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Connecting to nature at the zoo: implications for responding to climate change

Susan Clayton^{a*}, Jerry Luebke^b, Carol Saunders^c, Jennifer Matiassek^b and Alejandro Grajal^b

^a*Psychology, The College of Wooster, Wooster, OH, USA;* ^b*Chicago Zoological Society, Brookfield, IL, USA;* ^c*Antioch University, Keene, NH, USA*

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Societal response to climate change has been inadequate. A perception that the issue is both physically and temporally remote may reduce concern; concern may also be affected by the political polarization surrounding the issue in the USA. A feeling of connection to nature or to animals may increase personal relevance, and a supportive social context may counteract political tensions. Zoos may provide opportunities for both sense of connection and social support. We surveyed over 7000 zoo and aquarium visitors to examine the ways in which a feeling of personal connection among zoo visitors may encourage concern about climate change. Results show that feeling connected to animals at the zoo is significantly associated with cognitive and emotional responses to climate change, as well as with other social groupings and social responses. Overall, the zoo seems to present a supportive social context for considering the topic.

Keywords: climate change; identity; connection; zoos; attitudes; proenvironmental behavior

Introduction

The critical issue of climate change has not evoked a correspondingly serious response among the general public. One barrier to public concern may be that the issue of global environmental change seems remote and abstract, of little personal relevance. A second obstacle is the politically polarizing nature of climate change. The present paper explores the possibility that a zoo visit may help to overcome both barriers. Experiences with live animals, in the context of a zoo or aquarium, may encourage a sense of personal connection that in turn promotes greater concern about climate change. Zoos also provide a social context in which environmental information may be disseminated without being associated with the political left or right. Although the correlational data reported here cannot confirm causality, they suggest that the zoo visit provides a positive social context for education about climate change.

*Corresponding author. Email: sclayton@wooster.edu

Experience of connection

It is not uncommon for people to report a profound sense of connection to nature or to animals (e.g. Briseño-Garzón, Anderson, and Anderson 2007; Myers, Saunders, and Birjulin 2004; Nisbet, Zelenski, and Murphy 2009). Many zoo visitors attempt to establish a connection with the animals, through visual contact, imitation, or perspective taking (Clayton, Fraser, and Saunders 2009). This sense of connection may be an important precursor to empathy, which has been defined as ‘the psychological process that at least temporarily unites the separate social entities of self and other’ (Davis 2004, 20).

An empathic response is more likely when we perceive someone as similar. Westbury and Neumann (2008) demonstrated that increased phylogenetic similarity to an animal led to a stronger empathic response. Similarity, or shared identity, is associated not only with an empathic response but also with interest in taking action on behalf of the entity whose identity is shared (Krebs 1975; Opatow 1994; Thomas, McGarty, and Mavor 2009). Research has repeatedly found that a perception of animals as similar to humans is positively correlated with interest in protecting that animal or species (Allen et al. 2002; Clayton, Fraser, and Burgess 2011; Clayton, Fraser, and Saunders 2009; Sevillano, Aragonés, and Schultz 2007).

By suggesting some grounds for similarity between oneself and another entity, a sense of connection can fundamentally alter one’s self-definition. Research among zoo visitors has found that both a sense of connection to animals, and perceived similarity of the animals, correlate positively with an environmental identity – a sense of oneself as interdependent with the natural world (Clayton, Fraser, and Burgess 2011). Because the self-concept provides a salient template for organizing and encoding information, self-relevance enhances attention as well as elaboration and recall (e.g. Kihlstrom et al. 1988).

Just as a sense of connection to the animals at the zoo is correlated with interest in protecting the animal or species (Clayton, Fraser, and Burgess 2011), a sense of connectedness to nature (Kals, Schumacher, and Montada 1999; Nisbet, Zelenski, and Murphy 2009; Tam 2013) is associated with proenvironmental behavior. If people feel a personal connection between themselves and the natural environment, the topic of climate change may also seem more self-relevant and thus elicit a stronger response.

