

Viewing African and Asian elephants at accredited zoological institutions: Conservation intent and perceptions of animal welfare

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African and Asian elephants are popular within zoos, however there is currently limited information on how viewing them impacts zoo visitors. The goal of the current study was to examine the relationship between viewing elephants in zoos accredited by the Association of Zoos and Aquariums and zoo visitors' reported conservation intent and perceptions of animal welfare. Visitors were systematically selected to fill out questionnaires following elephant observation at nine facilities throughout North America. Questions included information on conservation predispositions, exhibit experience, exhibit perceptions, animal welfare perceptions, emotional experience, learning outcomes, conservation intent, and demographics. Results suggest that observing elephants engaged in a variety of species-typical behaviors and having an up-close experience was significantly correlated to visitors having a positive emotional response. The positive emotional response, combined with visitor conservation predisposition had a significant positive relationship with reported interest in getting involved in conservation. Perceptions of animal welfare were significantly related to a positive emotional experience driven by seeing animals engaged in a variety of active species-typical behaviors as well as exhibit perceptions and whether or not visitors thought it was important to have elephants in zoos. Exhibit perception was primarily correlated with exhibit size. The results provide factors that could help to increase visitor interest in conservation as well as the potential impact of viewing elephants in an accredited zoo. Facilities can use this information to help ensure their visitors have similar type experiences in order to inspire visitors' interest in conservation as well as positive perceptions of animal welfare.

KEYWORDS

animal behavior, animal welfare, conservation, education, elephant

1 | INTRODUCTION

Elephants around the world continue to face conservation challenges primarily due to habitat loss and poaching (e.g., Campos-Arceiz, Takatsuki, Ekanayaka, & Hasegawa, 2009; Chase et al., 2016;

Leimgruber et al., 2011). While Asian elephant (*Elephas maximus*) population numbers are not well known, certain areas that historically had Asian elephant populations have lost nearly 80% of their habitat in the last 100 years (Fernando & Leimgruber, 2011). The status of African elephants (*Loxodonta africana*) on the other hand, is much clearer due to recent survey efforts. African elephant populations in areas with historic efforts to track numbers combined with a recent aerial survey suggests the total population has decreased by at least

Correction added on 9 October, 2018, after first online publication: Table 1 has been updated.

144,000 elephants (Chase et al., 2016). Recent aerial surveys also suggest that the population of African elephants is currently decreasing by 8% annually continent-wide due primarily to poaching (Chase et al., 2016).

While declines in elephant populations are most directly linked to conservation issues in range countries, there are actions people around the world can take to impact elephant conservation (e.g., advocate against purchasing ivory, purchase sustainable wood products, recycle old cell phones, and purchase palm-oil friendly products). It is estimated the illegal trade of wildlife products such as ivory is over a \$20 billion a year market (Wasser et al., 2008). China is the largest contributor, however, Japan and the United States are close behind (McMurray, 2009). There is clearly a need for additional efforts to educate people about the issues still impacting the conservation of both African and Asian elephants.

The Association of Zoos and Aquariums has approximately 230 accredited member institutions (Association of Zoos & Aquariums [AZA], 2018) with approximately 70 (30%) of those exhibiting either Asian or African elephants (Meehan, Mench, Carlstead, & Hogan, 2016). Every year, there are approximately 183 million visits to those 230 facilities (Association of Zoos & Aquariums, 2018). While attendance across institutions are not equal, the opportunity to educate and inspire millions of visitors could have a significant impact on public awareness and support for elephant conservation. The impact of viewing elephants in accredited zoos, however, is currently unknown. To date, although elephants are highly popular animals to see at zoos (e.g., Carr, 2016), there have been relatively few studies examining their impact on the public's interest in getting involved in conservation. Nevertheless, the limited information that is available on these types of experiences is positive. For example, Hacker and Miller (2016) found that when visitors to one zoological facility had an up-close opportunity to see elephants engaged and active in a range of species-typical behaviors, their interest in getting involved in conservation increased. Another study examining elephant demonstrations found the experience increased visitors' knowledge of the species (Swanagan, 2000). In this study, visitors who had higher levels of interaction (e.g., attending a presentation, talking with staff, seeing artifacts) at the elephant exhibit were more likely to return solicitation cards, a possible demonstration of conservation action.

Beyond research related specifically to elephant exhibits, other research at accredited zoos and aquariums has helped us learn more about the types of experiences that have a positive impact on zoo visitors' conservation intent. In general, having an up-close experience with animals (in particular species classified as charismatic mega fauna), seeing them engaged in a variety of active species-typical behaviors, and experiencing the exhibit through multiple senses leads to positive emotional or empathic reactions which then leads to conservation-related outcomes (e.g., Luebke, Watters, Packer, Miller, & Powell, 2016; Packer & Ballantyne, 2010; Powell & Bullock, 2014; Skibins, Powell, & Hallo, 2013). Predispositions toward animals, zoos, and nature also play a critical role in how those experiences can vary across different visitors (Luebke & Matiassek, 2013). Finally, research has demonstrated that zoo and aquarium visits can lead to long-term biodiversity-related learning outcomes (Jensen, Moss, & Gusset, 2017). Still, additional research is needed to have a better understanding of how aspects of an animal encounter can engage a wide range of visitors.

