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Article

Linking Personal Experience to Global Concern: How Zoo Visits Affect Sustainability Behavior and Views of Climate Change

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Abstract: Globally, many species are threatened by habitat loss and are impacted by climate change due to human activities. According to the IUCN Red List, nearly 9000 animal species are now endangered or critically endangered. Yet, humans are largely ignorant to the impact they have on the environment due to lack of effective sustainability education. Currently, one of the most practical ways to connect with our global natural world is by visiting a local zoo. Zoos engage people with numerous species that they would otherwise never have the opportunity to see. Environmental education at zoos has come to address issues such as sustainability, personal green habits, and global climate change. Given the important role of zoos in sustainability education, there is a surprising lack of research on the topic. Due to its innovative nature, the research shown in this study acts as a pilot study set to gauge the impact of zoos on sustainability and climate change perspectives. This article investigates the extent to which adult survey respondents believe their current sustainability behaviors and their perceptions of global climate change have been influenced by their childhood visits to zoos and the environmental education topics learned during these visits. To investigate the long-term impact that zoos have on common sustainability behavior, a survey of 136 university students from various academic fields was conducted. The analysis found that 76% of respondents believe they act sustainably in their daily lives through actions such as sustainable shopping and recycling, with only 35% of individuals indicating that they learned their sustainable behaviors at zoos. Yet, 65% of respondents indicated that they believe zoos impact their overall level of environmental concern, primarily regarding knowledge of animal welfare and endangered species. Results suggest that individuals who are very concerned about climate change spent time at zoos, more than just one annual visit, and those zoo visits encourage global sustainability learning for the individual. This study suggests that zoos should expand visitor engagement through environmental education that encourages meaningful sustainability behavior and climate change knowledge.

Keywords: climate change; content analysis; endangered species; environmental education; mixed methods; sustainability; zoo education



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1. Introduction

Human activities cause the endangerment or extinction of thousands of animal species around the globe. Technological advancements flourish, but many people are unaware of the impact that their modern lifestyle has on the environment due to a loss of connection with nature and lack of access to environmental learning opportunities [1].

Environmental education in zoos allows students to learn how their decisions and actions affect the global environment. Zoos have shifted their focus to broader sustainability topics as they aim to teach their visitors environmentally friendly daily habits [2]. Zoos engage individuals with new species and learning opportunities that they are unlikely to have on their own. According to the Association of Zoos and Aquariums (AZA), zoos give the public access to the natural world, with over fifty million children visiting accred-

ited zoos and aquariums each year. This makes zoos an essential tool in environmental education [3].

Zoos demonstrate leadership in sustainability lessons and science learning [4–8]. Most zoos use conservation education to promote emotional connections between people, animals, and the environment [9]. In fact, zoo mission statements show two predominate themes: conservation and education [10]. Zoos are making strides to educate the general public, but because zoos and aquariums “attract visitors of all ages, from early childhood to late adulthood . . . visitors greatly differ in prior knowledge” [11] thus, varying learning opportunities must be provided.

Age and gender need to be considered because, according to prior research, female children tend to be more concerned about animal welfare and feel more empathy toward other species [12]. This is linked to the finding that females are more environmentally oriented and willing to participate in environmental organizations, learning opportunities, and surveys [13]. The Association of Zoos and Aquariums reported that 54% of the over 183 million annual zoo and aquarium visitors identify as female [14]. Based on prior research, it seems that gender plays a role in environmental attitudes. In other words, more women seem to be interested in environmental sustainability concepts [15]. These various learning opportunities are linked to social experiences at the zoo, especially when friends and families are able to expand their known relationships, solve puzzles, and build empathetic bonds while seeing and learning about animals [6,16]. Research indicates that these empathetic bonds are particularly important because they enhance visitor support for global conservation initiatives [17].

Other research explores the degree to which enjoyment is compatible with leisure time learning at a zoo [17]. Learning opportunities can promote family connections, as well as identity and activism, especially among families that purchase zoo memberships multiple years in a row [6,16,18]. This type of bond with the zoo promotes free choice learning, meaning that visitors are personally motivated to obtain first-hand information. Many visitors want to enjoy the social aspects of their trip and they want to enjoy learning for its own sake, not feel pressure to gain new knowledge [19,20].