Overall, research suggests that a sense of connection to nature may be associated with greater thought about, and interest in, environmental problems as well as a stronger sense of responsibility for acting. How, then, can such a connection be established? Direct experience seems to be important (e.g. Hinds and Sparks 2009; Wells and Lekies 2006). Emotional significance, and the presence of important others, are also relevant (Ballantyne and Packer 2005; Kals and Ittner 2003; Kals, Schumacher, and Montada 1999). People are capable of strong affective responses to nature and natural entities; sharing those responses with others such as family members lends additional emotional resonance, as well as providing validation and shared memory for the experience.

Zoos

The zoo is a site where all three of these elements – direct experience, emotional arousal, and social interactions – are typically present. Zoos provide an opportunity for individuals from a wide range of backgrounds to encounter the ‘natural’ world,

albeit one socially constructed and managed. People have direct sensory access not only to wild animals, but increasingly also to plant life that mimics natural settings. Zoos evoke emotional responses (Ballantyne et al. 2007; Clayton, Fraser, and Saunders 2009), and they seem to enhance a sense of connection to nature (Bruni, Fraser, and Schultz 2008; Schultz and Tabanico 2007).

These emotional responses can be channeled toward empathy for the animal, for example, by exhibits that emphasize similarities between humans and the other animals. Taking the perspective of an animal enhances concern. In an experimental manipulation, students who were explicitly told to take the perspective of an animal harmed by pollution showed a greater level of environmental concern than students who merely read about the problem without taking the animal's perspective (Schultz 2000). Berenguer (2007) elicited a similar effect by asking people to take the perspective of a bird or even a tree.

In addition to evoking emotional and perhaps empathetic responses, zoos represent highly social settings. Most people attend in the company of others; moreover, the events are typically planned primarily as social events rather than learning opportunities. The social interactions that occur during a zoo visit tend to include shared emotional experiences, understandings, and values. When Fraser (2009) asked parents about their motivation for taking children to the zoo, he discerned four general themes: encouraging altruism and empathy; promoting environmental values; enhancing self-esteem; and communicating cultural norms. Parents specifically valued the way in which the zoo allowed them to talk to their children about respect, responsibility, care, and appreciation for nature.

Thus, interactions at the zoo may convey a norm of interest in, and value for, the animals (Clayton, Fraser, and Burgess 2011). Further, they may provide a fertile climate for developing and transmitting social norms that encourage environmental concern and behavior.

Climate change attitudes

Public concern about climate change does not match the scientific evidence and the potential impacts. This is partly attributable to the fact that reactions to climate change occur within a social context. The issue has become increasingly polarized over the past decade and political ideology is currently one of the strongest predictors of acceptance or denial in the USA (Borick and Rabe 2010). Among liberals, higher education and greater understanding lead to a stronger belief in anthropogenic climate change. However, this is not true among conservatives, among whom a belief in climate change is rejected as implying a more general criticism of capitalism and traditional American values (Kahan et al. 2012; McCright and Dunlap 2011; see Poortinga et al. 2011, for similar results with a UK sample).

In part, this results from what McCright and Dunlap (2011) describe as 'a bifurcated flow of information' (171) on the topic. The Six Americas study, a national study of the US general public, categorizes six issue publics based on their attitudes toward climate change: alarmed, concerned, cautious, doubtful, dismissive, or disengaged (Leiserowitz et al. 2011; Maibach, Roser-Renouf, and Leiserowitz 2009). Although these groups differ little according to standard demographic characteristics, there are large differences in political ideology. According to the results of Maibach et al., degree of concern about climate change is not only associated with political orientation, it also predicts that the sources of information people are likely

to rely upon. People who are highly concerned are more attentive to scientists, online newspapers, and the internet, whereas people who are doubtful or dismissive pay more attention to their own friends and family. Even among media outlets, there are now television stations and radio commentators who are clearly associated with a particular ideological perspective. Faced with a vast amount of information about a complex topic, people in the different segments preferentially attend to those information sources that reinforce their existing view of the world (Maibach, Roser-Renouf, and Leiserowitz 2009).