One additional area that has gained interest is the nature and impact of visitors' perceptions of animal welfare at zoos and aquariums. For example, Ballantyne and Packer (2016) found in a study across 13 zoos and aquariums in the United States, United Kingdom, Canada, and South Africa that 71% of participants considered seeing animals "that are well cared for" as extremely important to satisfaction with their visit. Furthermore, research has demonstrated that simply viewing a pacing tiger can decrease a person's view of the level of care that animal receives in a zoological setting (Miller, 2012). Viewing a pacing tiger also decreases a person's interest in getting involved in conservation and supporting the facility. These perceptions of welfare are likely influenced by multiple sociocultural factors including people's individual history of experiences and personal values or world-views (e.g., De la Fuente, Souto, Caselli, & Schiel, 2017; Fraser, 2008). Finally, research has demonstrated that visitors' consistently rank natural exhibits as providing better welfare, which would suggest it is important to ensure exhibits are natural and well-maintained in addition to providing high levels of welfare for the animals (Melfi, McCormick, & Gibbs, 2004).

The goals of the current study were to examine the types of elephant experiences that increase visitor interest in conservation as well as factors that influence their perception of elephant welfare. This is the first multi-institutional study examining these questions specifically for African and Asian elephants and can provide critical information for determining the factors that increase visitor interest in conservation. Given the current status of both wild African and Asian elephants, additional information gained from this study will help us better understand the collective impact of accredited zoos on elephant conservation (e.g., Campos-Arceiz et al., 2009; Chase et al., 2016; Leimgruber et al., 2011). In addition, information gained could assist in tailoring future efforts to increase visitor interest in conservation.

2 | MATERIALS/METHODS

2.1 | Data collection locations

Data were collected at the Columbus Zoo & Aquarium (Columbus, OH), Denver Zoo (Denver, CO), Fresno Chaffee Zoo (Fresno, CA), Memphis Zoo (Memphis, TN), Milwaukee County Zoo (Milwaukee, WI), Oregon Zoo (Portland, OR), Point Defiance Zoo & Aquarium (Tacoma, WA), Saint Louis Zoo (Saint Louis, MO), and San Diego Zoo Safari Park (Escondido, CA). Approximately half of the zoos ($n = 4$) exhibited African elephants and the other half ($n = 5$) exhibited Asian elephants. Table 1 provides a summary of the species, number of elephants, exhibit size, and number of questionnaires completed at each facility. All exhibits had natural substrates with relatively open views of elephants.

2.2 | Design and procedure

2.2.1 | Data collection

Data were collected between May 1, 2017 and August 31, 2017 between the hours of 09:00 and 17:30. Each institution selected

TABLE 1 Summary of each study location

Institution	Species	Number of elephants	Age range	Exhibit size (m ²)	Respondents	Percent
Columbus Zoo & Aquarium	Asian	6	8–43	14,164	93	7.20%
Denver Zoo	Asian	3	9–46	20,234	177	13.70%
Fresno Chaffee Zoo	African	3	9–46	16,187	96	7.40%
Memphis Zoo	African	3	31–53	8,093	102	7.90%
Milwaukee County Zoo	African	2	35–35	4,046	200	15.50%
Oregon Zoo	Asian	6	4–54	10,672	170	13.10%
Point Defiance Zoo & Aquarium	Asian	2	52–53	6,070	76	5.90%
Saint Louis Zoo	Asian	10	3–46	8,732	197	15.20%
San Diego Zoo Safari Park	African	13	4–27	22,258	183	14.10%

specific data collection times within this range and varied their start times throughout their data collection periods. Data collection occurred on both weekdays and weekends over a minimum of 20 survey days at each facility. Trained research assistants or volunteers systematically identified potential research participants by approaching every second group to cross a predetermined line. Within each visitor group that was approached, the individual that was invited to complete the questionnaire was randomly selected by rotating between the adult (over age 18) standing to the left, right, or middle of the group. Questionnaires were filled out on an iPad mini 4 using Snap Mobile Anywhere Application (London, UK). Volunteers or staff provided no additional information related to elephants to ensure results were not biased. Upon collection of each questionnaire, volunteers or staff marked each electronic form as valid or invalid. Invalid questionnaires included those filled out by more than one person or those filled out by someone other than the randomly selected individual.

2.2.2 | Questionnaire

The questionnaire was designed to assess visitors' various exhibit experiences, perceptions, and reactions to the elephants they observed (Figure 1). Individual rating items were developed based on previous research focused on visitors' exhibit experiences (Hacker & Miller, 2016; Luebke et al., 2016). Items pertaining to respondents' conservation predispositions, exhibit experiences, exhibit perceptions, animal welfare perceptions, emotional experience, learning outcomes, conservation intentions, and demographic characteristics were included on the questionnaire. Throughout the survey, items were framed positively, as current efforts suggest that alternating between positively framed and negatively framed items can increase confusion and impact results more than creating an acquiescence bias (Van Sonderen, Sanderman, & Coyne, 2013; Zhang, Noor, & Savalei, 2016).

