interaction in Zoo-housed Non-Avian Reptiles. Doctoral Dissertation, University of Melbourne, Melbourne, Australia, 2020.
29. Wells, D.L.; Hepper, P.G. Pet ownership and adults' views on the use of animals. *Soc. Anim.* **1997**, *5*, 45–63.
30. Ballantyne, R.; Packer, J.; Hughes, K.; Dierking, L. Conservation learning in wildlife tourism settings: Lessons from research in zoos and aquariums. *Environ. Educ. Res.* **2007**, *13*, 367–383. [CrossRef]
31. Falk, J.H.; Reinhard, E.M.; Vernon, C.L.; Bronnenkant, K.; Heimlich, J.E.; Deans, N.L. *Why Zoos and Aquariums Matter: Assessing the Impact of a Visit to a Zoo or Aquarium*; Association of Zoos and Aquariums: Silver Spring, MD, USA, 2007; pp. 1–24.
32. Reading, R.P.; Miller, B.J.M. Attitudes and attitude change among zoo visitors. In *Zoos in the 21st Century: Catalysts for Conservation?* Zimmermann, A., Hatchwell, M., Dickie, L., West, C., Eds.; Cambridge University Press: London, UK, 2007; pp. 63–91.
33. Anderson, U.S.; Kelling, A.S.; Pressley-Keough, R.; Bloomsmith, M.A.; Maple, T.L. Enhancing the zoo visitor's experience by public animal training and oral interpretation at an otter exhibit. *Environ. Behav.* **2003**, *35*, 826–841. [CrossRef]
34. Association of Zoos and Aquariums Ambassador Animal Policy. Available online: https://assets.speakcdn.com/assets/2332/ambassador_animal_policy_2015.pdf (accessed on 31 October 2022).
35. D'Cruze, N.; Khan, S.; Carder, G.; Megson, D.; Coulthard, E.; Norrey, J.; Groves, G. A global review of animal-visitor interactions in modern zoos and aquariums and their implications for wild animal welfare. *Animals* **2019**, *9*, 332. [CrossRef] [PubMed]
36. Horak, J.C. Wildlife documentaries: From classical forms to reality TV. *Film Hist.* **2006**, *18*, 459–475. [CrossRef]
37. Rose, P.E.; Hunt, K.A.; Riley, L.M. Animals in an online world; an evaluation of how zoological collections use social media: Social media in zoos. *J. Zoo Aquar. Res.* **2018**, *6*, 57–62.
38. Fukano, Y.; Tanaka, Y.; Soga, M. Zoos and animated animals increase public interest in and support for threatened animals. *Sci. Total Environ.* **2020**, *704*, 135352. [CrossRef]

39. Godinez, A.M.; Fernandez, E.J. What is the zoo experience? How zoos impact a visitor's behaviors, perceptions, and conservation efforts. *Front. Psychol.* **2019**, *10*, 1746. [CrossRef]
40. Learmonth, M.J. Human-animal interactions in zoos: What can compassionate conservation, conservation welfare and duty of care tell us about the ethics of interacting, and avoiding unintended consequences? *Animals* **2020**, *10*, 2037. [CrossRef]
41. Spooner, S.L.; Stride, J.R. Animal-human two-shot images: Their out-of-context interpretation and the implications for zoo and conservation settings. *Zoo Biol.* **2021**, *40*, 563–574. [CrossRef]
42. Shaw, M.N.; McLeod, E.M.; Borrie, W.T.; Miller, K.K. Human positioning in close-encounter photographs and the effect on public perceptions of zoo animals. *Animals* **2021**, *12*, 11. [CrossRef]
43. Leighty, K.A.; Valuska, A.J.; Grand, A.P.; Bettinger, T.L.; Mellen, J.D.; Ross, S.R.; Boyle, P.; Ogden, J.J. Impact of visual context on public perceptions of non-human primate performers. *PLoS ONE* **2015**, *10*, e0118487. [CrossRef] [PubMed]
44. Schroepfer, K.K.; Rosati, A.G.; Chartrand, T.; Hare, B. Use of "entertainment" chimpanzees in commercials distorts public perception regarding their conservation status. *PLoS ONE* **2011**, *6*, e26048. [CrossRef] [PubMed]
45. Ross, S.R.; Vreeman, V.M.; Lonsdorf, E.V. Specific image characteristics influence attitudes about chimpanzee conservation and use as pets. *PLoS ONE* **2011**, *6*, e22050. [CrossRef] [PubMed]
46. Ahmad, S.; Ali, Z.; Nemat, A.; Sikander, S.K.; Hussain, Z.; Saleem, K. The study of public perception for captive animals at Lahore Zoo, Pakistan. *J. Anim. Plant Sci.* **2015**, *25*, 509–513.