The many educational approaches undertaken by zoos to both capture interest and provide knowledge to visitors implies a deeper capacity for environmental education. Zoos can encourage specific pro-environmental behaviors and can provide continuing and crucial education to the public. Zoos have the ability to be a positive influence in climate change education since they allow easy access to nature and provide practical instruction for handling environmental education challenges [21]. Zoos can provide visitors a personal connection with animals, which builds compassion and promotes a greater concern about global issues such as climate change [17,21]. In fact, visitors rank zoos second only to scientists in terms of trustworthiness regarding climate change information [17,21]. Climate change is causing a myriad of problems, including habitat loss and harm to various species of plants and animals, resulting in heightened risk of extinction for many species [22,23]. Zoos act to educate their visitors about these issues and teach behaviors that are effective in battling global environmental degradation and climate change [21].

Zoo exhibits are not only educational—through informal (signage, docent interaction) techniques, and formal techniques (camps, field trips)—but also result in an emotional connection between visitors and respective species. When visitors recognize this empathy in others and see that they are interested in doing more, a type of social connection emerges that nurtures collective action towards climate change [21]. At the end of the day, zoos only reach a self-selected audience—those who choose to visit the zoo—but this audience is broad and encompasses people from across the political, social, and cultural spectra, including many children who attend with school groups [17]. This wide variety of visitors has the potential to learn in informal and formal education settings at the zoo, which may later impact their environmental actions.

The goal of this pilot study is to investigate how visiting zoos as a child influences one's later adult sustainability behavior and global climate change attitudes by answering the following research questions:

1. Do university students who visited zoos more frequently in their childhood self-assess as more sustainable in their current daily actions?
2. Do university students who self-assess with higher sustainability behaviors now tend to have visited zoos for personal reasons or educational purposes?
3. Do university students who state they have visited zoos more frequently in their childhood show a high level of concern regarding global climate change?

Rather than accepting simple yes/no answers, this research investigated deeper perceptions from a longitudinal view. This provides an understanding of the long-term role zoos can play in educating the public about nature and global sustainability practices. A survey questionnaire was used to explore how university students self-assess the influence of previous childhood zoo visits on their current behavior and attitudes.

2. Materials and Methods

2.1. Survey Instrument

The survey was developed based on literature from previous studies, but since this topic is innovative, the questions were written specifically for the purposes of this project. The survey was designed to identify how respondents self-assess their sustainability behaviors as adults by examining their childhood zoo visitation experiences, specifically zoo-based education programs (formal and informal) and current beliefs about climate change. The survey was comprised of 14 questions and was a combination of closed- and open-ended questions. Questions one through five gathered respondents' demographic data (i.e., education level, gender, year of birth) and remaining questions assessed childhood zoo experiences and measured respondents' sustainability actions and attitudes about climate change (Table 1).

Table 1. Survey Questionnaire.

	Question	Response Options (Open If Not Listed)
1.	Please indicate your current year of study:	Undergraduate freshman Undergraduate sophomore Undergraduate junior Undergraduate senior 1st year graduate student 2nd year graduate student PhD student Other:
2.	What is your major?	
3.	If applicable, what is your minor?	
4.	What year were you born?	
5.	Please check one:	Male Female Prefer not to answer

Table 1. Cont.

Question		Response Options (Open If Not Listed)
6.	On average, during your childhood, how far away did you live from a zoo?	Less than 5 miles
		5–20 miles
		21–40 miles
		41–60 miles
		61–80 miles
		81–100 miles
		Greater than 100 miles
7.	On average, during your childhood, how many times did you visit a zoo annually?	0–1
		2–4
		5–8
		9+
8.	As a child, were you more likely to visit zoos for personal reasons or for educational school field trips/ camps?	Personal reasons
		Educational purposes
9.	Did you participate in zoo education programs or camps as a child?	Yes
		No
	9.1. If yes, what type(s) of program?	
10.	Do you remember learning sustainable actions at the zoo?	Yes
		No
	10.1. If yes, what type(s) of sustainable actions?	
11.	Do you believe you act sustainably in your daily life?	Yes
		No
	11.1. If yes, what type(s) of sustainable activities or behaviors do you participate in?	
12.	Do you believe visiting zoos has impacted your level of environmental concern?	
		12.1. If yes, how?
13.	On a scale of 1–10, with one being not very concerned and ten being very concerned, how concerned are you about Climate Change?	
14.	What are your opinions on Climate Change?	