Four items were related to respondents' conservation predispositions: (1) I pay attention to environmental news; (2) I often feel a sense of connection with nature; (3) I tend to support conservation organizations; and (4) I typically engage in conservation efforts. Another item asked respondents if they believed it was important to have elephants in zoos. Respondents rated how well each statement

described themselves on a seven-point scale ranging from not at all (1) to somewhat (4) to very much so (7).

Respondents were asked to rate their impressions of the elephants' environment on three dimensions: (1) artificial/natural; (2) cramped/spacious; and (3) run down/well-maintained. These items were rated on a seven-point semantic differential scale with the descriptive anchors at the two end points of the scale.

Respondents were asked to indicate on a checklist the elephant behaviors they had observed during their time at the exhibit. There were 16 individual behaviors they could check in five behavioral categories: (1) not visible at times; (2) inactive (standing-not active; sleeping); (3) abnormal/stereotypic behavior (pacing back and forth; swaying side to side); (4) active species-typical behaviors (walking; chewing/eating; drinking; playing; manipulating objects in exhibit; running; swimming; dust bathing; interacting with other elephants); and (5) Interactivity with humans (interacting with animal care staff; interacting with zoo guests). Respondents were also asked to indicate the number of elephants they saw in the exhibit.

Animal welfare was assessed by asking respondents to rate their perceptions of whether: (1) the elephants appeared to be well cared for; (2) the elephants' enclosure/habitat appeared to be well cared for; (3) the elephants appeared healthy; and (4) the elephants appeared happy. These items were rated on a seven-point scale ranging from strongly disagree (1) to strongly agree (7).

Five items were used to assess respondents' self-reported emotional reactions to observing the elephants. These items were: (1) awe or amazement; (2) wonder/curiosity; (3) respect/admiration; (4) excitement; and (5) sense of connection. These items were rated on a seven-point scale ranging from not at all (1) to somewhat (4) to very much so (7).

Exhibit experience items included: (1) I had an up-close view of the elephants; (2) I read the exhibit signs or messages regarding elephant conservation; (3) I wondered about the thoughts and feelings of the elephants; and (4) I experienced something that I could not have gotten from a book, television, or the Internet. These items were rated on a seven-point scale ranging from not at all (1) to somewhat (4) to very much so (7). There were also two items that asked if the respondent attended an elephant talk or demonstration and whether they spoke to any staff or volunteers about elephants (yes/no response format for both items).

1. Please rate how well each statement normally describes you.

	<u>Not at all</u>		<u>Somewhat</u>			<u>Very much</u>	
a) I pay attention to news about environmental issues.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) I often feel a sense of connection with nature.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) I tend to support conservation organizations (volunteer my time, make a donation, sign a petition, etc.).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) I typically engage in conservation efforts during my daily activities (recycling, reducing energy usage, buying earth-friendly products, etc.).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) I believe it is important to have elephants in zoos.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. How many elephants did you see in the exhibit today? _____ **2b. How many were calves?** _____

3. Please indicate the types of animal behaviors you observed today at the elephant exhibit. (Check all that apply.)

<input type="checkbox"/> Not visible at times	<input type="checkbox"/> Chewing / Eating	<input type="checkbox"/> Running	<input type="checkbox"/> Interacting with animal care staff
<input type="checkbox"/> Standing – not active	<input type="checkbox"/> Drinking	<input type="checkbox"/> Swimming	<input type="checkbox"/> Interacting with zoo guests
<input type="checkbox"/> Sleeping	<input type="checkbox"/> Playing	<input type="checkbox"/> Dust Bathing	<input type="checkbox"/> Pacing (back and forth)
<input type="checkbox"/> Walking	<input type="checkbox"/> Manipulating objects in exhibit	<input type="checkbox"/> Interacting with other elephants	<input type="checkbox"/> Swaying (side to side)

4. Please check the box that is closest to your impression of the elephants' environment.

Artificial	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Natural
Spacious	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Cramped
Run down	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Well-maintained

5. Thinking about your overall observations of the elephant exhibit, how much do you agree with the following statements?

	<u>Strongly disagree</u>				<u>Strongly agree</u>			
a) The elephants appear to be well cared for.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) The elephants' enclosure/habitat appears to be well cared for.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) The elephants appear happy.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) The elephants appear healthy.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. Please indicate the feelings you experienced towards the elephants while observing them today.

	<u>Not at all</u>		<u>Somewhat</u>			<u>Very much so</u>	
a) Awe or Amazement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Wonder/ Curiosity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Respect/ Admiration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Excitement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Sense of connection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

FIGURE 1 Survey questions utilized for the elephant questionnaire

Learning outcome items included: (1) I learned more about the care and welfare of elephants; (2) I learned more about the natural history of elephants; and (3) I learned more about the conservation issues surrounding elephants. These items were rated on a seven-point scale ranging from not at all (1) to somewhat (4) to very much so (7).

Conservation intention items included: (1) I want to spend more time learning about elephants; (2) I am going to have discussions with others about elephants; (3) I have a better understanding of what actions to take to help protect and preserve elephants and their habitats; (4) I want to donate money to an

7. How much do the following statements describe different aspects of your visit to this exhibit?

	<u>Not at all</u>		<u>Somewhat</u>			<u>Very much so</u>	
a) I had an up-close view of the elephants today.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) I read exhibit signs or messages regarding elephant conservation issues.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) The exhibit inspired me to wonder about the thoughts and feelings of the elephants I saw.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) I experienced something today at the elephant exhibit that I could not have gotten from a book, television, or the Internet.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8. As a result of my experience today I learned more about...