Social groupings and affiliations thus help to determine both the information sources that people encounter and the extent to which they trust those sources. Mistrust in scientists, for example, can lead people to reject a message based on scientific information even if they encounter it. In addition, social groupings provide both attitudinal and behavioral norms. A supportive social context can validate concern about climate change or, perhaps more typically, encourage inattention and denial (Norgaard 2011). Perhaps most important are the behavioral norms. The behavior of family and friends, co-workers, and neighbors can have a direct impact on behaviors such as recycling and reduced resource use.

Zoos and aquariums, as conservation organizations, have begun to address the issue of climate change (e.g. Grajal, Goldman, and Marks 2012). As institutions that attract a large and diverse audience, they have the opportunity to educate people about the causes and effects of climate change, and the behaviors that may mitigate it. Because they are widely trusted (Falk et al. 2007), they may be able to transcend political ideology. They can also go beyond education that is defined simply as information transfer, and evoke an emotional connection that makes environmental issues become more self-relevant and increases environmental concern.

Study goals

The emotional and social experiences at the zoo, as well as the level of trust that people have in zoos, should enhance concern about the issue and receptivity to climate change information. The present research was designed to explore visitors' responses to climate change, and the way in which these responses relate to a feeling of connection experienced at the zoo.

We hypothesize that

H1 Aspects of a zoo visit will relate to a feeling of connection to animals and to nature.

H2 This sense of connection will correlate with emotional and cognitive responses to climate change; specifically, it will be associated with greater thought, interest, and knowledge, concern and personal relevance, and sense of responsibility to take action.

H3 Sense of connection will be associated with other factors associated to one's position in a social network, including trust in social information sources, behavior and behavioral intentions, and other social identities such as political orientation.

Methods

Visitors were surveyed at 10 zoos and 5 aquariums in the USA during the summer of 2011. (More detail about the survey forms, survey sites, and general results can

be found at <http://clizen.org/survey.html>) Two different survey forms were distributed simultaneously at each site, alternating between forms. Institutional staff at each of the participating zoo and aquarium sites conducted data collection by approaching every second group that crossed a predetermined line at two different locations within each facility on a given day. Locations, day of the week, and time of day for surveying varied randomly throughout the data collection period.

Participants

Completed forms were deemed 'usable' and entered only if at least 50% of the questionnaire was completed and if the respondents were aged 18 years or older. The overall final count of usable responses was 7182, including 3594 of Form A and 3588 of Form B. The overall response rate was 49%. (Response rates varied by site, ranging from 27 to 79%; the site with the unusually low response rate had just conducted a different survey on the same topic, apparently leading to visitor burnout.) The average age of participants was 39.3; 60.5% were female and 29.5% were members of the zoo or aquarium. Political orientation, measured on a scale of 1 (conservative) to 5 (liberal), received an average score of just over the midpoint at 3.04 (SD = 1.1).

Questionnaires

We created two independent short paper questionnaires: (a) one primarily focused on attitudes and (b) one primarily focused on behaviors. By using two forms, we hoped to increase response rate by minimizing the time needed for an individual to complete a questionnaire while still being able to collect a broad range of information. Each visitor completed only one of the two forms. Because of space considerations, constructs were sometimes assessed with more items on one form than on the other.

Form A

This questionnaire included 15 items from the Six Americas survey to serve as classification tools. (Comparisons between the zoo and national samples are detailed elsewhere.) For the present paper, many of the items from the Six Americas survey were evaluated individually. Additional questions asked about visitors' experiences at the zoo, their general tendency toward environmentally relevant behavior, and their perceived connection to animals and nature.

Form B

This questionnaire, focused on behavior, contained eight items to assess visitors' current actions in addressing climate change. Other items included: (1) visitors' perceived personal control over addressing climate change and various perceived barriers to their actions; (2) level of trust in various information sources about climate change; (3) awareness of climate change threats (to human health, ocean health, arctic wildlife, local wildlife, species worldwide, and extreme weather events); (4) sense of connection with zoo animals: 'Would you say you feel a sense of connection with the animals you see at a zoo or aquarium?'; (5) concern about

the effects of climate change on self, other people, and the biosphere (these items were based on a validated survey instrument focused on environmental concern; Schultz 2001); (6) religious, spiritual, and political perspectives; and (7) items related to visitors' technology access and usage. In addition, Form B consistently used the term 'climate change' (vs. 'global warming') to determine any differences in visitors' responses to the two different phrases. ('Climate change' evoked greater concern in general; Luebke et al. 2012.)