2.2. Procedure

An invitation to participate in this research survey was posted on the online campus learning management website for Southern Illinois University Carbondale, which can be accessed by all students. In the “announcement” section, this message was posted: “Sustainability and Zoos: Research is being conducted to assess if visiting zoos as a child impacts how people self-assess their sustainable habits and behaviors as adults . . . Interested in participating? Take the survey here: [link]”.

The survey was advertised as an announcement twice over the course of the university’s Summer 2020 academic session, specifically on 16 June and 25 June, and was offered online as a sustainable approach to reaching as many voluntary participants as possible. It is important to note that there are frequent updates with new announcements “pushing” older ones below the user’s view. Thus, these announcements were purposefully posted at times with fewer competing announcements and on dates to avoid the busy atmosphere that accompanies week one of classes.

3. Results and Discussion

Zoos provide many children an opportunity to learn about the natural world, and this study evaluated the linkage between current sustainability behavior and previous zoo visitation. Findings suggest that as children, many respondents were not aware of gaining global sustainability messages from zoos. However, as adults, participants have indicated that they believe zoos encourage sustainability and conservation, further indicating that this has influenced their level of environmental concern. Environmental concern is generally referred to as an evaluation of a person's beliefs, attitudes, and behaviors based on facts regarding the environment [24], while environmental sustainability is defined as a condition of interconnectedness that allows humans to satisfy their needs without exceeding the capacity of the ecosystem [25].

3.1. Age of Respondents

There were 136 individuals who participated in the study, ranging from first-year undergraduates through PhD students (Figure 1). Respondents were from a wide age range due to the presence of several nontraditional students and graduate (Master's and Doctoral) students. The birth years ranged from 1954 to 2002, with the years 1998 and 1999 comprising 42% of the total. This reflects that a majority of survey respondents were undergraduate seniors (42%).

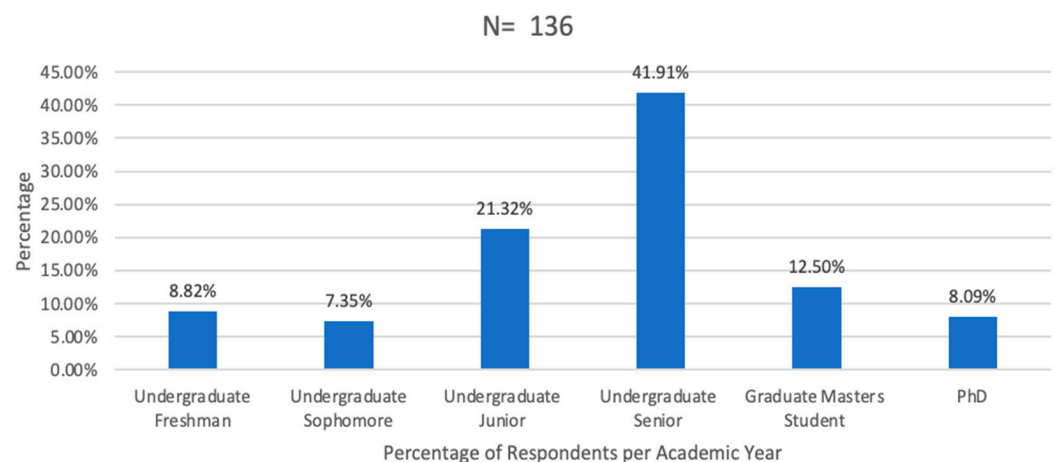


Figure 1. Respondent academic year.

Age can play a role in people's environmental attitudes and behaviors. Cognitive development progresses at different rates based on a wide variety of factors, so the behaviors exhibited by children change gradually [2]. The common assumption is that younger people are more likely to be concerned with the state of the environment, which is the age hypothesis [24]. However, older age groups can be equally concerned about human impact on the environment because it will harm future generations; this is known as legacy thinking [26]. For example, a social survey of 792 people over the age of 55 explored the concept of attitudes and behaviors towards the environment and found that 96% of individuals think the environment should be maintained for future generations, clearly exemplifying legacy thinking [6].