	<u>Not at all</u>		<u>Somewhat</u>			<u>Very much so</u>	
a) The care and welfare of elephants (enrichment, training, veterinary care, exhibit design).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) The natural history of elephants (physical abilities, social behavior, communication).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) The conservation issues surrounding elephants (poaching, habitat loss, human-elephant conflict).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9. Thinking about your overall reactions to visiting the elephant exhibit, how much do you agree with the following statement

	<u>Strongly disagree</u>					<u>Strongly agree</u>	
a) I want to spend more time learning about elephants (reading books, searching the Internet, etc.).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) I am going to have discussions with others about elephants (discuss conservation issues, what they can do to help, etc.).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) I now have a better understanding of what actions I can take that will help protect and preserve elephants and their habitats.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) As a result of visiting this exhibit, I want to donate money to an elephant conservation organization.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) After today, I want to do more to make sure the products I buy don't harm wild elephants (no ivory, no palm oil or only sustainable palm oil).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

10. Did you attend an elephant talk or demonstration today at this exhibit? ☐ No ☐ Yes

11. Did you speak to any staff or volunteers about elephants today at this exhibit? ☐ No ☐ Yes

12. Are you a current zoo member? ☐ No ☐ Yes If yes, how long? _____ years

13. How often have you visited this zoo in the last 5 years?

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I usually visit the zoo 3 or more times a year	I usually visit the zoo about 1 or 2 times a year	I have only visited the zoo a few times in the last 5 years	I have <u>not</u> visited the zoo in the last 5 years	Never, this is my first time at the zoo

14. Is there anyone younger than 11 years old in your group today? ☐ No ☐ Yes

15. Which best describes your ethnicity?

☐ Black or African American
 ☐ Asian or Pacific Islander
 ☐ White (Non-Hispanic)
 ☐ Hispanic/Latino
 ☐ Native American
 ☐ Multi-ethnic heritage – describe: _____
 ☐ Other – describe: _____

16. Your home Zip Code: _____ **17. Your age:** _____ **18. Your gender:** _____

FIGURE 1 Continued.

elephant conservation organization; and (5) I want to do more to make sure the products I buy do not harm wild elephants. These items were rated on a seven-point scale ranging from strongly disagree (1) to strongly agree (7).

Finally, respondents' demographic information included questions related to their age, gender, ethnicity, zoo membership, recent zoo

visitation pattern, home Zip/postal code, and whether they were with any young children at the zoo.

2.2.3 | Data analysis

Questionnaires that were incomplete, identified as invalid, had a standard deviation of zero across the final three questions (i.e.,

TABLE 2 Summary of descriptive statistics for questionnaire rating items

Questionnaire rating items	M (SD)
Predispositions	
I pay attention to news about environmental issues.	4.89 (1.50)
I often feel a sense of connection with nature.	5.54 (1.33)
I tend to support conservation organizations (volunteer my time, make a donation, sign a petition, etc.).	4.29 (1.74)
I typically engage in conservation efforts during my daily activities (recycling, reducing energy usage, buying earth-friendly products, etc.).	5.29 (1.50)
I believe it is important to have elephants in zoos.	6.02 (1.34)
Exhibit perception	
Artificial/Natural (Artificial = 1; Natural = 7)	4.98 (1.54)
Cramped/Spacious (Cramped = 1; Spacious = 7)	4.83 (1.84)
Run-down/Well-maintained (Run-down = 1; Well-maintained = 7)	6.05 (1.26)
Animal welfare	
The elephants appear to be well cared for.	6.28 (0.97)
The elephants' enclosure/habitat appears to be well cared for.	6.22 (1.05)
The elephants appear happy.	5.77 (1.32)
The elephants appear healthy.	6.26 (0.99)
Emotional experience	
Awe or Amazement	5.76 (1.22)
Wonder/Curiosity	5.69 (1.20)
Respect/Admiration	6.18 (1.01)
Excitement	5.67 (1.31)
Sense of connection	5.15 (1.53)
Aspects of visit	
I had an up-close view of the elephants today.	5.75 (1.42)
I read exhibit signs or messages regarding elephant conservation issues.	4.90 (1.80)
The exhibit inspired me to wonder about the thoughts and feelings of the elephants I saw.	5.13 (1.58)
I experienced something today at the elephant exhibit that I could not have gotten from a book, television, or the Internet.	5.67 (1.57)
I learned more about ...	
The care and welfare of elephants (enrichment, training, veterinary care, exhibit design).	4.81 (1.68)
The natural history of elephants (physical abilities, social behavior, communication).	4.71 (1.65)
The conservation issues surrounding elephants (poaching, habitat loss, human-elephant conflict).	4.73 (1.74)
Conservation intent	
I want to spend more time learning about elephants (reading books, searching the Internet, etc.).	4.77 (1.44)
I am going to have discussions with others about elephants (discuss conservation issues, what they can do to help, etc.).	4.38 (1.58)
I now have a better understanding of what actions I can take that will help protect and preserve elephants and their habitats.	4.55 (1.61)
As a result of visiting this exhibit, I want to donate money to an elephant conservation organization.	3.93 (1.69)
After today, I want to do more to make sure the products I buy don't harm wild elephants (no ivory, no palm oil or only sustainable palm oil).	5.54 (1.60)

All ratings based on a 7-point scale.

repeaters) on learning outcomes and conservation intent, or questionnaires that were completed in 2 min or less were removed (17.5%). Respondents' reported observations of the elephants' nine active species-typical behaviors were transformed to create a total score by simply taking the sum of the number of behaviors checked for each respondent (score range 0–9). All analyses were performed using SPSS

(Version 22), R (Version 3.4.3), and RStudio (Version 1.1.383) with Lavaan (Version 0.5–23.1097) and Semplot (Version 1.1) packages.