47. Knight, S.; Bard, K.; Vrij, A.; Brandon, D. Human rights, animal wrongs? Exploring attitudes toward animal use and possibilities for change. *Soc. Anim.* **2010**, *18*, 251–272.
48. Matthews, S.; Herzog, H.A. Personality and attitudes toward the treatment of animals. *Soc. Anim.* **1997**, *5*, 169–175.
49. Povey, K.D.; Rios, J. Using interpretive animals to deliver affective messages in zoos. *J. Interpret. Res.* **2002**, *7*, 19–28. [CrossRef]
50. Stazaker, K.; Mackinnon, J. Visitor perceptions of captive, endangered barbary macaques (*Macaca sylvanus*) used as photo props in Jemaa El Fna Square, Marrakech, Morocco. *Anthrozoös* **2018**, *31*, 761–776. [CrossRef]
51. R Core Team. *R: A Language and Environment for Statistical Computing*; R Foundation for Statistical Computing: Vienna, Austria, 2020.
52. Revelle, W. Psych: Procedures for Personality and Psychological Research. R Package Version 2.1.6. 2021. Available online: https://CRAN.R-project.org/package=psych (accessed on 17 August 2021).
53. Hair, J.F.; Black, W.C.; Babin, B.J.; Anderson, R.E. *Multivariate Data Analysis*, 7th ed.; Prentice Hall: Hoboken, NJ, USA, 2010.
54. Stevens, J.P. *Applied Multivariate Statistics for the Social Sciences*, 5th ed.; Routledge: New York, NY, USA, 2009.
55. Kaiser, H. An index of factor simplicity. *Psychometrika* **1974**, *39*, 31–36. [CrossRef]
56. Maier, M.J. Companion Package to the Book "R: Einführung Durch Angewandte Statistik"_. R Package Version 0.9.3. 2015. Available online: http://CRAN.R-project.org/package=REdaS (accessed on 17 August 2021).
57. Cattell, R.B. The scree test for the number of factors. *Multivar. Behav. Res.* **1966**, *1*, 245–276. [CrossRef]
58. Dimock, M. Defining generations: Where Millennials end and Generation Z begins. *Pew Res. Cent.* **2019**, *17*, 1–7.
59. Lindqvist, A.; Sendén, M.G.; Renström, E.A. What is gender, anyway: A review of the options for operationalising gender. *Psychol Sex* **2020**, *18*, 332–344. [CrossRef]
60. Fox, J.; Weisberg, S. *An R Companion to Applied Regression*, 3rd ed.; Sage: Thousand Oaks, CA, USA, 2019. Available online: https://socialsciences.mcmaster.ca/jfox/Books/Companion/ (accessed on 17 August 2021).
61. Lenth, R.V. Emmeans: Estimated Marginal Means, aka Least-Squares Means. R Package Version 1.6.3. 2021. Available online: https://CRAN.R-project.org/package=emmeans (accessed on 17 August 2021).
62. Venables, W.N.; Ripley, B.D. *Modern Applied Statistics with S*, 4th ed.; Springer: New York, NY, USA, 2002. Available online: https://www.stats.ox.ac.uk/pub/MASS4/ (accessed on 17 August 2021).
63. Schlegel, B.; Steenbergen, M. Brant: Test for Parallel Regression Assumption. R Package Version 0.3-0. 2020. Available online: https://CRAN.R-project.org/package=brant (accessed on 17 August 2021).