According to our survey of college students, individuals who were born before 1997 (classified as a nontraditional student because they are older than 24 years of age) [27] were just as concerned with the impacts of their actions on the environment as those of younger students. When respondents were asked if they believed they act sustainably in their daily lives, many answered yes (76%), regardless of age. They also provided written responses to the open-ended question asking for specific examples. Representative comments are noted here:

I recycle what I can. I use reusable containers. I try to minimize my waste and water usage.

(R128, born 1964)

I use reusable shopping bags, biodegradable trash bags, no single use plastic. (R89, born 1976)

I'm vegetarian, I ride a bike (don't own a car), participate in community farming, carpool, purchasing home goods and clothing second-hand, buying local goods rather than online, re-using glass jars and plastic containers, composting when I can, etc. (R95, born 1999)

However, when examining how respondents learned these sustainability behaviors, a majority of individuals born between 1953 and 1989 reported that they did not participate in zoo education programming or remember learning sustainability actions at zoos. This is likely due to the fact that conservation and sustainability education at zoos did not become common until the 1970s, when the US environmental movement stimulated concern about local and global issues. Yet, it was not until the mid-1980s that high quality zoo environmental education became more common place in the US [28]. It took many years for top-notch zoos to reach the level of excellence shown today, which may have impacted the perception of sustainability learning of participants whose childhood zoo visits occurred prior or during the 1980s.

3.2. Global Sustainability Learning at Zoos

Several survey questions evaluated how respondents link global sustainability learning to their childhood zoo visits. A variety of questions were asked regarding sustainability education, including the main purpose of the zoo visits. Of the 136 surveyed, 69% said that they had primarily visited zoos during their childhood for personal purposes, rather than being brought to zoos for only educational reasons, such as a mandatory school field trip.

Using open-ended responses, the survey also investigated whether respondents participated in zoo education programs and if so, what type. The responses were then categorized using summative content analysis [29]. Only 10% of respondents indicated that they had participated in formal zoo education programs such as summer camp or volunteer activities (Table 2).

Table 2. Types of zoo programs, as indicated in written responses.

Zoo Program	Details of Program	Responses
Zoo Camp	Participation in zoo run camps; can be daily, weekly, or monthly	5
Junior Zookeeper	Participation in a youth career program; seeing what it would be like to be a zookeeper	4
Educational Classes	Participation in educational classes offered at the zoo or other wildlife facilities such as raptor rehabilitation, and ecosystem maintenance	4
Volunteering	Participation as a zoo volunteer, consisting of various tasks, including:	1
	Habitat Docent	
	Food Preparation	
	Enrichment Creation	

Only 35% of the respondents indicated that they could recall learning any sustainability activities at zoos. Below are representative examples of the affirmative responses to the survey question: "Do you remember learning sustainable actions at the zoo?":

Yes, looking for the sustainability certifications on products, planting native species to fight biodiversity. (R17)

I remember having trash bins saying to recycle what trash we could, and they offered us cute reusable cups with animals on them. I would buy one because I loved the animal and would take it with me around the zoo to get refills or use at other places instead of a throw away cup. (R55)

Summative content analysis [29] of written comments further shows that zoos prompted these respondents to think more about how their actions impacted various species, especially those on the endangered species list, due to educational signage (Table 3).

Table 3. Sustainable actions taught at zoos, based on content analysis of written responses.

Sustainability Topic	Discussion Details	Responses
Sustainability at Home	Discussion over	12
	Reduce, Reuse, Recycle	
	Sustainable products	
	Composting	
	Diet	
Renewable Resources	Plastic use	6
	Use of hydroelectric and wind power to conserve energy	
Ecosystems	Discussion regarding:	5
	Deforestation	
	Palm Oil Industry	
	Native Species	
	Invasive Species	
	And how to assist with conservation efforts surrounding these topics	
Endangered Species	Discussion covering the rehabilitation of endangered species at zoos, and what actions can be taken to assist with these topics	4
Kindness	Overall attitude towards the environment	3

3.3. Zoo Visits Influence Sustainability Behavior

Respondents were asked to estimate the approximate average annual number of times they visited a zoo during their childhood. According to the data, 45% respondents listed their visits as zero to one time per year, and 37% visited two to four times annually (Figure 2).