Finally, both survey forms contained identical demographic items on group composition, home Zip Code, age, sex, frequency of zoo or aquarium visits, and membership status at the particular zoo or aquarium the respondent was visiting that day.

Data preparation

To assess a sense of connection on Form A, two items were combined and averaged: 'In general, I feel a spiritual connection with nature when I am at a zoo or aquarium' and 'I feel I have a lot in common with other species'. The second item was taken from Clayton's (2003) EID scale. The two items are correlated at $r=0.49$.

A short index of environmental behavior contained three items: 'You usually try to help protect and preserve local wildlife habitats', 'You tend to support conservation organizations (volunteer your time, make a donation, sign a petition, etc.)', and 'You typically engage in conservation efforts during your daily activities (recycling, reducing energy usage, buying earth-friendly products, etc.)'. Cronbach's alpha for this behavioral scale was .76.

For Form B, preliminary analyses were conducted on the eight behavior items to look for any underlying correlational pattern in ratings. A principal components factor analysis found two underlying factors that accounted for 54.8% of the variance (Table 1). Factor one, accounting for the majority of the explained variance, contained three items concerning active conservation support behaviors. The second factor contained five items centered on various consumer behaviors. These factors are consistent with two general types of environmentally significant behavior that Stern (2000) has classified as public-sphere environmentalism (conservation support behaviors) and private-sphere environmentalism (consumer behaviors).

Table 1. Rotated factor loadings for visitor behaviors.

	Factor 1	Factor 2
Sign a petition or take political action for a conservation cause	0.858	0.187
Donate money to a conservation or environmental group	0.833	0.195
Talk to others about the importance of addressing climate change	0.747	0.314
Buy food grown locally	0.080	0.717
Make at least one dinner a week meatless	0.170	0.690
Swap out all incandescent (regular) light bulbs for compact fluorescents at home	0.194	0.646
Turn your thermostat to 65° or lower in winter and up to 78° in summer	0.286	0.562
Drive a fuel-efficient car (i.e. hybrid or a car that gets at least 30 miles a gallon)	0.250	0.536

Survey items related to visitors' concern about the effects of climate change were adapted from Schultz (2001). Although previous analyses of responses to the 12 items have uncovered three distinct factors of environmental concern related to concern for self, concern for others, and concern for the biosphere, factor analysis of the present results found that the 12 items only grouped into one overall factor, perhaps as a consequence of specifying 'climate change' as the topic of concern. Thus, we combined them into a single score for overall concern. An overall 'awareness of consequences' measure was calculated by taking the mean of the agreement ratings for the six climate change threats.

Results

Because the large sample size and number of statistical tests increased the likelihood of Type I error, the decision was made to set the alpha level at 0.001 and not to emphasize correlations under 0.10, even when they were statistically significant.

Sense of connection and the zoo visit

Visitors reported a moderate sense of connection. On Form A, the mean for connection was just above the midpoint of the seven-point scale (4.18; SD=1.63). On Form B, the mean was 3.56 on a five-point scale (SD=1.04). (As noted above, the construct of 'connection' was measured differently on the two forms, but results showed a similar pattern for each measure.) Supporting Hypothesis 1, zoo members were significantly higher in the sense of connection, and frequency of zoo visit was related to sense of connection, on both questionnaires. See Table 2. Using the zoo visit as a prompt for contemplating environmental issues was also positively correlated with sense of connection. See Table 3, which shows substantial correlations between a feeling of connection and aspects of the zoo visit.

The impact of the sense of connection

As predicted by Hypothesis 2, a sense of connection was associated with stronger cognitive and emotional responses to climate change. See Tables 3 and 4. People high in a sense of connection were more likely to have thought about global warming, thought it was less likely that they would change their mind, showed more interest in the topic, knew more about the potential consequences, felt that it was more personally relevant, and were higher in overall concern. They were more likely to say that citizens had a responsibility to do something to address global warming. These correlations were not as strong as those relating to the zoo visit, suggesting that the relationship to climate change attitudes is more indirect or that there are additional causal influences (see Davis 1971, for a categorization of correlation strength).