Initial analysis involved examining the distribution of the variables and running univariate analysis to better understand the relationships (Table 2). Descriptive statistics, univariate analysis, and previous research models (Luebke et al., 2016) were then used to create a

TABLE 3 Summary of latent variables created for the analysis

Latent variable	Questionnaire items	Model name
Predispositions	I pay attention to news about environmental issues.	Issues
	I often feel a sense of connection with nature.	Connection
	I tend to support conservation organizations (volunteer my time, make a donation, sign a petition, etc.)	Support
	I typically engage in conservation efforts during my daily activities (recycling, reducing energy usage, buying earth-friendly products, etc.)	Efforts
Emotional Experience	Awe or Amazement	Awe
	Wonder or Curiosity	Wonder
	Respect or Admiration	Respect
	Excitement	Excitement
	Sense of Connection	Connection
Conservation Intent	I want to spend more time learning about elephants (reading books, searching the Internet, etc.).	Learning
	I am going to have discussions with others about elephants (discuss conservation issues, what they can do to help, etc.).	Discussions
	I now have a better understanding of what actions I can take that will help protect and preserve elephants and their habitats.	Actions
	As a result of visiting this exhibit, I want to donate money to an elephant conservation organization.	Money
	After today, I want to do more to make sure the products I buy don't harm wild elephants (no ivory, no palm oil or only sustainable palm oil).	Products
Exhibit Perception	Artificial or Natural	Natural
	Cramped or Spacious	Spacious
	Run down or Well-maintained	Maintained
Animal Welfare	The elephants appear to be well cared for.	Care
	The elephants' enclosure/habitat appears to be well cared for.	Habitat
	The elephants appear happy.	Happy
	The elephants appear healthy.	Healthy

hypothesized model to examine the relationships among multiple variables. Two structural equation models were used to examine the factors that led to visitors' conservation intent and perceptions of animal welfare. Table 3 is a summary of the variables used to create the latent variables for analysis. These included predispositions, emotional experience, animal welfare perception, and conservation intent. Given the large sample size, Comparative Fit Index (CFI) and Root Mean Square Error of Approximation (RMSEA) were the two fit indices used to develop the model. These indices have been found not to be impacted by large sample size unlike the Chi-Square Minimum Function Test Statistic (Bentler, 1990). In order to interpret the models, fit values of CFI>0.90 were considered acceptable and CFI>0.95 were considered good, while RMSEA <1.00 were considered acceptable and RMSEA <0.80 were considered good (Awang, 2012; Byrne, 2010; Hair, Anderson, Tatham, & Black, 2010).

3 | RESULTS

In total, we received 1,294 valid questionnaires resulting in an average of 143.7 per facility (Table 1). The average age of respondents was

39 years, 64% were female, 77% White (non-Hispanic), 65% living within 75 miles of the zoo, 47% visiting the zoo one or more times a year, 50% reported they were with children under the age of 11 years old, and 35% were zoo members with an average duration of membership at 5.13 years.

3.1 | Predispositions

On a scale of 1 (Not at all) to 7 (Very much so), 87% of respondents at least somewhat (rated "4" or higher) pay attention to news about environmental issues. In addition, 94% of respondents at least somewhat feel a sense of connection with nature and 70% of respondents at least somewhat support conservation organizations. Finally, 88% at least somewhat incorporate conservation into their daily activities and 96% report at least somewhat that it is important to have elephants in zoos.

3.2 | Viewing experience

During their experience, the majority of respondents viewed between two and five elephants (74%), with the primary behaviors observed

TABLE 4 Summary of relationships at the univariate level of analysis

Questionnaire rating items	Conservation intent composite score	Animal welfare composite score
Predisposition composite score	0.50*	0.16*
I believe it is important to have elephants in zoos.	0.23*	0.39*
Active species-typical behaviors total score	0.17*	0.23*
Artificial/Natural (Artificial = 1; Natural = 7)	0.20*	0.48*
Cramped/Spacious (Cramped = 1; Spacious = 7)	0.10*	0.36*
Run-down/Well-maintained (Run-down = 1; Well-maintained = 7)	0.19*	0.54*
Exhibit size (m ²)	0.02	0.16*
Emotional experience composite score	0.55*	0.46*
I had an up-close view of the elephants today.	0.22*	0.28*
I read exhibit signs or messages regarding elephant conservation issues.	0.43*	0.19*
The exhibit inspired me to wonder about the thoughts and feelings of the elephants I saw.	0.59*	0.25*
I experienced something today at the elephant exhibit that I could not have gotten from a book, television, or the Internet.	0.38*	0.36*
Attended an elephant talk or demonstration (Yes =1; No = 0)	0.11*	0.09*
Spoke to any staff or volunteers about elephants (Yes =1; No = 0)	0.22*	0.14*
The care and welfare of elephants (enrichment, training, veterinary care, exhibit design).	0.48*	0.35*
The natural history of elephants (physical abilities, social behavior, communication).	0.53*	0.32*
The conservation issues surrounding elephants (poaching, habitat loss, human-elephant conflict).	0.57*	0.32*