The survey asked the straightforward question: “Do you believe you act sustainably in your daily life?” Approximately 76% of respondents indicated that they do indeed believe they act sustainably now. When asked to describe their sustainability actions, most respondents listed one or two daily actions. Summative content analysis [29] was conducted to group the written responses based on similar sustainability activities and six categories emerged: Activism, Community Action, Food Sustainability, Personal Action, Positive Thinking, and Transportation (Table 4). When the two data points were compared, 76% of respondents who believe they act sustainably in their daily lives had an average childhood zoo visitation rate of two to four times per year, which is a higher average visitation rate than respondents who did not believe they act sustainably in their daily lives. Furthermore, 7% of individuals who say they act sustainably as adults reported a very high annual frequency of visiting zoos as children (nine or more times per year) compared to those who say they do not believe they act sustainably in their daily lives (1%). This implies that zoo visitation seems to have a positive effect on sustainability behavior.

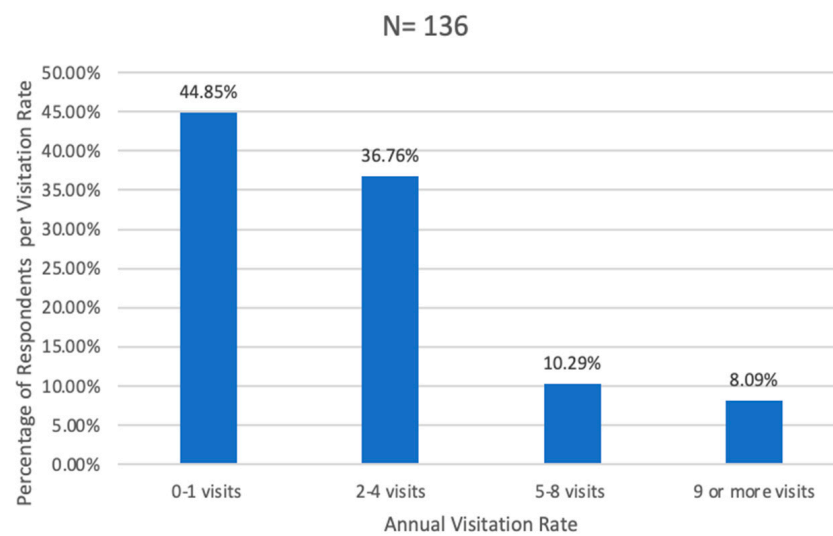


Figure 2. Annual zoo visitation rates.

Table 4. Self-Identified sustainability behaviors, based on content analysis of written responses.

Sustainable Activity	Ways to Participate in Sustainable Activity	Number of Responses
Personal Action	Reduce, Reuse, Recycle	83
	Sustainable shopping (thrifting, reusable bags, etc.)	
	Electricity consumption	
	Water consumption	
Community Action	Plastic consumption	34
	Supporting Local Business	
	Public Litter Clean-Up	
	Community Gardening	
Transportation	Community Compost Centers	17
	Walking more	
	Carpooling	
	Electric cars	
Food Sustainability	Scooters and bikes as alternate means of transportation	10
	Concerns regarding red meat consumption	
	Veganism	
Optimistic; seeks guidance	Vegetarianism	6
	Kind attitude toward nature	
	Not sure how to start being sustainable	
Activism	Thinks they don't have financial resources to be sustainable	6
	Peaceful protests	
	Education Rights	

Most respondents (69%) indicated that they visited zoos for personal purposes, such as family trips. Investigating the correlation between purpose and outcome, it can be noted that the 76% of respondents who believe they act sustainably in their daily lives as adults visited zoos for personal reasons as children. On the other hand, of those who self-assess as

less sustainable in their daily lives only 23% visited the zoo for personal reasons. Instead, these less-sustainable respondents say they mostly visited zoos for educational purposes as children, such as mandatory participation in school field trips.

Of the 136 respondents, 65% believe that visiting zoos has impacted their level of environmental concern. Below are representative examples of respondent affirmative responses to survey question: “Do you believe visiting zoos has impacted your level of environmental concern?”