As predicted by Hypothesis 3, a sense of connection was associated with differences in respondents' perceptions of their own abilities as well as with differences in their societal positioning on this issue as expressed in their beliefs and behavior, although the correlations were low. See Tables 3 and 4. People who expressed a stronger sense of connection with animals believed they could have a greater impact on addressing climate change (self-efficacy). Sense of connection was also associated with greater belief in climate change/global warming and stronger behavioral tendencies. (This finding is further explored in Luebke et al. 2012.)

Table 2. Sense of connection and the zoo visit.

Connection	Yes		No		F	df	η^2
	Mean	SD	Mean	SD			
Form A	4.36 (N=961)	1.60	4.12 (N=2242)	1.63	14.29	1,3201	0.004
Form B	3.76 (N=840)	1.06	3.49 (N=2057)	1.00	39.86	1,2895	0.01
How frequently do you usually visit zoos or aquariums?							
	Often		Occasionally		Rarely		
	Mean	SD	Mean	SD	Mean	SD	
Form A	4.55 (N=923)	1.61	4.17 (N=1842)	1.59	3.57 (N=508)	1.62	60.74 2,3270
Form B	3.94 (N=846)	0.97	3.51 (N=1934)	0.98	3.19 (N=633)	1.16	104.9 2,3420

Note: 'Sense of connection' was measured on a 1–7 scale in Form A and a 1–5 scale in Form B. All *F*-ratios are significant at $p < 0.001$.

Table 3. Correlations with connection, Form A.

Item	Correlation with sense of connection
Cognitive involvement	
*How much had you thought about global warming before today?	0.24
*How much do you agree or disagree with the following statement: 'I could easily change my mind about global warming'?	0.10
When I am at a zoo or aquarium I am interested in finding out more about how global warming is affecting wildlife and their natural habitats	0.50
Emotional involvement	
*How worried are you about global warming?	0.32
*How much do you think global warming will harm you personally?	0.26
*How important is the issue of global warming to you personally?	0.34
Sense of responsibility	
*Do you think citizens themselves should be doing more or less to address global warming?	0.22
Relation to zoo experience	
I enjoy discussing the exhibit signs and displays with my family or companions while I am at a zoo or aquarium	0.40
I use my visits to zoos or aquariums as a chance to talk to my family or companions about our relationships to nature	0.52
Seeing animals at a zoo or aquarium makes me think about my concern for animals in the wild	0.54
Social implications	
*Do you think that global warming is happening?	0.27
Zoos and aquariums are trustworthy places to find out how to help reduce the effects of global warming	0.38
*Over the past 12 months, how many times have you punished companies that are opposing steps to reduce global warming by NOT buying their products?	0.27
Environmental behavior scale	0.42

Note: All correlations are significant at $p < 0.001$.

*Item taken from the Six Americas survey.

Those high in connection were more likely to identify cost, and a lack of knowledge, as barriers to action. In contrast, other barriers were not associated with the sense of connection. See Table 5. The enhanced emphasis on cost may suggest that participants had actually looked far enough into the possibility of engaging in this behavior to be aware of the practical difficulties.

Connectedness in the context of social identities

In order to further explore Hypothesis 3, we evaluated differences in sense of connection associated with the other social groupings. There was a significant difference among the Six Americas segments ($F [5, 3290] = 64.29, p < 0.001, R^2 = 0.09$): generally, increased concern and involvement with the issue were associated with a stronger rating of connection. See Figure 1. There was a slight sex difference, with women reporting a higher level of connection; although it did not reach the 0.001 level of significance for Form A, it did for Form B (Mean for women = 3.63; mean

Table 4. Correlations with connection, Form B.