* $p \leq 0.001$.

being walking (75%), and chewing/eating (67%). On average, respondents watched 2.83 active species-typical behaviors during their experience. On a scale of 1 (Not at all) to 7 (Very much so), a majority of respondents gave a rating of at least somewhat (rated "4" or higher) for having an up-close view of the elephants (94%), stating their experience was something they could not get from a book, television or the Internet (90%), indicating the exhibit inspired them to wonder about the thoughts and feelings of the elephants (87%), and reading the signage at the exhibit (81%). While at the elephant exhibit, 15% attended an elephant talk or demonstration and 51% spoke to either staff or volunteers about elephants.

3.3 | Learning outcomes

On a scale of 1 (Not at all) to 7 (Very much so), a majority of respondents gave a rating of at least somewhat (rated "4" or higher) for learning more about the care and welfare of elephants in zoos (82%), learning more about the conservation issues surrounding elephants (79%), and learning more about the natural history of elephants (81%).

3.4 | Conservation intent model

In order to develop the models, univariate relationships were first examined (Table 4). The model successfully converged normally after 32 iterations (Figure 2). Factor loadings of final predisposition questions on the latent variable were all significant ($p < 0.001$) and

ranged between 0.831 and 1.147. Factor loadings for final emotional experience variables on the latent variable were all significant ($p < 0.001$) and ranged between 0.673 and 1.001. Finally, factor loadings for final conservation intent questions on the latent variable were all significant ($p < 0.001$) and ranged between 0.844 and 1.126. The final model was considered adequate based on the first fit index (CFI = 0.941) and considered good based on the second index (RMSEA = 0.066). Predispositions ($\beta = 0.28$, $p < 0.001$), viewing elephants engaged in species-appropriate active behaviors ($\beta = 0.20$, $p < 0.01$), and having an up-close experience ($\beta = 0.29$, $p < 0.01$) significantly predicted a positive emotional experience. Predispositions ($\beta = 0.45$, $p < 0.01$) and emotional experience ($\beta = 0.43$, $p < 0.01$) significantly predicted conservation intent.

3.5 | Animal welfare model

The model successfully converged normally after 34 iterations (Figure 3). Factor loadings of final emotion questions on the latent variable were all significant ($p < 0.001$) and ranged between 0.670 and 1.004. The factor loadings for final perceptions of animal welfare questions on the latent variable were all significant ($p < 0.001$) and ranged between 1.000 and 1.258. Finally, the factor loadings for final exhibit perception questions on the latent variable were all significant ($p < 0.001$) and ranged between 0.859 and 1.034. The final model was considered adequate based on the first fit index (CFI = 0.934) and considered good based on the second fit index