It has made me realize environmental topics that are occurring across the globe, such as unsustainable resource mining in Africa and other such topics. It has also opened my eyes to urban sustainability issues. (R17)

In more recent zoo visits, I have been exposed to more information about conservation efforts and environmental issues we are facing. (R30)

Based on the data shown, many respondents do not believe that their sustainability behaviors as adults were specifically influenced by zoos because they do not remember learning global sustainability actions at the zoo during their childhood visits. However, as adults, these respondents do recognize the value of global sustainability information that zoos possess.

Those who indicated that they visited the zoo for personal reasons (i.e., not a required school trip) also indicated a higher level of personal sustainability actions. This could indicate that the social connections played a role in influencing future actions. The desire and motivation to learn also has the potential to be affected by peers, family, and learning setting. Learning approach plays a role in sustainability education and cognitive perception, as some students may absorb more information in a formal school setting, while others learn better outdoors or in more hands-on settings [30].

Individuals who indicated that they went to the zoo for personal purposes were more likely to believe that visiting the zoo impacted their levels of environmental concern, specifically due to the presence of educational interactions and information signage at the zoo (Table 5). The data was categorized using summative content analysis [29].

Table 5. Do zoos impact levels of environmental concern?

Response	Description
Yes	Information provided through education materials (signage and classes)
	Zookeeper passion
	Species extinction
	Habitat destruction
	Reduce, reuse, recycle
No	Negative view of zoos as a whole
	Cages are cruel
	Common thought: Zoo habitats use a lot of energy, are they really sustainable?

Indeed, when asked if they believed zoos impacted their overall environmental concern, 65% of respondents indicated “yes”. Environmental concern is generally referred to as an evaluation of a person’s beliefs, attitudes, and behaviors based on facts regarding the environment [24], while environmental sustainability is defined as a condition of interconnectedness which allows humans to satisfy their needs without exceeding the capacity of the ecosystem [25]. Even though individuals who were brought to the zoo for educational reasons tend to rank their sustainability actions at a low level, they still believe that zoos impact environmental concern. A large majority (90%) of survey respondents indicated that they did not participate in zoo education programs as a way to learn sustainability behaviors at zoos. These findings indicate that zoos must assess their education and outreach

techniques to ensure that sustainability information is accessible to the highest possible number of people.

Research done on the cognitive perception capability of children indicates that by age four, children develop the capability to construct simple representative relationships. This increases so that by the age of seven, children can comprehend complex problems. At the age of ten children, can construct categories based on concrete instances [2]. Factors such as the age of the child at the time of initial exposure to the zoo, which are linked to distance from the zoo, cost of tickets, amount of time spent annually at the zoo, may vary among respondents. Motivation to learn might indicate how childhood participation in events (such as going to the zoo) could impact views of global issues.

3.4. Attitudes on Climate Change

In order to better understand the attitudes of respondents and why they partake in the global sustainability activities they listed; respondents were asked the open-ended question: “What is your opinion on climate change?” since personal sustainability actions can have an impact on climate change knowledge and mitigation. In the US, climate change is a key environmental issue that often separates people with more pro-environmental attitudes and behaviors [21]. Furthermore, zoos often act to educate their visitors about climate change and sustainability issues and teach behaviors that are effective in battling global environmental degradation and climate change [21].

An additional question asked participants to rate their overall concern regarding climate change on a 1–10 scale. Answers were analyzed and categorized ranging from denial to extremist (Table 6). Five categories were created based on the contents and tone of responses. For instance, a respondent would fall into the category “Denial” if they stated that global climate change was not real.

Climate Change is a hoax used to give money to companies that will not do anything to help the earth. They only use the money to line their pockets. (R122)

Individuals were categorized as “Not Concerned” if they stated that climate change is a natural phenomenon that should not concern humans.

The climate has always changed. The current fantasy version being batted around is a political rather than scientific construct—and I have actually run the numbers from raw data to confirm this. (R42)

Individuals who claimed they did not have enough scientific background regarding climate change were categorized as “unsure”.