Item	Correlation with sense of connection
Cognitive involvement	
Awareness of consequences	0.27
Emotional involvement	
Overall concern	0.27
Personal implications	
How much of an impact do you believe you can have personally on addressing climate change?	0.28
Social implications	
Do you think that climate change is happening?	0.23
Consumer behavior	0.26
Conservation support behavior	0.36

Note: All correlations significant at $p < 0.001$ unless otherwise indicated.

Table 5. Sense of connection and identification of barriers.

Barrier	Mean sense of connection		F	η^2
	Checked (SD)	Unchecked (SD)		
I am unsure if my actions will make a difference	3.58 (1.01) N=545	3.56 (1.05) N=2891	0.18	0.00
I do not know what actions would be effective	3.69 (0.96) N=954	3.51 (1.07) N=2482	18.62*	0.005
The necessary actions are too time consuming	3.63 (0.95) N=358	3.55 (1.05) N=3078	1.90	0.001
The necessary actions would make life less comfortable	3.56 (0.90) N=256	3.56 (1.05) N=3180	0.00	0.00
The necessary actions are too inconvenient or difficult	3.62 (0.95) N=259	3.56 (1.05) N=3177	0.80	0.00
My friends or family would not support my actions	3.67 (0.90) N=90	3.56 (1.04) N=3346	0.93	0.00
The necessary actions would cost too much money	3.88 (0.98) N=595	3.50 (1.04) N=2841	67.96*	0.02

Note: Visitors were asked to check all the barriers that stood in the way of their doing more to address climate change.

for men = 3.47; $F [1, 3406] = 18.12, p < 0.001, R^2 = 0.005$). Sense of connection was also correlated with political ideology, such that a higher level of connection was associated with self-identifying as more liberal (as compared to conservative), $r = 0.19$.

The social significance of perceived connection was also seen in responses to the question, ‘how much do you trust the following sources of information about climate change?’ on Form B. Zoos were highly trusted, second only to scientists. There were significant, though low, correlations between connection and trust in all sources; however, the highest correlation was with zoos, followed by environmental organizations and scientists. See Table 6. Similarly, on Form A, sense of connection was correlated with a perception of zoos as a trustworthy source of information.

Table 6. Zero-order correlations and beta coefficients for political ideology, sense of connection, and zoo visit frequency.

Criterion	Mean(SD)	Connection <i>r/beta</i>	Ideology <i>r/beta</i>	Zoo visit frequency <i>r/beta</i>
Belief	7.53 (1.93)	0.23/0.17	0.36/0.30	0.05/0.01 ^a
Awareness of consequences	5.47 (1.43)	0.27/0.21	0.39/0.32	0.06/0.01 ^a
Overall concern	5.05 (1.57)	0.27/0.22	0.33/0.25	0.06/0.01 ^a
Trust in scientists	5.55 (1.45)	0.21/0.15	0.33/0.28	0.07/0.04 ^a
Trust in the media	3.09 (1.53)	0.05/0.02 ^a	0.21/0.18	-0.01 ^a /-0.01 ^a
Trust in zoos	5.30 (1.40)	0.28/0.23	0.26/0.18	0.12/0.06
Trust in envtl orgs	4.78 (1.70)	0.22/0.17	0.36/0.30	0.04/0.00 ^a
Trust in govt. agencies	3.55 (1.67)	0.08/0.04 ^a	0.23/0.20	0.04/0.03 ^a
Trust in family	3.56 (1.54)	0.09/0.09	0.07/0.04 ^a	0.00 ^a /-0.02 ^a
Consumer behavior	4.27 (1.01)	0.26/0.21	0.27/0.21	0.11/0.06
Conservation support behavior	3.40 (1.39)	0.36/0.29	0.37/0.29	0.13/0.07
Desire to do more	0.69 (0.46)	0.25/0.21	0.30/0.25	0.05/0.00 ^a
Self-efficacy	3.40 (0.94)	0.28/0.25	0.23/0.16	0.06/0.01 ^a

^aNot significant.

Note: All coefficients are significant at $p < .001$ unless indicated.