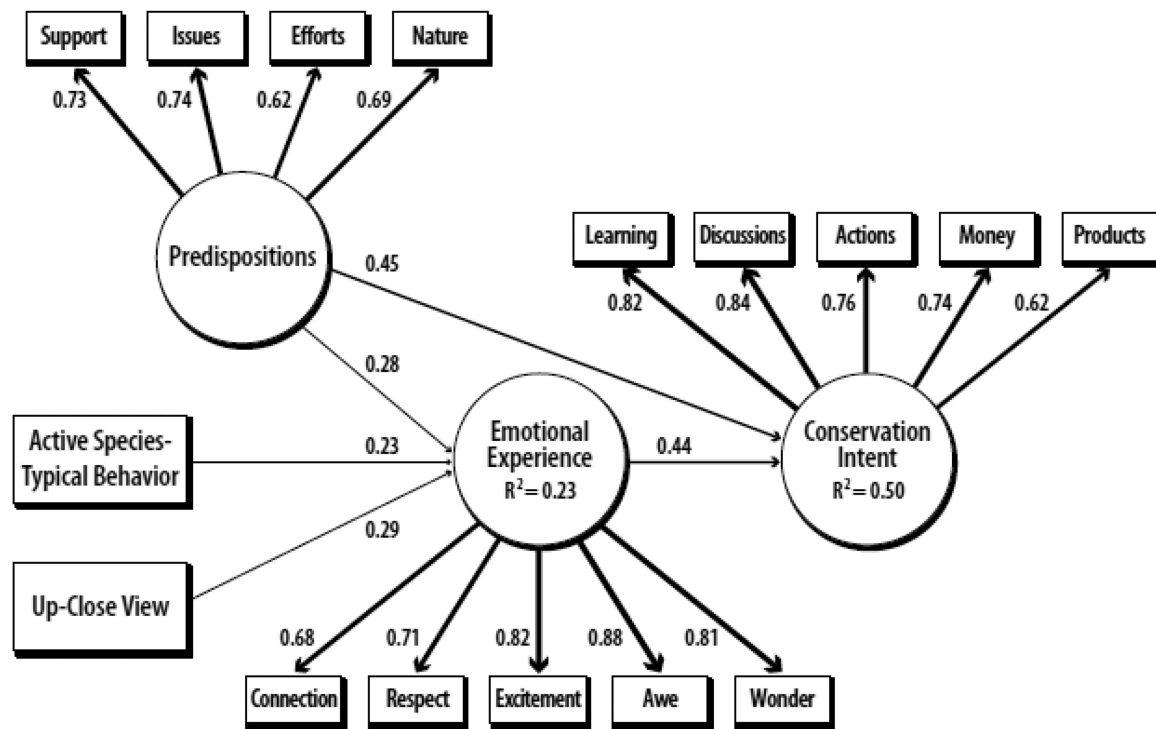


FIGURE 2 Structural equation model for factors impacting conservation intent

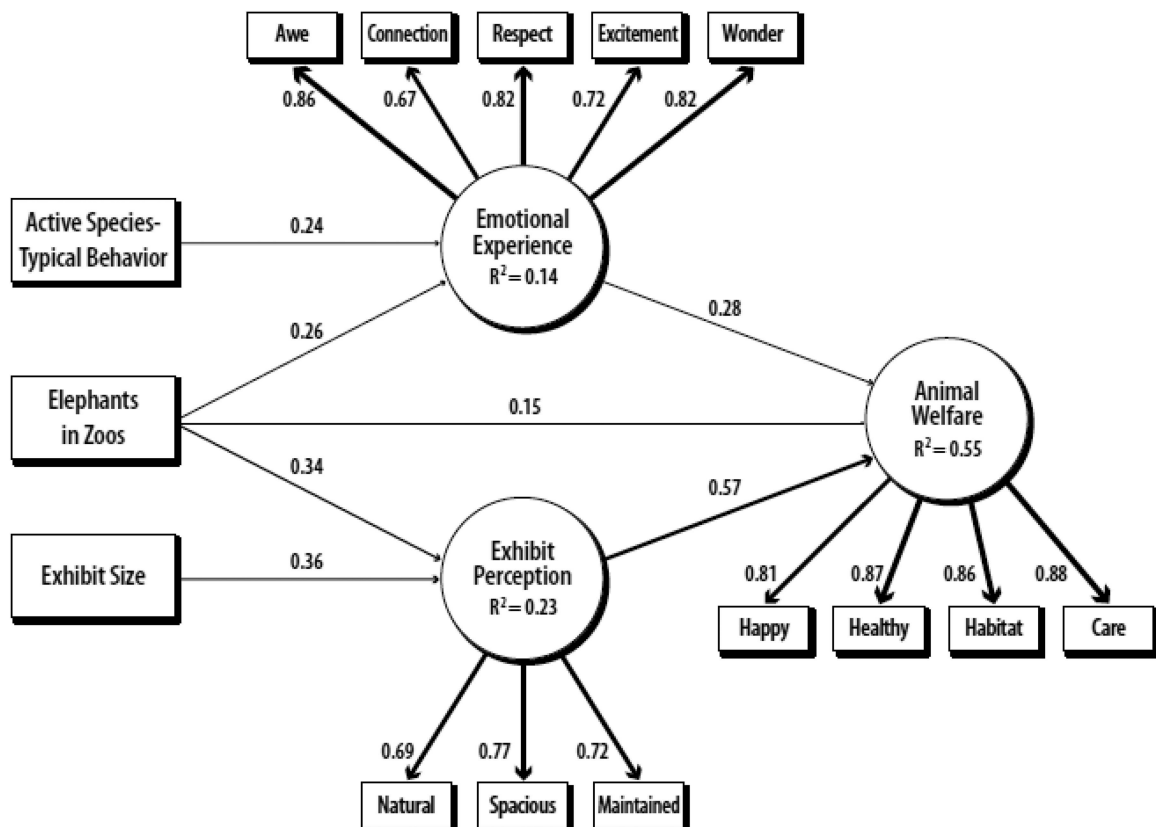


FIGURE 3 Structural equation model for factors impacting welfare perception

(RMSEA = 0.077). The belief in the importance of having elephants in zoos ($\beta = 0.34$, $p < 0.001$) and exhibit size ($\beta = 0.36$, $p < 0.01$) significantly predicted exhibit perception. The belief in the importance of having elephants in zoos ($\beta = 0.26$, $p < 0.001$) and viewing elephants engaged in species-appropriate active behaviors ($\beta = 0.24$, $p < 0.01$) significantly predicted emotional experience. The belief in the importance of having elephants in zoos ($\beta = 0.26$, $p < 0.001$), exhibit perception ($\beta = 0.23$, $p < 0.01$), and emotional experience ($\beta = 0.26$, $p < 0.001$) significantly predicted visitor's perception of animal welfare.

4 | DISCUSSION

While there are many important factors to consider, overall the results from the current study suggest there is a significant positive relationship between having an up-close viewing experience of elephants engaged in a variety of active species-typical behaviors and a visitor's interest in conservation. In addition, the study identifies several factors including perceptions of the elephant exhibit, exhibit size, and a diversity of species-typical animal behaviors that significantly relate to a positive emotional experience and perceptions of animal welfare. Both models are considered adequate or good depending on the fit index.