64. Brant, R. Assessing proportionality in the proportional odds model for ordinal logistic regression. *Biometrics* **1990**, *46*, 1171–1178. [CrossRef]
65. Manfredo, M.J.; Teel, T.L.; Henry, K.L. Linking society and environment: A multilevel model of shifting wildlife value orientations in the Western United States. *Soc. Sci. Q.* **2009**, *90*, 407–427. [CrossRef]
66. Teel, T.L.; Manfredo, M.J. Understanding the diversity of public interests in wildlife conservation. *Conserv. Biol.* **2009**, *24*, 128–139. [CrossRef] [PubMed]
67. Vaske, J.J.; Jacobs, M.H.; Sijtsma, M.T. Wildlife value orientations and demographics in The Netherlands. *Eur. J. Wildl. Res.* **2011**, *57*, 1179–1187. [CrossRef]
68. Liordos, V.; Kontsiotis, V.J.; Eleftheriadou, I.; Telidis, S.; Triantafyllidis, A. Wildlife value orientations and demographics in Greece. *Earth* **2021**, *2*, 457–467. [CrossRef]
69. Zinn, H.C.; Manfredo, M.J.; Barro, S.C. Patterns of wildlife value orientations in hunters' families. *Hum. Dimens. Wildl.* **2002**, *7*, 147–162. [CrossRef]
70. Hruska, J.; Maresova, P. Use of social media platforms among adults in the United States—Behavior on social media. *Societies* **2020**, *10*, 27. [CrossRef]
71. Daniels, C.; Cheyne, S.; Waters, S.; Svensson, M. Professional primate keepers and online primate imagery: An assessment of knowledge and attitudes. *J. Zoo Aquar. Res.* **2021**, *9*, 259–265.

72. Perrin, A. Social media usage. *Pew Res. Cent.* **2015**, *125*, 52–68.
73. Jeffries, V. Unlocking the power of the 'like' button—Leveraging the science of social media to support WAZA members. *WAZA NEWS Mag.* **2020**, *4*, 30–33.
74. Lenzi, C.; Speiran, S.; Grasso, C. "Let me take a selfie": Implications of social media for public perceptions of wild animals. *Soc. Anim.* **2020**, *1*, 1–20. [CrossRef]
75. Waters, S.; Setchell, J.M.; Maréchal, L.; Oram, F.; Wallis, J.; Cheyne, S.M. Best Practice Guidelines for Responsible Images of Non-Human Primates. A Publication of The IUCN Primate Specialist Group Section for Human-Primate Interactions. Available online: http://eprints.lincoln.ac.uk/id/eprint/43949/1/HPI-Imagery-Guidelines.pdf (accessed on 13 December 2021).
76. Carder, G.; Plese, T.; Machado, F.C.; Paterson, S.; Matthews, N.; McAnea, L.; D'Cruze, N. The impact of 'selfie' tourism on the behaviour and welfare of brown-throated three-toed sloths. *Animals* **2018**, *8*, 216. [CrossRef] [PubMed]
77. Kuhnen, V.; Kanaan, V. Wildlife trade in Brazil: A closer look at wild pets welfare issues. *Braz. J. Biol.* **2014**, *74*, 124–127. [CrossRef]
78. Schuppli, C.A.; Fraser, D.; Bacon, H.J. Welfare of non-traditional pets. *Rev. Sci. Tech.* **2014**, *33*, 221–231. [CrossRef]
79. Von Essen, E.; Lindsjš, J.; Berg, C. Instagranimal: Animal welfare and animal ethics challenges of animal-based tourism. *Animals* **2020**, *10*, 1830. [CrossRef]
80. Lietz, P. Research into questionnaire design: A summary of the literature. *Int. J. Mark. Res.* **2010**, *52*, 249–272. [CrossRef]
81. Torrico, J.F. The survival of animal care organizations impacted by the Covid-19 pandemic in 2020. *EELJ* **2021**, *11*, 2.
82. Berinsky, A.J.; Huber, G.A.; Lenz, G.S. Evaluating online labor markets for experimental research: Amazon.com's Mechanical Turk. *Polit. Anal.* **2012**, *20*, 351–368. [CrossRef]
83. Clayton, S.; Fraser, J.; Saunders, C. Zoo experiences: Conversations, connections, and concern for animals. *Zoo Biol.* **2009**, *28*, 377–397. [CrossRef] [PubMed]