Clearly, many of these variables are interconnected. Sense of connection was associated with both political ideology and zoo visits, though political ideology was not associated with frequency of zoo visits. In Table 6, we present zero-order correlations as well as beta weights from regression analyses on the dependent variables that simultaneously entered political ideology, sense of connection, and frequency of zoo visit as predictors. Overall, ideology and sense of connection contributed independent variance. Ideology, which has more significance as a social identity, was a stronger predictor of belief, concern, and who is trusted, except in the case of zoos. Sense of connection, which is more self-relevant, was a stronger predictor of self-efficacy and an equally strong predictor of behavior. In general, the small but significant impact of zoo visit on the dependent variables becomes nonsignificant when the other predictors are included, though it is still significantly associated with behavior and with trust in zoos.

Perceived social support

A final set of analyses explored differences between those who had social support for their position on climate change and those who did not. People who said that 'most' or 'all' of their friends shared their views on global warming ($N=1348$) were compared to those who said that 'none' or 'a few' did ($N=787$). This variable was not associated with zoo membership (Chi-square=1.98, $df=2$, n.s.); that is, zoo members were no more or less likely to have friends who shared their views than were nonmembers.

Belief in climate change, environmental concern, and proenvironmental behavior scores were all significantly higher among people whose friends shared their views. (People ($N=1395$) who said 'some' of their friends shared their views were not included in the t-test analyses.) See Table 7. People may develop attitudes and behavior that are similar to those of their friends; they may also choose friends whose attitudes and behaviors are similar. However, it is clear that our sample of zoo visitors perceived greater support, among their close social connections, for climate change acceptance than for climate change denial.

Table 7. Differences related to social support.

How many of your friends share your views on global warming?	None or a few Mean (SD)	Most or all Mean (SD)	<i>t</i>	df
Do you think g.w. is happening? (1–9 scale)	6.69 (2.15)	7.37 (2.50)	6.32	2090
How worried are you about g.w.? (1–4 scale)	2.59 (0.76)	2.99 (0.98)	9.71	2122
How much do you think g.w. will harm you personally? (1–5 scale)	2.65 (0.91)	2.91 (1.0)	5.48	1917
How much do you think g.w. will harm future generations? 1–5 scale)	3.26 (0.86)	3.48 (0.97)	4.74	1914
How much had you thought about g.w. before today? (1–4 scale)	2.49 (0.86)	3.26 (0.82)	20.74	2126
How important is the issue of g.w. to you personally? (1–5 scale)	2.74 (0.90)	3.38 (1.1)	13.70	2127
Do you think citizens should be doing more to address g.w.? (1–5 scale)	3.84 (0.86)	4.05 (1.1)	4.69	2099
How many times have you punished companies that are opposing steps to reduce g.w.? (1–6 scale)	1.57 (1.00)	2.31 (1.4)	11.42	1729
Do you think g.w. should be a priority for the government? (1–4 scale)	2.27 (0.90)	2.79 (1.10)	10.95	2023
Combined environmental behavior score (1–7 scale)	4.50 (1.44)	5.25 (1.33)	11.89	2003

Note: All differences are significant at $p < 0.001$.

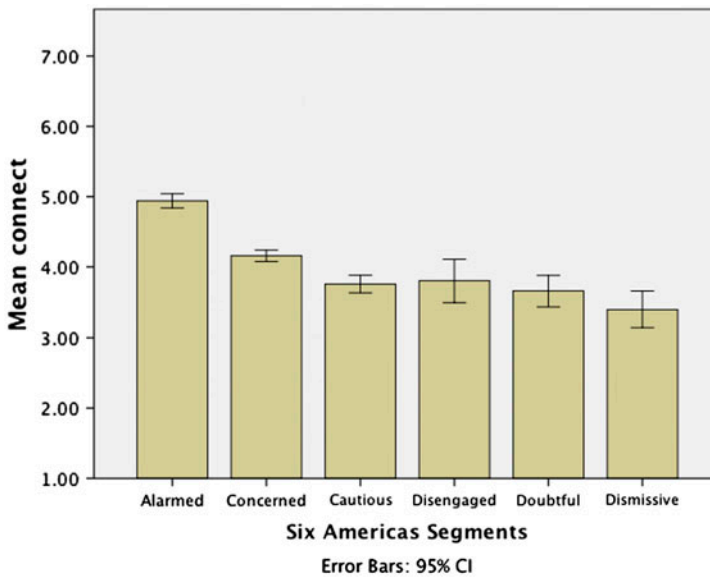


Figure 1. Differences in rating of connection associated with six Americas segmentation.