I don't think I know enough about climate change and the science behind to have an informed opinion. (R13)

Comments acknowledging that there is a problem and advocating for more discussion on the topic comprise the “Concerned” category.

I think climate change is a very important topic that we need to discuss more so we can take more action to reduce our environmental impact and slow the current rate of climate change. (R30)

Respondents who realize there is a problem and advocate for finding immediate solutions through action and policy were labeled as “Very Concerned”.

It's our responsibility as a society to take care of the planet we live on, but that can't simply be a burden carried by the working class. As children we're taught that we can do plenty of things like recycling or riding bikes to reduce our carbon footprint, and it's true that we all have a part to play, but we can't successfully fix any of the problems we've created without determined leaders or the proper legislation. Big corporations and fossil fuel companies must be held accountable for their actions if the general public is expected to make any real changes at all. (R130)

Finally, a respondent exemplifies the “Fear” category if their response notes extreme concern and that drastic measures must be taken in order to respond to the climate crisis.

It is very real. It is here now. People will die. I want to move north, possibly to Canada.
(R11)

Written comments in response to open-ended survey questions showed that a majority of respondents (83%) see effects of climate change in their lives as they fall into categories of “concerned, very concerned, and extremist” based summative content analysis that discovered similarities in responses [29].

Table 6. Respondents’ opinions on climate change, discovered through content analysis.

Response Category	Key Points of Response	Number of Responses
Denial	Climate change is fake	1
	“Hoax”	
Not Concerned	Climate change is a natural process	7
	People should not worry	
Unsure	Claim they don’t have enough information	7
	Climate change might not be real	
Concerned	Realize there is a problem	27
	Encourage discussion	
	“Needs to be addressed”	
Very Concerned	Realize there is a problem	51
	Advocate for action and policy	
	“Action plan”	
Fear	Scary problem	7
	Advocate for extreme action	
	Pessimistic view	
	“Moving” or “death”	
Outlier	Inadequate answer	2
	Cannot be categorized	
No Written Response		34

In addition to these descriptive categories, respondents rated their overall concern regarding climate change, on a scale of 1–10, with 1 being “not concerned” and 10 being “very concerned”. A majority of individuals (41%) chose 10 and no respondents indicated one as their response value (Figure 3).

These data were then analyzed to investigate correlations between respondents who rated their concern about climate change very high (8–10) and other characteristics. In the survey, respondents were asked to indicate their gender through the options “male, female, prefer not to answer”. Of the 101 (74%) of respondents who indicated a high level of concern (rating it 8–10) regarding climate change, 72% were female. This matches the overall response rate of 72% female, and further supports previous research on the role that gender plays on environmental thinking and behavior [8,15].

The majority of high level of concern respondents indicated that they visited zoos two to four times per year, and 71% of high level of concern respondents indicated that they visited the zoo for personal reasons. These results verify that individuals who are very concerned about climate change spend time at zoos in a way that positively promotes global learning for that individual.

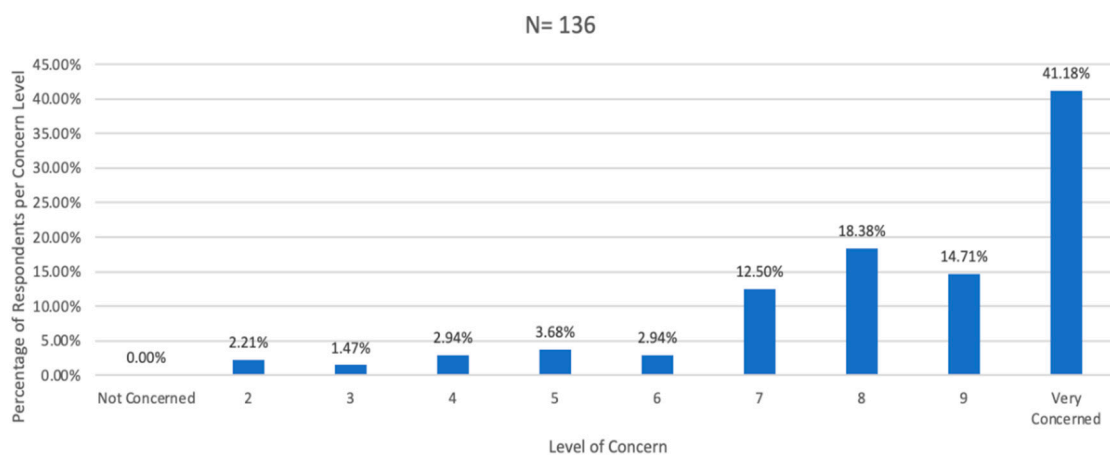


Figure 3. Respondents' level of concern regarding climate change.