The significant model predicting conservation intent after viewing African and Asian elephants in accredited zoos is quite similar to those from previous research. An up-close experience and viewing elephants engaged in a variety of active species-typical behaviors was significantly correlated with a more positive emotional experience. Similarly, having an up-close experience watching cheetahs and red pandas engaged in a variety of active species-typical behaviors was also significantly correlated with a more positive emotional experience (Luebke et al., 2016). Turnock and Moss (2015) also found for an animal to have an educational role, it is important that individuals observe animal behavior, not just see an animal. In the current study, a positive emotional experience, combined with visitor predispositions, was significantly related to higher interest in getting involved in elephant conservation similar to the conservation outcomes in the previous study.

The significant model predicting perceptions of animal welfare after viewing African and Asian elephants at accredited zoos revealed many different factors that are important. Visitors who thought it was important to have elephants in zoos were more likely to have a positive emotional experience, had better perceptions of the exhibit in terms of naturalness, spaciousness, and being well maintained, and gave higher ratings for their overall perceptions of the welfare of the elephants. Visitors who thought it was important to have elephants in zoos and who viewed a variety of active species-typical behaviors were more likely also to report having a positive emotional experience. Exhibit perception was significantly correlated with a combination of thinking it was important to have elephants in zoos, exhibit size, and ratings of the exhibit as natural, spacious and well-maintained. All of these factors combined were significantly correlated with a positive

perception of animal welfare for the elephants in accredited zoos. There is limited previous peer-reviewed research examining visitor's perceptions of animal welfare. However, the limited research that is available suggests that the behavior of the animal is important for visitor perceptions (Melfi et al., 2004; Miller, 2012). Additionally, while in the current study exhibit size was related to visitors' perceptions of the exhibit, previous research has demonstrated that naturalness is also important (Melfi et al., 2004) which was one of the significant variables creating the exhibit perception trait variable. It is important to note that while the models significantly predict interest in conservation and perceptions of welfare, the models are correlational in nature and predicted models do not imply causation.

It also is important to note that many of the significant univariate relationships observed did not end up in either model. In particular, there was a strong correlation between conservation intent and being inspired to wonder about the thoughts and feeling of the elephants observed. Responses to the three learning outcome items were related to both conservation intent and positive perceptions of the elephants' welfare. These univariate relationships should be considered as important and more research is needed to clarify visitors' empathic and cognitive experiences and reactions at an elephant exhibit.

While the results of the current study are promising, there are a few limitations of the study. First, during the current study, we did not track the duration of time visitors spent at the different elephant exhibits. This could prove to be important for future studies asking similar questions. There also were some terms such as dust bathing and manipulating objects in the exhibit that could have been confusing to visitors, however, given the significant relationships, we doubt this had any significant impact on the results. In addition, one of the questions asked respondents if they read the signs at the elephant exhibit. One of the participating facilities currently has no interpretive signs, as the exhibit was designed to be more of an immersive experience. However, univariate results were similar with or without including data from that institution for that particular question, and the influence of reading signs fell out of the final model. In addition, previous research has found that viewing area size can impact visitor behavior (Moss, Francis, & Esson, 2008) and was not included in the current study. Future research could add this as an additional variable to determine the influence on perceptions of animal welfare and reported interest in conservation intent. A final potential limitation of this study is that additional demographic items (e.g., educational level, group size, and income) were not included due to consideration of survey length. These factors could be important to examine in the future.

Moving forward, accredited zoos that exhibit African and Asian elephants can use this information to help ensure they are having the largest impact. However, as the results of the current study are correlational, facilities should continue to examine these types of experiences to assess causation. Given that active species-typical behaviors and up-close experiences are important, correlated with people reporting a greater interest in elephant conservation, enrichment, and training could be two useful tools to increase these types of experiences. In addition, knowing that perceptions of animal welfare

are correlated with the exhibit characteristics of being natural, spacious and well-maintained, institutions can focus efforts on developing future or maintaining current exhibits that meet those expectations. Current science suggests there are many factors about an exhibit that are highly important for the elephants' welfare (i.e., appropriate social groups and enrichment) and that current elephant exhibit sizes at most facilities are adequate (Miller, Chase, & Hacker, 2016; Holdgate et al., 2016). However, visitors in the current study still focused on the size of the habitat, which correlated with their perception of the exhibit. While there is still more to study with regard to elephant experiences at accredited zoos, this represents a first look at how viewing elephants in these facilities relates to visitor perceptions of animal welfare and reported interest in getting involved in conservation.

5 | CONCLUSIONS

1. Up-close experiences watching elephants engage in a variety of active species-typical behaviors significantly correlates with a positive emotional experience and visitors' interest in getting involved in conservation.
2. Viewing elephants engaged in a variety of active species-typical behaviors significantly correlates with a positive emotional experience which combined with exhibit size and perception relate to visitors' perceptions of animal welfare.
3. Most visitors to an elephant exhibit are arriving with very receptive predispositions focused towards wanting to learn more and reportedly get more involved in conservation.
4. Accredited zoos with African and Asian elephants can engage animals through enrichment and training to help ensure visitors have positive emotional experiences that increase their interest in conservation.

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