Discussion

Results show that a sense of connection to animals or nature in the zoo is related to attitudinal and behavioral responses to climate change. The data cannot distinguish whether the sense of connection is preexisting or is a more transient state induced by the zoo visit. However, some of these results suggest that the zoo context facilitates a sense of connection: zoo members report feeling a stronger connection than nonmembers; people who visit the zoo more often feel a stronger connection; and people who report a sense of connection are more likely to say they use their visit to promote discussions about environmental topics with their companions.

Zoo visitors' attitudes toward climate change show greater concern than those of the general public as represented by the Six Americas sample (Luebke et al. 2012). The present findings provide suggestive evidence that the zoo visit has an impact on attitudes. Beyond this, people respond to the zoo visit in different ways; those who respond with a stronger sense of connection or similarity to the animals have a higher level of environmental concern and behavioral propensity. That sense of connection, we argue, makes the issue of climate change personally relevant. Zoos can build upon these findings to design exhibits and visitor experiences that encourage the feeling of connection (e.g. Routman, Ogden, and Winsten 2010).

These data confirm the connection between political ideology and environmental attitudes and beliefs. The fact that conservatives are less likely to trust scientists, environmental, and governmental organizations, and the media demonstrates why it can be difficult to reach a broad audience with messages about climate change. Responses to climate change must be considered within a social network and educational interventions must reflect that consideration.

In thinking about educational possibilities, it is relevant to note that people who felt that their friends shared their opinions were more likely to endorse the existence of climate change and taking action to address it. Thus, although some segments of society may rally around opposition to climate change, among the zoo sample there is more social support for concern. This means that zoos may be able to exploit social networks to convey information about climate change without evoking resistance from their visitors.

Overall, these results suggest that zoos have a powerful potential to transcend the barrier represented by political ideology and deliver an effective message about climate change. Although zoos only reach a self-selected audience, that audience is quite broad and incorporates people from across the political spectrum, as well as many children who attend as part of a school group. The study adds to our existing understanding of the importance of a sense of connection, by emphasizing the way in which a context that incorporates emotionally rich experiences with animals as well as supportive social interactions may have the ability to strengthen that sense of connection. It also enhances our understanding of the possible role of zoos in delivering a proenvironmental message by capitalizing on people's tendency to feel a connection to the animals. Future research can strengthen the evidence for a causal connection by testing the same respondents at the beginning of their zoo visit and again at the end, or before and after specific zoo exhibits.

In the face of increasingly urgent environmental challenges, such as the one posed by climate change, psychologists need to explore ways in which people can make the link between their individual experience and global events (Stokols et al. 2009). The sense of connection people feel to zoo animals may constitute one such avenue.

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Notes on contributors

Susan Clayton is Whitmore-Williams Professor of Psychology and chair of Environmental Studies at the College of Wooster. Her research focuses on the human relationship to the natural world and the social context for environmental attitudes. She recently edited the *Oxford Handbook of Environmental and Conservation Psychology*.

Jerry Luebke is Senior Manager, Audience Research Conservation, Education, and Training, at the Chicago Zoological Society. His specialty areas include program evaluation, formal and informal learning assessment, and customer satisfaction assessment.

Jennifer Matiasek is the research program coordinator for audience research at the Chicago Zoological Society.

Carol Saunders is a research faculty member in the Department of Environmental Studies at Antioch University New England. Her education and research interests focus on the psychological aspects of biodiversity conservation, especially how the experience of observing wildlife can affect stewardship behavior.

Alejandro Grajal is senior vice president for Conservation and Education at the Chicago Zoological Society. He recently authored *Climate Change Education: A Primer for Zoos and Aquariums* and has authored numerous papers on ecology, animal behavior, biodiversity policy, and visitor studies.

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