Finally, survey respondents were asked to indicate their area of academic study. The responses were then categorized based on whether the field was ecological in nature. Ecological fields of study were defined as those in the S.T.E.M. field—Science, Technology, Engineering, and Mathematics—which all play a part in sustainability education [31]. Of the 74% (101 out of 136) of individuals who indicated they had a high level of concern regarding climate change (8–10), 65% indicated that they had a S.T.E.M. related primary or secondary field of study. This indicates that individuals who show a high level of concern regarding climate change have a high likelihood of incorporating S.T.E.M. into their academic pursuits.

4. Limitations

This study gleaned new data regarding zoos and attitudes towards sustainability action, but several limitations must be acknowledged. The 2020 COVID-19 pandemic halted our planned in-person survey research, and we kept this online questionnaire extremely brief due concern about students feeling online overload (i.e., Zoom fatigue). We opted to have fewer questions in order to encourage a higher number of valid responses. Based on this study, we realize that, in the future, various potential confounding variables could be assessed through additional survey questions (i.e., income, future occupation, average duration of visit to the zoo, group composition). Furthermore, a small population size during the summer semester led to insufficient sample size for inferential statistical analysis. This could be avoided in the future by submitting a Freedom of Information Act request to obtain email addresses for all students in order to send the survey directly to each student, rather than rely on the learning management system that is not consistently used by all students during the summer session. Finally, it should be noted that there is an assumption of bias within the results due to the fact that individuals with prior interest in the subject are more likely to be motivated to participate in the survey. However, despite these limitations, the study provides original research on an innovative topic that can be used as a baseline data in future research.

5. Conclusions

Given the magnitude of global environmental problems that humans must address, local and personal environmental actions must be part of the solution. Likewise, for many people in urban areas, their only experience with nature and diverse species comes from an opportunity to a visit zoo. To assess the innovative topic of the role that local zoos can play in providing globally relevant environmental education, this pilot study evaluated self-assessed sustainability behavior and global climate change attitudes among university students in terms of their childhood zoo visitation. A diverse campus setting led to a variety of responses, indicating that global sustainability attitudes and environmental concerns are present among multiple generations and from students in varying academic fields.

Females self-selected to participate at a higher rate than males in the survey, supporting prior research that females are historically more interested in environmental issues, having higher levels of concern about endangered species and the impacts of global climate change [12]. There is also a relationship between the reasons that individuals visit the zoo and how highly they assess their sustainability actions. Specifically, people who visit a zoo for personal purposes (as opposed to a required school trip) are more likely to participate in individual sustainability actions in daily life. This indicates that learning in an enjoyable zoo setting plays a role in influencing future environmental actions among individuals.

Indeed, learning should be fun and embedded in the zoo visit. Analysis found that 76% of respondents believe they act sustainably in their daily lives, but only 35% of individuals indicated that they learned their sustainable habits at zoos. Yet, 65% of respondents indicated that they believe zoos impact their overall level of environmental concern. This underscores the need for environmental education that is entertaining, practical, and accessible to many people. Furthermore, research suggests that zoo visitors are interested in sustainability topics and zoos are the ideal setting to provide this link between local visitors and global environmental issues. These results also verify that individuals who are very concerned about climate change spend time at zoos in a way that positively promotes global sustainability learning for that individual.

Our research shows that key aspects of local-to-global learning can occur at zoos. Zoos can have a positive influence on climate change education since they allow easy access to nature, opportunities for life-long learning, and practical instruction for handling environmental education challenges [21]. They promote learning by providing a comfortable, fun, low-pressure setting in which to acquire information about the earth and its species, which could be expanded to promote a conservation-minded society. Indeed, zoos already have a broad audience, and they should continue to develop new ways of engaging visitors in order to reinforce and extend global sustainability messages and actions.

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